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[v.04 p.0498] **BRÉQUIGNY, LOUIS GEORGE OUDARD FEUDRIX DE** (*continued from part 2*)

... volumes x.-xiv., the preface to vol. xi. containing important researches into the French communes. To the *Table chronologique des diplômes, chartes, lettres, et actes imprimés concernant l'histoire de France* he contributed three volumes in collaboration with Mouchet (1769-1783). Charged with the supervision of a large collection of documents bearing on French history, analogous to Rymer's *Foedera*, he published the first volume (*Diplomatat. Chartae*, &c., 1791). The Revolution interrupted him in his collection of *Mémoires concernant l'histoire, les sciences, les lettres, et les arts des Chinois*, begun in 1776 at the instance of the minister Bertin, when fifteen volumes had appeared.

See the note on Bréquigny at the end of vol. i. of the *Mémoires de l'Académie des Inscriptions* (1808); the Introduction to vol. iv. of the *Table chronologique des diplômes* (1836); Champollion-Figeac's preface to the *Lettres des rois et reines*; the *Comité des travaux historiques*, by X. Charmes, vol. i. *passim*; N. Oursel, *Nouvelle biographie normande* (1886); and the *Catalogue des manuscrits des collections Duchesne et Bréquigny* (in the Bibliothèque Nationale), by René Poupardin (1905).

(C. B.*)

BRESCIA (anc. *Brixia*), a city and episcopal see of Lombardy, Italy, the capital of the province of Brescia, finely situated at the foot of the Alps, 52 m. E. of Milan and 40 m. W. of Verona by rail. Pop. (1901) town, 42,495; commune, 72,731. The plan of the city is rectangular, and the streets intersect at right angles, a peculiarity handed down from Roman times, though the area enclosed by the medieval walls is larger than that of the Roman town, which occupied the eastern portion of the present one. The Piazza del Museo marks the site of the forum, and the museum on its north side is ensconced in a Corinthian temple with three *cellae*, by some attributed to Hercules, but more probably the Capitolium of the city, erected by Vespasian in A.D. 73 (if the inscription really belongs to the building; cf. Th. Mommsen in *Corp. Inscrip. Lat.* v. No. 4312, Berlin, 1872), and excavated in 1823. It contains a famous bronze statue of Victory, found in 1826. Scanty remains of a building on the south side of the forum, called the *curia*, but which may be a basilica, and of the theatre, on the east of the temple, still exist.

Brescia contains many interesting medieval buildings. The castle, at the north-east angle of the town, commands a fine view. It is now a military prison. The old cathedral is a round domed structure of the 10th (?) century erected over an early Christian basilica, which has forty-two ancient columns; and the Broletto, adjoining the new cathedral (a building of 1604) on the north, is a massive building of the 12th and 13th centuries (the original town hall, now the prefecture and law courts), with a lofty tower. There are also remains of the convent of S. Salvatore, founded by Desiderius, king of Lombardy, including three churches, two of which now contain the fine medieval museum, which possesses good ivories. The church of S. Francesco has a Gothic façade and cloisters. There are also some good Renaissance palaces and other buildings, including the Municipio, begun in 1492 and completed by Jacopo Sansovino in 1554-1574. This is a magnificent structure, with fine ornamentation. The church of S. Maria dei Miracoli (1488-1523) is also noteworthy for its general effect and for the richness of its details, especially of the reliefs on the façade. Many other churches, and the picture gallery (Galleria Martinengo), contain fine works of the painters of the Brescian school, Alessandro Bonvicino (generally known as Moretto), Girolamo Romanino and Moretto's pupil, Giovanni Battista Moroni. The Biblioteca

Queriniana contains early MSS., a 14th-century MS. of Dante, &c., and some rare incunabula. The city is well supplied with water, and has no less than seventy-two public fountains. Brescia has considerable factories of iron ware, particularly fire-arms and weapons (one of the government small arms factories being situated here), also of woollens, linens and silks, matches, candles, &c. The stone quarries of Mazzano, 8 m. east of Brescia, supplied material for the monument to Victor Emmanuel II. and other buildings in Rome. Brescia is situated on the main railway line between Milan and Verona, and has branch railways to Iseo, Parma, Cremona and (via Rovato) to Bergamo, and steam tramways to Mantua, Soncino, Ponte Toscolano and Cardone Valtrompia.

The ancient Celtic Brixia, a town of the Cenomani, became Roman in 225 B.C., when the Cenomani submitted to Rome. Augustus founded a civil (not a military) colony here in 27 B.C., and he and Tiberius constructed an aqueduct to supply it. In 452 it was plundered by Attila, but was the seat of a duchy in the Lombard period. From 1167 it was one of the most active members of the Lombard League. In 1258 it fell into the hands of Eccelino of Verona, and belonged to the Scaligers (della Scala) until 1421, when it came under the Visconti of Milan, and in 1426 under Venice. Early in the 16th century it was one of the wealthiest cities of Lombardy, but has never recovered from its sack by the French under Gaston de Foix in 1512. It belonged to Venice until 1797, when it came under Austrian dominion; it revolted in 1848, and again in 1849, being the only Lombard town to rally to Charles Albert in the latter year, but was taken after ten days' obstinate street fighting by the Austrians under Haynau.

See *Museo Bresciano Illustrato* (Brescia, 1838).

(T. As.)

BRESLAU (Polish *Wraclaw*), a city of Germany, capital of the Prussian province of Silesia, and an episcopal see, situated in a wide and fertile plain on both banks of the navigable Oder, 350 m. from its mouth, at the influx of the Ohle, and 202 m. from Berlin on the railway to Vienna. Pop. (1867) 171,926; (1880) 272,912; (1885) 299,640; (1890) 335,186; (1905) 470,751, about 60% being Protestants, 35% Roman Catholics and nearly 5% Jews. The Oder, which here breaks into several arms, divides the city into two unequal halves, crossed by numerous bridges. The larger portion, on the left bank, includes the old or inner town, surrounded by beautiful promenades, on the site of the ramparts, dismantled after 1813, from an eminence within which, the Liebichs Höhe, a fine view is obtained of the surrounding country. Outside, as well as across the Oder, lies the new town with extensive suburbs, containing, especially in the Schweidnitz quarter in the south, and the Oder quarter in the north, many handsome streets and spacious squares. The inner town, in contrast to the suburbs, still retains with its narrow streets much of its ancient characters, and contains several medieval buildings, both religious and secular, of great beauty and interest. The cathedral, dedicated to St John the Baptist, was begun in 1148 and completed at the close of the 15th century, enlarged in the 17th and 18th centuries, and restored between 1873 and 1875; it is rich in notable treasures, especially the high altar of beaten silver, and in beautiful paintings and sculptures. The Kreuzkirche (church of the Holy Cross), dating from the 13th and 14th centuries, is an interesting brick building, remarkable for its stained glass and its historical monuments, among which is the tomb of Henry IV., duke of Silesia. The Sandkirche, so called from its dedication to Our Lady on the Sand, dates from the 14th century, and was until 1810 the church of the Augustinian canons. The Dorotheenor Minoritenkirche, remarkable for its high-pitched roof, was founded by the emperor Charles IV. in 1351. These are the most notable of the Roman Catholic churches. Of the Evangelical churches the most important is that of St Elizabeth, founded about 1250, rebuilt in the 14th and 15th centuries, and restored in 1857. Its lofty tower contains the largest bell in Silesia, and the church possesses a celebrated organ, fine stained glass, a magnificent stone pyx (erected in 1455) over 52 ft. high, and portraits of Luther and Melanchthon by Lucas Cranach. The church of St Mary Magdalen, built in the 14th century on the model of the cathedral, has two lofty Gothic towers connected by a bridge, and is interesting as having been the church in which, in 1523, the reformation in Silesia was first proclaimed. Other noteworthy ecclesiastical buildings are the graceful Gothic church of St Michael built in 1871, the bishop's palace and the Jewish synagogue, the finest in Germany after that in Berlin.

The business streets of the city converge upon the Ring, the market square, in which is the town-hall, a fine Gothic building, begun in the middle of the 14th and completed in the 16th century. Within is the Fürstensaal, in which the diets of Silesia were formerly held, while beneath is the famous Schweidnitzer Keller, used continuously since 1355 as a beer and wine house. The university, a spacious Gothic building facing the Oder, is a striking edifice. It was built (1728-1736) as a college by the Jesuits, on the site of the former imperial castle presented to them by the emperor Leopold I., and contains a magnificent hall (Aula Leopoldina), richly ornamented with frescoes and capable of holding 1200 persons. Breslau possesses a large number of other important public buildings: the Stadthaus (civic hall), the royal palace, the government offices (a handsome pile erected in 1887), the provincial House of Assembly, the municipal archives, the courts of law, the Silesian museum of arts and crafts and antiquities, stored in the former assembly hall of the estates (Ständehaus), which was rebuilt for the purpose, the museum of fine arts, the exchange, the Stadt and Lobe theatres, the post office and central railway station. There are also numerous hospitals and schools. Breslau is exceedingly rich in fine monuments; the most noteworthy being the equestrian statues of Frederick the Great and Frederick William III., both by Kiss; the statue of Blücher by Rauch; a marble statue of General Tauentzien by Langhans and Schadow; a bronze statue of Karl Gottlieb Svarez (1746-1798), the Prussian jurist, a monument to

Schleiermacher, born here in 1768, and statues of the emperor William I., Bismarck and Moltke. There are also several handsome fountains. Foremost among the educational establishments stands the university, founded in 1702 by the emperor Leopold I. as a Jesuit college, and greatly extended by the incorporation of the university of Frankfort-on-Oder in 1811. Its library contains 306,000 volumes and 4000 MSS., and has in the so-called *Bibliotheca Habichtiana* a valuable collection of oriental literature. Among its auxiliary establishments are botanical gardens, an observatory, and anatomical, physiological and kindred institutions. There are eight classical and four modern schools, two higher girls' schools, a Roman Catholic normal school, a Jewish theological seminary, a school of arts and crafts, and numerous literary and charitable foundations. It is, however, as a commercial and industrial city that Breslau is most widely known. Its situation, close to the extensive coal and iron fields of Upper Silesia, in proximity to the Austrian and Russian frontiers, at the centre of a network of railways directly communicating both with these countries and with the chief towns of northern and central Germany, and on a deep waterway connecting with the Elbe and the Vistula, facilitates its very considerable transit and export trade in the products of the province and of the neighbouring countries. These embrace coal, sugar, cereals, spirits, petroleum and timber. The local industries comprise machinery and tools, railway and tramway carriages, furniture, cast-iron goods, gold and silver work, carpets, furs, cloth and cottons, paper, musical instruments, glass and china. Breslau is the headquarters of the VI. German army corps and contains a large garrison of troops of all arms.

History.—Breslau (Lat. *Vratislavia*) is first mentioned by the chronicler Thietmar, bishop of Merseburg, in A.D. 1000, and was probably founded some years before this date. Early in the 11th century it was made the seat of a bishop, and after having formed part of Poland, became the capital of an independent duchy in 1163. Destroyed by the Mongols in 1241, it soon recovered its former prosperity and received a large influx of German colonists. The bishop obtained the title of a prince of the Empire in 1290.[1] When Henry VI., the last duke of Breslau, died in 1335, the city came by purchase to John, king of Bohemia, whose successors retained it until about 1460. The Bohemian kings bestowed various privileges on Breslau, which soon began to extend its commerce in all directions, while owing to increasing wealth the citizens took up a more independent attitude. Disliking the Hussites, Breslau placed itself under the protection of Pope Pius II. in 1463, and a few years afterwards came under the rule of the Hungarian king, Matthias Corvinus. After his death in 1490 it again became subject to Bohemia, passing with the rest of Silesia to the Habsburgs when in 1526 Ferdinand, afterwards emperor, was chosen king of Bohemia. Having passed almost undisturbed through the periods of the Reformation and the Thirty Years' War, Breslau was compelled to own the authority of Frederick the Great in 1741. It was, however, recovered by the Austrians in 1757, but was regained by Frederick after his victory at Leuthen in the same year, and has since belonged to Prussia, although it was held for a few days by the French in 1807 after the battle of Jena, and again in 1813 after the battle of Bautzen. The sites of the fortifications, dismantled by the French in 1807, were given to the civic authorities by King Frederick William III., and converted into promenades. In March 1813 this monarch issued from Breslau his stirring appeals to the Prussians, *An mein Volk* and *An mein Kriegesheer*, and the city was the centre of the Prussian preparations for the campaign which ended at Leipzig. After the Prussian victory at Sadowa in 1866, William I. made a triumphant and complimentary entry into the city, which since the days of Frederick the Great has been only less loyal to the royal house than Berlin itself.

See Bürkner and Stein, *Geschichte der Stadt Breslau* (Bresl. 1851-1853); J-Stein, *Geschichte der Stadt Breslau im 19ten Jahrhundert* (1884); O Frenzel, *Breslauer Stadtbuch* ("Codex dipl. Silisiae," vol. ii. 1882); Luchs, *Breslau, ein Führer durch die Stadt* (12th ed., Bresl. 1904).

[1] In 1195 Jaroslaw, son of Boleslaus I. of Lower Silesia, who became bishop of Breslau in 1198, inherited the duchy of Neisse, which at his death (1201) he bequeathed to his successors in the see. The Austrian part of Neisse still belongs to the bishop of Breslau, who also still bears the title of prince bishop.

BRESSANT, JEAN BAPTISTE PROSPER (1815-1886), French actor, was born at Chalon-sur-Saône on the 23rd of October 1815, and began his stage career at the Variétés in Paris in 1833. In 1838 he went to the French theatre at St Petersburg, where for eight years he played important parts with ever-increasing reputation. His success was confirmed at the Gymnase when he returned to Paris in 1846, and he made his *début* at the Comédie Française as a full-fledged *sociétaire* in 1854. From playing the ardent young lover, he turned to leading rôles both in modern plays and in the classical répertoire. His Richelieu in *Mlle de Belle-Isle*, his Octave in Alfred de Musset's *Les Caprices de Marianne*, and his appearance in de Musset's *Il faut qu'une porte soit ouverte ou fermée* and *Un caprice* were followed by *Tartuffe*, *Le Misanthrope* and *Don Juan*. Bressant retired in 1875, and died on the 23rd of January 1886. During his professorship at the Conservatoire, Mounet-Sully was one of his pupils.

BRESSE, a district of eastern France embracing portions of the departments of Ain, Saône-et-Loire and Jura. The Bresse extends from the Dombes on the south to the river Doubs on the north, and from the Saône eastwards to the Jura, measuring some 60 m. in the former, and 20 m. in the latter direction. It is a plain varying from 600 to 800 ft. above the sea, with few eminences and a slight inclination westwards. Heaths and coppice alternate with pastures and arable land; pools and marshes are numerous, especially in the north. Its chief rivers are the Veyle, the Reyssouze and the Seille, all tributaries of the Saône. The soil is a gravelly clay but moderately fertile, and cattle-raising is largely carried on. The region is, however, more especially celebrated for its table poultry. The inhabitants preserve a distinctive but almost obsolete costume, with a

curious head-dress. The Bresse proper, called the *Bresse Bressane*, comprises the northern portion of the department of Ain. The greater part of the district belonged in the middle ages to the lords of Bâgé, from whom it passed in 1272 to the house of Savoy. It was not till the first half of the 15th century that the province, with Bourg as its capital, was founded as such. In 1601 it was ceded to France by the treaty of Lyons, after which it formed (together with the province of Bugey) first a separate government and afterwards part of the government of Burgundy.

BRESSUIRE, a town of western France, capital of an arrondissement in the department of Deux-Sèvres, 48 m. N. of Niort by rail. Pop. (1906) 4561. The town is situated on an eminence overlooking the Dolo, a tributary of the Argenton. It is the centre of a cattle-rearing and agricultural region, and has important markets; the manufacture of wooden type and woollen goods is carried on. Bressuire has two buildings of interest: the church of Notre-Dame, which, dating chiefly from the 12th and 15th centuries, has an imposing tower of the Renaissance
[v.04 p.0500] period; and the castle, built by the lords of Beaumont, vassals of the viscount of Thouars. The latter is now in ruins, and a portion of the site is occupied by a modern château, but an inner and outer line of fortifications are still to be seen. The whole forms the finest assemblage of feudal ruins in Poitou. Bressuire is the seat of a sub-prefect and has a tribunal of first instance. Among the disasters suffered at various times by the town, its capture from the English and subsequent pillage by French troops under du Guesclin in 1370 is the most memorable.

BREST, a fortified seaport of western France, capital of an arrondissement in the department of Finistère, 155 m. W.N.W. of Rennes by rail. Population (1906) town, 71,163; commune, 85,294. It is situated to the north of a magnificent landlocked bay, and occupies the slopes of two hills divided by the river Penfeld,—the part of the town on the left bank being regarded as Brest proper, while the part on the right is known as Recouvrance. There are also extensive suburbs to the east of the town. The hill-sides are in some places so steep that the ascent from the lower to the upper town has to be effected by flights of steps and the second or third storey of one house is often on a level with the ground storey of the next. The chief street of Brest bears the name of rue de Siam, in honour of the Siamese embassy sent to Louis XIV., and terminates at the remarkable swing-bridge, constructed in 1861, which crosses the mouth of the Penfeld. Running along the shore to the south of the town is the Cours d'Ajot, one of the finest promenades of its kind in France, named after the engineer who constructed it. It is planted with trees and adorned with marble statues of Neptune and Abundance by Antoine Coysevox. The castle with its donjon and seven towers (12th to the 16th centuries), commanding the entrance to the river, is the only interesting building in the town. Brest is the capital of one of the five naval arrondissements of France. The naval port, which is in great part excavated in the rock, extends along both banks of the Penfeld; it comprises gun-foundries and workshops, magazines, shipbuilding yards and repairing docks, and employs about 7000 workmen. There are also large naval barracks, training ships and naval schools of various kinds, and an important naval hospital. Brest is the seat of a sub-prefect and has tribunals of first instance and of commerce, a chamber of commerce, a board of trade-arbitrators, two naval tribunals, and a tribunal of maritime commerce. There are also lycées for boys and girls and a school of commerce and industry. The commercial port, which is separated from the town itself by the Cours d'Ajot, comprises a tidal port with docks and an outer harbour; it is protected by jetties to the east and west and by a breakwater on the south. In 1905 the number of vessels entered was 202 with a tonnage of 67,755, and cleared 160 with a tonnage of 61,012. The total value of the imports in 1905 was £244,000. The chief were wine, coal, timber, mineral tar, fertilizers and lobsters and crayfish. Exports, of which the chief were wheat-flour, fruit and superphosphates, were valued at £40,000. Besides its sardine and mackerel fishing industry, the town has flour-mills, breweries, foundries, forges, engineering works, and manufactures of blocks, candles, chemicals (from sea-weed), boots, shoes and linen. Brest communicates by submarine cable with America and French West Africa. The roadstead consists of a deep indentation with a maximum length of 14 m. and an average width of 4 m., the mouth being barred by the peninsula of Quélern, leaving a passage from 1 to 2 m. broad, known as the Goulet. The outline of the bay is broken by numerous smaller bays or arms, formed by the embouchures of streams, the most important being the Anse de Quélern, the Anse de Poulmie, and the mouths of the Châteaulin and the Landerneau. Brest is a fortress of the first class. The fortifications of the town and the harbour fall into four groups: (1) the very numerous forts and batteries guarding the approaches to and the channel of the Goulet; (2) the batteries and forts directed upon the roads; (3) a group of works preventing access to the peninsula of Quélern and commanding the ground to the south of the peninsula from which many of the works of group (2) could be taken in reverse; (4) the defences of Brest itself, consisting of an old-fashioned *enceinte* possessing little military value and a chain of detached forts to the west of the town.

Nothing definite is known of Brest till about 1240, when it was ceded by a count of Léon to John I., duke of Brittany. In 1342 John of Montfort gave it up to the English, and it did not finally leave their hands till 1397. Its medieval importance was great enough to give rise to the saying, "He is not duke of Brittany who is not lord of Brest." By the marriage of Francis I. with Claude, daughter of Anne of Brittany, Brest with the rest of the duchy definitely passed to the French crown. The advantages of the situation for a seaport town were first recognized by Richelieu, who in 1631 constructed a harbour with wooden wharves, which soon became a station of the French navy. Colbert changed the wooden wharves for masonry and otherwise improved the post, and Vauban's fortifications followed in 1680-1688. During the 18th century the fortifications and the naval importance of the town continued to develop. In 1694 an English squadron under John, 3rd Lord Berkeley, was miserably defeated in attempting a landing; but in 1794, during the revolutionary war, the French fleet, under Villaret de Joyeuse, was as thoroughly beaten in the same place by the English admiral Howe.

BREST-LITOVSK (Polish *Brzesc-Litevski*; and in the Chron. *Berestie* and *Berestov*), a strongly fortified town of Russia, in the government of Grodno, 137 m. by rail S. from the city of Grodno, in 52° 5′ N. lat. and 23° 39′ E. long., at the junction of the navigable river Mukhovets with the Bug, and at the intersection of railways from Warsaw, Kiev, Moscow and East Prussia. Pop. (1867) 22,493; (1901) 42,812, of whom more than one-half were Jews. It contains a Jewish synagogue, which was regarded in the 16th century as the first in Europe, and is the seat of an Armenian and of a Greek Catholic bishop; the former has authority over the Armenians throughout the whole country. The town carries on an extensive trade in grain, flax, hemp, wood, tar and leather. First mentioned in the beginning of the 11th century, Brest-Litovsk was in 1241 laid waste by the Mongols and was not rebuilt till 1275; its suburbs were burned by the Teutonic Knights in 1379; and in the end of the 15th century the whole town met a similar fate at the hands of the khan of the Crimea. In the reign of the Polish king Sigismund III. diets were held there; and in 1594 and 1596 it was the meeting-place of two remarkable councils of the bishops of western Russia. In 1657, and again in 1706, the town was captured by the Swedes; in 1794 it was the scene of Suvarov's victory over the Polish general Sierakowski; in 1795 it was added to the Russian empire. The Brest-Litovsk or King's canal (50 m. long), utilizing the Mukhovets-Bug rivers, forms a link in the waterways that connect the Dnieper with the Vistula.

BRETEUIL, LOUIS CHARLES AUGUSTE LE TONNELIER, Baron de (1730-1807), French diplomatist, was born at the chateau of Azay-le-Féron (Indre) on the 7th of March 1730. He was only twenty-eight when he was appointed by Louis XV. ambassador to the elector of Cologne, and two years later he was sent to St Petersburg. He arranged to be temporarily absent from his post at the time of the palace revolution by which Catherine II. was placed on the throne. In 1769 he was sent to Stockholm, and subsequently represented his government at Vienna, Naples, and again at Vienna until 1783, when he was recalled to become minister of the king's household. In this capacity he introduced considerable reforms in prison administration. A close friend of Marie Antoinette, he presently came into collision with Calonne, who demanded his dismissal in 1787. His influence with the king and queen, especially with the latter, remained unshaken, and on Necker's dismissal on the 11th of July 1789, Breteuil succeeded him as chief minister. The fall of the Bastille three days later put an end to the new ministry, and Breteuil made his way to Switzerland with the first party of *émigrés*. At Soleure, in November 1790, he received from Louis XVI. exclusive powers to negotiate with the European courts, and in his efforts to check the ill-advised diplomacy of the *émigré* princes, he soon brought himself into opposition with his old rival Calonne, who held a chief place in their councils. After the failure of the flight to Varennes, in the arrangement of which he had a share, Breteuil received instructions from Louis XVI., designed to restore amicable relations with the princes. His distrust of the king's brothers and his defence of Louis XVI.'s prerogative were to some extent justified, but his intransigeant attitude towards these princes emphasized the dissensions of the royal family in the eyes of foreign sovereigns, who looked on the comte de Provence as the natural representative of his brother and found a pretext for non-interference on Louis's behalf in the contradictory statements of the negotiators. Breteuil himself was the object of violent attacks from the party of the princes, who asserted that he persisted in exercising powers which had been revoked by Louis XVI. After the execution of Marie Antoinette he retired into private life near Hamburg, only returning to France in 1802. He died in Paris on the 2nd of November 1807.

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See the memoirs of Bertrand de Molleville (2 vols., Paris, 1816) and of the marquis de Bouillé (2 vols., Paris, 1884); and E. Daudet, *Coblentz, 1789-1793* (1889), forming part of his *Hist. de l'émigration.*

BRÉTIGNY, a French town (dept. Eure-et-Loir, arrondissement and canton of Chartres, commune of Sours), which gave its name to a celebrated treaty concluded there on the 8th of May 1360, between Edward III. of England and John II., surnamed the Good, of France. The exactions of the English, who wished to yield as few as possible of the advantages claimed by them in the treaty of London, made negotiations difficult, and the discussion of terms begun early in April lasted more than a month. By virtue of this treaty Edward III. obtained, besides Guienne and Gascony, Poitou, Saintonge and Aunis, Agenais, Périgord, Limousin, Quercy, Bigorre, the countship of Gaure, Angoumois, Rouergue, Montreuil-sur-mer, Ponthieu, Calais, Sangatte, Ham and the countship of Guines. John II. had, moreover, to pay three millions of gold crowns for his ransom. On his side the king of England gave up the duchies of Normandy and Touraine, the countships of Anjou and Maine, and the suzerainty of Brittany and of Flanders. As a guarantee for the payment of his ransom, John the Good gave as hostages two of his sons, several princes and nobles, four inhabitants of Paris, and two citizens from each of the nineteen principal towns of France. This treaty was ratified and sworn to by the two kings and by their eldest sons on the 24th of October 1360, at Calais. At the same time were signed the special conditions relating to each important article of the treaty, and the renunciatory clauses in which the kings abandoned their rights over the territory they had yielded to one another.

See Rymer's *Foedera*, vol. iii; Dumont, *Corps diplomatique*, vol. ii.; Froissart, ed. Luce, vol. vi.; *Les Grandes Chroniques de France*, ed. P. Paris, vol. vi.; E. Cosneau, *Les Grands Traités de la guerre de cent ans* (1889).

BRETON, JULES ADOLPHE AIMÉ LOUIS (1827-), French painter, was born on the 1st of May 1827, at Courrières, Pas de Calais, France. His artistic gifts being manifest at an early age, he was sent in 1843 to Ghent, to study under the historical painter de Vigne, and in 1846 to Baron Wappers at Antwerp. Finally he worked in Paris under Drolling. His first efforts were in historical subjects: "Saint Piat preaching in Gaul"; then, under the influence of the revolution of 1848, he

represented "Misery and Despair." But Breton soon discovered that he was not born to be a historical painter, and he returned to the memories of nature and of the country which were impressed on him in early youth. In 1853 he exhibited the "Return of the Harvesters" at the Paris Salon, and the "Little Gleaner" at Brussels. Thenceforward he was essentially a painter of rustic life, especially in the province of Artois, which he quitted only three times for short excursions: in 1864 to Provence, and in 1865 and 1873 to Brittany, whence he derived some of his happiest studies of religious scenes. His numerous subjects may be divided generally into four classes: labour, rest, rural festivals and religious festivals. Among his more important works may be named "Women Gleaning," and "The Day after St Sebastian's Day" (1855), which gained him a third-class medal; "Blessing the Fields" (1857), a second-class medal; "Erecting a Calvary" (1859), now in the Lille gallery; "The Return of the Gleaners" (1859), now in the Luxembourg; "Evening" and "Women Weeding" (1861), a first-class medal; "Grandfather's Birthday" (1862); "The Close of Day" (1865); "Harvest" (1867); "Potato Gatherers" (1868); "A Pardon, Brittany" (1869); "The Fountain" (1872), medal of honour; "The Bonfires of St John" (1875); "Women mending Nets" (1876), in the Douai museum; "A Gleaner" (1877), Luxembourg; "Evening, Finistère" (1881); "The Song of the Lark" (1884); "The Last Sunbeam" (1885); "The Shepherd's Star" (1888); "The Call Home" (1889); "The Last Gleanings" (1895); "Gathering Poppies" (1897); "The Alarm Cry" (1899); "Twilight Glory" (1900). Breton was elected to the Institut in 1886 on the death of Baudry. In 1889 he was made commander of the Legion of Honour, and in 1899 foreign member of the Royal Academy of London. He also wrote several books, among them *Les Champs et la mer* (1876), *Nos peintres du siècle* (1900), "Jeanne," a poem, *Delphine Bernard* (1902), and *La Peinture* (1904).

See Jules Breton, *Vie d'un artiste, art et nature* (autobiographical), (Paris, 1890); Marius Vachon, *Jules Breton* (1899).

BRETON, BRITTON or BRITTAINE, NICHOLAS (1545?-1626), English poet, belonged to an old family settled at Layer-Breton, Essex. His father, William Breton, who had made a considerable fortune by trade, died in 1559, and the widow (née Elizabeth Bacon) married the poet George Gascoigne before her sons had attained their majority. Nicholas Breton was probably born at the "capitall mansion house" in Red Cross Street, in the parish of St Giles without Cripplegate, mentioned in his father's will. There is no official record of his residence at the university, but the diary of the Rev. Richard Madox tells us that he was at Antwerp in 1583 and was "once of Oriel College." He married Ann Sutton in 1593, and had a family. He is supposed to have died shortly after the publication of his last work, *Fantastickes* (1626). Breton found a patron in Mary, countess of Pembroke, and wrote much in her honour until 1601, when she seems to have withdrawn her favour. It is probably safe to supplement the meagre record of his life by accepting as autobiographical some of the letters signed N.B. in *A Poste with a Packet of Mad Letters* (1603, enlarged 1637); the 19th letter of the second part contains a general complaint of many griefs, and proceeds as follows: "hath another been wounded in the warres, fared hard, lain in a cold bed many a bitter storme, and beene at many a hard banquet? all these have I; another imprisoned? so have I; another long been sicke? so have I; another plagued with an unquiet life? so have I; another indebted to his hearts griefe, and fame would pay and cannot? so am I." Breton was a facile writer, popular with his contemporaries, and forgotten by the next generation. His work consists of religious and pastoral poems, satires, and a number of miscellaneous prose tracts. His religious poems are sometimes wearisome by their excess of fluency and sweetness, but they are evidently the expression of a devout and earnest mind. His praise of the Virgin and his references to Mary Magdalene have suggested that he was a Catholic, but his prose writings abundantly prove that he was an ardent Protestant. Breton had little gift for satire, and his best work is to be found in his pastoral poetry. His *Passionate Shepheard* (1604) is full of sunshine and fresh air, and of unaffected gaiety. The third pastoral in this book—"Who can live in heart so glad As the merrie country lad"—is well known; with some other of Breton's daintiest poems, among them the lullaby, "Come little babe, come silly soule,"[1] —it is incorporated in A.H. Bullen's *Lyrics from Elizabethan Romances* (1890). His keen observation of country life appears also in his prose idyll, *Wits Trenchmour*, "a conference betwixt a scholler and an angler," and in his *Fantastickes*, a series of short prose pictures of the months, the Christian festivals and the hours, which throw much light on the customs of the times. Most of Breton's books are very rare and have great bibliographical value. His works, with the exception of some belonging to private owners, were collected by Dr A.B. Grosart in the *Chertsey Worthies Library* in 1879, with an elaborate introduction quoting the documents for the poet's history.

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Breton's poetical works, the titles of which are here somewhat abbreviated, include *The Workes of a Young Wit* (1577); *A Floorish upon Fancie* (1577); *The Pilgrimage to Paradise* (1592); *The Countess of Penbrook's Passion* (MS.), first printed by J.O. Halliwell Phillipps in 1853; *Pasquil's Fooles cappe*, entered at Stationers' Hall in 1600; *Pasquil's Mistresse* (1600); *Pasquil's Passe and Passeth Not* (1600); *Melancholike Humours* (1600); *Marie Magdalen's Love: a Solemne Passion of the Soules Love* (1595), the first part of which, a prose treatise, is probably by another hand; the second part, a poem in six-lined stanza, is certainly by Breton; *A Divine Poem*, including "The Ravisht Soul" and "The Blessed Weeper" (1601); *An Excellent Poem, upon the Longing of a Blessed Heart* (1601); *The Soules Heavenly Exercise* (1601); *The Soules Harmony* (1602); *Olde Madcappe newe Gaily mawfrey* (1602); *The Mother's Blessing* (1602); *A True Description of Unthankfulnesse* (1602); *The Passionate Shepheard* (1604); *The Soules Immortall Crowne* (1605); *The Honour of Valour* (1605); *An Invective against Treason; I would and I would not* (1614); *Bryton's Bowre of Delights* (1591), edited by Dr Grosart in 1893, an unauthorized publication

which contained some poems disclaimed by Breton; *The Arbor of Amorous Devises* (entered at Stationers' Hall, 1594), only in part Breton's; and contributions to *England's Helicon* and other miscellanies of verse. Of his twenty-two prose tracts may be mentioned *Wit's Trenchmour* (1597), *The Wil of Wit* (1599), *A Poste with a Packet of Mad Letters* (1603). *Sir Philip Sidney's Ourania by N.B.* (1606); *Mary Magdalen's Lamentations* (1604), and *The Passion of a Discontented Mind* (1601), are sometimes, but erroneously, ascribed to Breton.

[1] This poem, however, comes from *The Arbor of Amorous Devises*, which is only in part Breton's work.

BRETÓN DE LOS HERREROS, MANUEL (1796-1873), Spanish dramatist, was born at Quel (Logroño) on the 19th of December 1796 and was educated at Madrid. Enlisting on the 24th of May 1812, he served against the French in Valencia and Catalonia, and retired with the rank of corporal on the 8th of March 1822. He obtained a minor post in the civil service under the liberal government, and on his discharge determined to earn his living by writing for the stage. His first piece, *Á la vejez viruelas*, was produced on the 14th of October 1824, and proved the writer to be the legitimate successor of the younger Moratin. His industry was astonishing: between October 1824 and November 1828, he composed thirty-nine plays, six of them original, the rest being translations or recasts of classic masterpieces. In 1831 he published a translation of Tibullus, and acquired by it an unmerited reputation for scholarship which secured for him an appointment as sub-librarian at the national library. But the theatre claimed him for its own, and with the exception of *Elena* and a few other pieces in the fashionable romantic vein, his plays were a long series of successes. His only serious check occurred in 1840; the former liberal had grown conservative with age, and in *La Ponchada* he ridiculed the National Guard. He was dismissed from the national library, and for a short time was so unpopular that he seriously thought of emigrating to America; but the storm blew over, and within two years Bretón de los Herreros had regained his supremacy on the stage. He became secretary to the Spanish Academy, quarrelled with his fellow-members, and died at Madrid on the 8th of November 1873. He is the author of some three hundred and sixty original plays, twenty-three of which are in prose. No Spanish dramatist of the nineteenth century approaches him in comic power, in festive invention, and in the humorous presentation of character, while his metrical dexterity is unique. *Marcela o a cual de los trés?* (1831), *Muérete; y verás!* (1837) and *La Escuela del matrimonio* (1852) still hold the stage, and are likely to hold it so long as Spanish is spoken.

See Marqués de Molíns, *Bretón de los Herreros, recuerdos de su vida y de sus obras* (Madrid, 1883); *Obras de Bretón de Herreros* (5 vols., Madrid, 1883); E. Piñeyro, *El Romanticismo en España* (Paris, 1904).

(J. F.-K.)

BRETSCHNEIDER, KARL GOTTLIEB (1776-1848), German scholar and theologian, was born at Gersdorf in Saxony. In 1794 he entered the university of Leipzig, where he studied theology for four years. After some years of hesitation he resolved to be ordained, and in 1802 he passed with great distinction the examination for *candidatus theologiae*, and attracted the regard of F.V. Reinhard, author of the *System der christlichen Moral* (1788-1815), then court-preacher at Dresden, who became his warm friend and patron during the remainder of his life. In 1804-1806 Bretschneider was *Privat-docent* at the university of Wittenberg, where he lectured on philosophy and theology. During this time he wrote his work on the development of dogma, *Systematische Entwickelung aller in der Dogmatik vorkommenden Begriffe nach den symbolischen Schriften der evangelisch-lutherischen und reformirten Kirche* (1805, 4th ed. 1841), which was followed by others, including an edition of Ecclesiasticus with a Latin commentary. On the advance of the French army under Napoleon into Prussia, he determined to leave Wittenberg and abandon his university career. Through the good offices of Reinhard, he became pastor of Schneeberg in Saxony (1807). In 1808 he was promoted to the office of superintendent of the church of Annaberg, in which capacity he had to decide, in accordance with the canon law of Saxony, many matters belonging to the department of ecclesiastical law. But the climate did not agree with him, and his official duties interfered with his theological studies. With a view to a change he took the degree of doctor of theology in Wittenberg in August 1812. In 1816 he was appointed general superintendent at Gotha, where he remained until his death in 1848. This was the great period of his literary activity.

In 1820 was published his treatise on the gospel of St John, entitled *Probabilia de Evangelii el Epistolarum Joannis Apostoli indole et origine*, which attracted much attention. In it he collected with great fulness and discussed with marked moderation the arguments against Johannine authorship. This called forth a number of replies. To the astonishment of every one, Bretschneider announced in the preface to the second edition of his *Dogmatik* in 1822, that he had never doubted the authenticity of the gospel, and had published his *Probabilia* only to draw attention to the subject, and to call forth a more complete defence of its genuineness. Bretschneider remarks in his autobiography that the publication of this work had the effect of preventing his appointment as successor to Karl C. Tittmann in Dresden, the minister Detlev von Einsiedel (1773-1861) denouncing him as the "slanderer of John" (*Johannisschänder*). His greatest contribution to the science of exegesis was his *Lexicon Manuale Graeco-Latinum in libros Novi Testamenti* (1824, 3rd ed. 1840). This work was valuable for the use which its author made of the Greek of the Septuagint, of the Old and New Testament Apocrypha, of Josephus, and of the apostolic fathers, in illustration of the language of the New Testament. In 1826 he published *Apologie der neuern Theologie des evangelischen Deutschlands*. Hugh James Rose had published in England (1825) a volume of sermons on the rationalist movement (*The State of the*

Protestant Religion in Germany), in which he classed Bretschneider with the rationalists; and Bretschneider contended that he himself was not a rationalist in the ordinary sense of the term, but a "rational supernaturalist." Some of his numerous dogmatic writings passed through several editions. An English translation of his *Manual of the Religion and History of the Christian Church* appeared in 1857. His dogmatic position seems to be intermediate between the extreme school of naturalists, such as Heinrich Paulus, J.F. Röhr and Julius Wegscheider on the one hand, and D.F. Strauss and F.C. Baur on the other. Recognizing a supernatural element in the Bible, he nevertheless allowed to the full the critical exercise of reason in the interpretation of its dogmas (cp. Otto Pfleiderer, *Development of Theology*, pp. 89 ff.).

See his autobiography, *Aus meinem Leben: Selbstbiographie von K.G. Bretschneider* (Gotha, 1851), of which a translation, with notes, by Professor George E. Day, appeared in the *Bibliotheca Sacra and American Biblical Repository*, Nos. 36 and 38 (1852, 1853); Neudecker in *Die allgemeine Kirchenzeitung* (1848), No. 38; Wüstemann, *Bretschneideri Memoria* (1848); A.G. Farrar, *Critical History of Free Thought* (Bampton Lectures, 1862); Herzog-Hauck, *Realencyklopädie* (ed. 1897).

BRETTEN, a town of Germany, in the grand duchy of Baden, on the Saalbach, 9 m. S.E. of Bruchsal by rail. Pop. (1900) 4781. It has some manufactories of machinery and japanned goods, and a considerable trade in timber and livestock. Bretten was the birthplace of Melanchthon
[v.04 p.0503] (1497), and in addition to a statue of him by Drake, a memorial hall, containing a collection of his writings and busts and pictures of his famous contemporaries, has been erected.

BRETWALDA, a word used in the *Anglo-Saxon Chronicle* under the date 827, and also in a charter of Æthelstan, king of the English. It appears in several variant forms (*brytenwalda*, *bretenanwealda*, &c.), and means most probably "lord of the Britons" or "lord of Britain"; for although the derivation of the word is uncertain, its earlier syllable seems to be cognate with the words Briton and Britannia. In the *Chronicle* the title is given to Ecgbert, king of the English, "the eighth king that was Bretwalda," and retrospectively to seven kings who ruled over one or other of the English kingdoms. The seven names are copied from Bede's *Historia Ecclesiastica*, and it is interesting to note that the last king named, Oswiu of Northumbria, lived 150 years before Ecgbert. It has been assumed that these seven kings exercised a certain superiority over a large part of England, but if such superiority existed it is certain that it was extremely vague and was unaccompanied by any unity of organization. Another theory is that Bretwalda refers to a war-leadership, or *imperium*, over the English south of the Humber, and has nothing to do with Britons or Britannia. In support of this explanation it is urged that the title is given in the *Chronicle* to Ecgbert in the year in which he "conquered the kingdom of the Mercians and all that was south of the Humber." Less likely is the theory of Palgrave that the Bretwaldas were the successors of the pseudo-emperors, Maximus and Carausius, and claimed to share the imperial dignity of Rome; or that of Kemble, who derives Bretwalda from the British word *breotan*, to distribute, and translates it "widely ruling." With regard to Ecgbert the word is doubtless given as a title in imitation of its earlier use, and the same remark applies to its use in Æthelstan's charter.

See E.A. Freeman, *History of the Norman Conquest*, vol. i. (Oxford, 1877); W. Stubbs, *Constitutional History*, vol. i. (Oxford, 1897); J.R. Green, *The Making of England*, vol. ii. (London, 1897); F. Palgrave, *The Rise and Progress of the English Commonwealth* (London, 1832); J. M. Kemble, *The Saxons in England* (London, 1876); J. Rhys, *Celtic Britain* (London, 1884).

BREUGHEL (or BRUEGHEL), **PIETER,** Flemish painter, was the son of a peasant residing in the village of Breughel near Breda. After receiving instruction in painting from Koek, whose daughter he married, he spent some time in France and Italy, and then went to Antwerp, where he was elected into the Academy in 1551. He finally settled at Brussels and died there. The subjects of his pictures are chiefly humorous figures, like those of D. Teniers; and if he wants the delicate touch and silvery clearness of that master, he has abundant spirit and comic power. He is said to have died about the year 1570 at the age of sixty; other accounts give 1590 as the date of his death.

His son PIETER, the younger (1564-1637), known as "Hell" Breughel, was born in Brussels and died at Antwerp, where his "Christ bearing the Cross" is in the museum.

Another son JAN (*c.* 1569-1642), known as "Velvet" Breughel, was born at Brussels. He first applied himself to painting flowers and fruits, and afterwards acquired considerable reputation by his landscapes and sea-pieces. After residing long at Cologne he travelled into Italy, where his landscapes, adorned with small figures, were greatly admired. He left a large number of pictures, chiefly landscapes, which are executed with great skill. Rubens made use of Breughel's hand in the landscape part of several of his small pictures—such as his "Vertumnus and Pomona," the "Satyr viewing the Sleeping Nymph," and the "Terrestrial Paradise."

BREVET (a diminutive of the Fr. *bref*), a short writing, originally an official writing or letter, with the particular meaning of a papal indulgence. The use of the word is mainly confined to a commission, or official document, giving to an officer in the army a permanent, as opposed to a local and temporary, rank in the service higher than that he holds substantively in his corps. In the British army "brevet rank" exists only above the rank of captain, but in the United States army it is possible to obtain a brevet as first lieutenant. In France the term *breveté* is particularly used with respect to the General Staff, to express the equivalent of the English "passed Staff College" (p.s.c.).

BREVIARY (Lat. *breviarium*, abridgment, epitome), the book which contains the offices for the canonical hours, *i.e.* the daily service of the Roman Catholic Church. As compared with the Anglican Book of Common Prayer it is both more and less comprehensive; more, in that it includes lessons and hymns for every day in the year; less, because it excludes the Eucharistic office (contained in the Missal), and the special offices connected with baptism, marriage, burial, ordination, &c., which are found in the Ritual or the Pontifical. In the early days of Christian worship, when Jewish custom was followed, the Bible furnished all that was thought necessary, containing as it did the books from which the lessons were read and the psalms that were recited. The first step in the evolution of the Breviary was the separation of the Psalter into a choir-book. At first the president of the local church (bishop) or the leader of the choir chose a particular psalm as he thought appropriate. From about the 4th century certain psalms began to be grouped together, a process that was furthered by the monastic practice of daily reciting the 150 psalms. This took so much time that the monks began to spread it over a week, dividing each day into hours, and allotting to each hour its portion of the Psalter. St Benedict in the 6th century drew up such an arrangement, probably, though not certainly, on the basis of an older Roman division which, though not so skilful, is the one in general use. Gradually there were added to these psalter choir-books additions in the form of antiphons, responses, collects or short prayers, for the use of those not skilful at improvisation and metrical compositions. Jean Beleth, a 12th-century liturgical author, gives the following list of books necessary for the right conduct of the canonical office:—the *Antiphonarium*, the Old and New Testaments, the *Passionarius* (*liber*) and the *Legendarius* (dealing respectively with martyrs and saints), the *Homiliarius* (homilies on the Gospels), the *Sermologus* (collection of sermons) and the works of the Fathers, besides, of course, the *Psalterium* and the *Collectarium*. To overcome the inconvenience of using such a library the Breviary came into existence and use. Already in the 8th century Prudentius, bishop of Troyes, had in a *Breviarium Psalterii* made an abridgment of the Psalter for the laity, giving a few psalms for each day, and Alcuin had rendered a similar service by including a prayer for each day and some other prayers, but no lessons or homilies. The Breviary rightly so called, however, only dates from the 11th century; the earliest MS. containing the whole canonical office is of the year 1099 and is in the Mazarin library. Gregory VII. (pope 1073-1085), too, simplified the liturgy as performed at the Roman court, and gave his abridgment the name of Breviary, which thus came to denote a work which from another point of view might be called a Plenary, involving as it did the collection of several works into one. There are several extant specimens of 12th-century Breviaries, all Benedictine, but under Innocent III. (pope 1198-1216) their use was extended, especially by the newly founded and active Franciscan order. These preaching friars, with the authorization of Gregory IX., adopted (with some modifications, *e.g.* the substitution of the "Gallican" for the "Roman" version of the Psalter) the Breviary hitherto used exclusively by the Roman court, and with it gradually swept out of Europe all the earlier partial books (Legendaries, Responsories), &c., and to some extent the local Breviaries, like that of Sarum. Finally, Nicholas III. (pope 1277-1280) adopted this version both for the curia and for the basilicas of Rome, and thus made its position secure. The Benedictines and Dominicans have Breviaries of their own. The only other types that merit notice are:—(1) the Mozarabic Breviary, once in use throughout all Spain, but now confined to a single foundation at Toledo; it is remarkable for the number and length of its hymns, and for the fact that the majority of its collects are addressed to God the Son; (2) the Ambrosian, now confined to Milan, where it owes its retention to the attachment of the clergy and people to their traditionary rites, which they derive from St Ambrose (see LITURGY).

[v.04 p.0504] Till the council of Trent every bishop had full power to regulate the Breviary of his own diocese; and this was acted upon almost everywhere. Each monastic community, also, had one of its own. Pius V. (pope 1566-1572), however, while sanctioning those which could show at least 200 years of existence, made the Roman obligatory in all other places. But the influence of the court of Rome has gradually gone much beyond this, and has superseded almost all the local "uses." The Roman has thus become nearly universal, with the allowance only of additional offices for saints specially venerated in each particular diocese. The Roman Breviary has undergone several revisions: The most remarkable of these is that by Francis Quignonez, cardinal of Santa Croce in Gerusalemme (1536), which, though not accepted by Rome,[1] formed the model for the still more thorough reform made in 1549 by the Church of England, whose daily morning and evening services are but a condensation and simplification of the Breviary offices. Some parts of the prefaces at the beginning of the English Prayer-Book are free translations of those of Quignonez. The Pian Breviary was again altered by Sixtus V. in 1588, who introduced the revised Vulgate text; by Clement VIII. in 1602 (through Baronius and Bellarmine), especially as concerns the rubrics; and by Urban VIII. (1623-1644), a purist who unfortunately tampered with the text of the hymns, injuring both their literary charm and their historic worth.

In the 17th and 18th centuries a movement of revision took place in France, and succeeded in modifying about half the Breviaries of that country. Historically, this proceeded from the labours of Jean de Launoy (1603-1678), "le dénicheur des saints," and Louis Sébastien le Nain de Tillemont, who had shown the falsity of numerous lives of the saints; while theologically it was produced by the Port Royal school, which led men to dwell more on communion with God as contrasted with the invocation of the saints. This was mainly carried out by the adoption of a rule that all antiphons and responses should be in the exact words of Scripture, which, of course, cut out the whole class of appeals to created beings. The services were at the same time simplified and shortened, and the use of the whole Psalter every week (which had become a mere theory in the Roman Breviary, owing to its frequent supersession by saints' day services) was made a reality. These reformed French Breviaries—*e.g.* the Paris Breviary of 1680 by Archbishop François de Harlay (1625-1695) and that of 1736 by Archbishop Charles Gaspard Guillaume de

Vintimille (1655-1746)—show a deep knowledge of Holy Scripture, and much careful adaptation of different texts; but during the pontificate of Pius IX. a strong Ultramontane movement arose against them. This was inaugurated by Montalembert, but its literary advocates were chiefly Dom Gueranger, a learned Benedictine monk, abbot of Solesmes, and Louis François Veuillot (1813-1883) of the *Univers*; and it succeeded in suppressing them everywhere, the last diocese to surrender being Orleans in 1875. The Jansenist and Gallican influence was also strongly felt in Italy and in Germany, where Breviaries based on the French models were published at Cologne, Münster, Mainz and other towns. Meanwhile, under the direction of Benedict XIV. (pope 1740-1758), a special congregation collected many materials for an official revision, but nothing was published. Subsequent changes have been very few and minute. In 1902, under Leo XIII., a commission under the presidency of Monsignor Louis Duchesne was appointed to consider the Breviary, the Missal, the Pontifical and the Ritual.

The beauty and value of many of the Latin Breviaries were brought to the notice of English churchmen by one of the numbers of the Oxford *Tracts for the Times*, since which time they have been much more studied, both for their own sake and for the light they throw upon the English Prayer-Book.

From a bibliographical point of view some of the early printed Breviaries are among the rarest of literary curiosities, being merely local. The copies were not spread far, and were soon worn out by the daily use made of them. Doubtless many editions have perished without leaving a trace of their existence, while others are known by unique copies. In Scotland the only one which has survived the convulsions of the 16th century is that of Aberdeen, a Scottish form of the Sarum Office,[2] revised by William Elphinstone (bishop 1483-1514), and printed at Edinburgh by Walter Chapman and Andrew Myllar in 1509-1510. Four copies have been preserved of it, of which only one is complete; but it was reprinted in facsimile in 1854 for the Bannatyne Club by the munificence of the duke of Buccleuch. It is particularly valuable for the trustworthy notices of the early history of Scotland which are embedded in the lives of the national saints. Though enjoined by royal mandate in 1501 for general use within the realm of Scotland, it was probably never widely adopted. The new Scottish *Proprium* sanctioned for the Roman Catholic province of St Andrews in 1903 contains many of the old Aberdeen collects and antiphons.

The Sarum or Salisbury Breviary itself was very widely used. The first edition was printed at Venice in 1483 by Raynald de Novimagio in folio; the latest at Paris, 1556, 1557. While modern Breviaries are nearly always printed in four volumes, one for each season of the year, the editions of the Sarum never exceeded two parts.

Contents of the Roman Breviary.—At the beginning stands the usual introductory matter, such as the tables for determining the date of Easter, the calendar, and the general rubrics. The Breviary itself is divided into four seasonal parts—winter, spring, summer, autumn—and comprises under each part (1) the Psalter; (2) *Proprium de Tempore* (the special office of the season); (3) *Proprium Sanctorum* (special offices of saints); (4) *Commune Sanctorum* (general offices for saints); (5) Extra Services. These parts are often published separately.

1. *The Psalter*.—This is the very backbone of the Breviary, the groundwork of the Catholic prayer-book; out of it have grown the antiphons, responsories and versicles. In the Breviary the psalms are arranged according to a disposition dating from the 8th century, as follows. Psalms i.-cviii., with some omissions, are recited at Matins, twelve each day from Monday to Saturday, and eighteen on Sunday. The omissions are said at Lauds, Prime and Compline. Psalms cix.-cxlvii. (except cxvii., cxviii. and cxlii.) are said at Vespers, five each day. Psalms cxlviii.-cl. are always used at Lauds, and give that hour its name. The text of this Psalter is that commonly known as the Gallican. The name is misleading, for it is simply the second revision (A.D. 392) made by Jerome of the old *Itala* version originally used in Rome. Jerome's first revision of the *Itala* (A.D. 383), known as the Roman, is still used at St Peter's in Rome, but the "Gallican," thanks especially to St Gregory of Tours, who introduced it into Gaul in the 6th century, has ousted it everywhere else. The Antiphonary of Bangor proves that Ireland accepted the Gallican version in the 7th century, and the English Church did so in the 10th.

2. The *Proprium de Tempore* contains the office of the seasons of the Christian year (Advent to Trinity), a conception that only gradually grew up. There is here given the whole service for every Sunday and week-day, the proper antiphons, responsories, hymns, and especially the course of daily Scripture-reading, averaging about twenty verses a day, and (roughly) arranged thus: for Advent, Isaiah; Epiphany to Septuagesima, Pauline Epistles; Lent, patristic homilies (Genesis on Sundays); Passion-tide, Jeremiah; Easter to Whitsun, Acts, Catholic epistles and Apocalypse; Whitsun to August, Samuel and Kings; August to Advent, Wisdom books, Maccabees, Prophets. The extracts are often scrappy and torn out of their context.

3. The *Proprium Sanctorum* contains the lessons, psalms and liturgical formularies for saints' festivals, and depends on the days of the secular month. Most of the material here is hagiological biography, occasionally revised as by Leo XIII. in view of archaeological and other discoveries, but still largely uncritical. Covering a great stretch of time and space, they do for the worshipper in the field of church history what the Scripture readings do in that of biblical history. As something like 90% of the days in the year have, during the course of centuries, been allotted to some saint or other, it is easy to see how this section of the Breviary has encroached upon the *Proprium de Tempore*, and this is the chief problem that confronts any who are concerned for a revision of the Breviary.

4. The *Commune Sanctorum* comprises psalms, antiphons, lessons, &c., for feasts of various groups or classes (twelve in all); *e.g.* apostles, martyrs, confessors, virgins, and the Blessed
[v.04 p.0505] Virgin Mary. These offices are of very ancient date, and many of them were probably in origin proper to individual saints. They contain passages of great literary beauty. The lessons read at the third nocturn are patristic homilies on the Gospels, and together form a rough summary of theological instruction.

5. *Extra Services*.—Here are found the Little Office of the Blessed Virgin Mary, the Office of the Dead (obligatory on All Souls' Day), and offices peculiar to each diocese.

It has already been indicated, by reference to Matins, Lauds, &c., that not only each day, but each part of the day, has its own office, the day being divided into liturgical "hours." A detailed account of these will be found in the article Hours, Canonical. Each of the hours of the office is composed of the same elements, and something must be said now of the nature of these constituent parts, of which mention has here and there been already made. They are: psalms (including canticles), antiphons, responsories, hymns, lessons, little chapters, versicles and collects.

The *psalms* have already been dealt with, but it may be noted again how the multiplication of saints' festivals, with practically the same special psalms, tends in practice to constant repetition of about one-third of the Psalter, and correspondingly rare recital of the remaining two-thirds, whereas the *Proprium de Tempore*, could it be adhered to, would provide equal opportunities for every psalm. As in the Greek usage and in the Benedictine, certain canticles like the Song of Moses (Exodus xv.), the Song of Hannah (1 Sam. ii.), the prayer of Habakkuk (iii.), the prayer of Hezekiah (Isaiah xxxviii.) and other similar Old Testament passages, and, from the New Testament, the Magnificat, the Benedictus and the Nunc dimittis, are admitted as psalms.

The *antiphons* are short liturgical forms, sometimes of biblical, sometimes of patristic origin, used to introduce a psalm. The term originally signified a chant by alternate choirs, but has quite lost this meaning in the Breviary.

The *responsories* are similar in form to the antiphons, but come at the end of the psalm, being originally the reply of the choir or congregation to the precentor who recited the psalm.

The *hymns* are short poems going back in part to the days of Prudentius, Synesius, Gregory of Nazianzus and Ambrose (4th and 5th centuries), but mainly the work of medieval authors. Together they make a fine collection, and it is a pity that Urban VIII. in his mistaken humanistic zeal tried to improve them.

The *lessons*, as has been seen, are drawn variously from the Bible, the Acts of the Saints and the Fathers of the Church. In the primitive church, books afterwards excluded from the canon were often read, *e.g.* the letters of Clement of Rome and the *Shepherd of Hermas*. In later days the churches of Africa, having rich memorials of martyrdom, used them to supplement the reading of Scripture. Monastic influence accounts for the practice of adding to the reading of a biblical passage some patristic commentary or exposition. Books of homilies were compiled from the writings of SS. Augustine, Hilary, Athanasius, Isidore, Gregory the Great and others, and formed part of the library of which the Breviary was the ultimate compendium. In the lessons, as in the psalms, the order for special days breaks in upon the normal order of ferial offices and dislocates the scheme for consecutive reading. The lessons are read at Matins (which is subdivided into three nocturns).

The *little chapters* are very short lessons read at the other "hours."

The *versicles* are short responsories used after the little chapters.

The *collects* come at the close of the office and are short prayers summing up the supplications of the congregation. They arise out of a primitive practice on the part of the bishop (local president), examples of which are found in the *Didachē* (Teaching of the Apostles) and in the letters of Clement of Rome and Cyprian. With the crystallization of church order improvisation in prayer largely gave place to set forms, and collections of prayers were made which later developed into Sacramentaries and Orationals. The collects of the Breviary are largely drawn from the Gelasian and other Sacramentaries, and they are used to sum up the dominant idea of the festival in connexion with which they happen to be used.

The difficulty of harmonizing the *Proprium de Tempore* and the *Proprium Sanctorum*, to which reference has been made, is only partly met in the thirty-seven chapters of general rubrics. Additional help is given by a kind of Catholic Churchman's Almanack, called the *Ordo Recitandi Divini Officii*, published in different countries and dioceses, and giving, under every day, minute directions for proper reading.

Every clerk in orders and every member of a religious order must publicly join in or privately read aloud (*i.e.* using the lips as well as the eyes—it takes about two hours in this way) the whole of the Breviary services allotted for each day. In large churches the services are usually grouped; *e.g.* Matins and Lauds (about 7.30 A.M.); Prime, Terce (High Mass), Sext, and None (about 10 A.M.); Vespers and Compline (4 P.M.); and from four to eight hours (depending on the amount of music and the number of high masses) are thus spent in choir. Laymen do not use the Breviary as a manual of devotion to any great extent.

The Roman Breviary has been translated into English (by the marquess of Bute in 1879; new ed.

with a trans, of the Martyrology, 1908), French and German. The English version is noteworthy for its inclusion of the skilful renderings of the ancient hymns by J.H. Newman, J.M. Neale and others.

AUTHORITIES.—F. Cabrol, *Introduction aux études liturgiques*; Probst, *Kirchenlex*. ii., *s.v.* "Brevier"; Bäumer, *Geschichte des Breviers* (Freiburg, 1895); P. Batiffol, *L'Histoire du bréviaire romain* (Paris, 1893; Eng. tr.); Baudot, *Le Bréviaire romain* (1907). A complete bibliography is appended to the article by F. Cabrol in the *Catholic Encyclopaedia*, vol. ii. (1908).

[1] It was approved by Clement VII. and Paul III., and permitted as a substitute for the unrevised Breviary, until Pius V. in 1568 excluded it as too short and too modern, and issued a reformed edition (*Breviarium Pianum*, Pian Breviary) of the old Breviary.

[2] The Sarum Rite was much favoured in Scotland as a kind of protest against the jurisdiction claimed by the church of York.

BREVIARY OF ALARIC (*Breviarium Alaricanum*), a collection of Roman law, compiled by order of Alaric II., king of the Visigoths, with the advice of his bishops and nobles, in the twenty-second year of his reign (A.D. 506). It comprises sixteen books of the Theodosian code; the Novels of Theodosius II., Valentinian III., Marcian, Majorianus and Severus; the Institutes of Gaius; five books of the *Sententiae Receptae* of Julius Paulus; thirteen titles of the Gregorian code; two titles of the Hermogenian code; and a fragment of the first book of the *Responsa Papiniani*. It is termed a code (codex), in the certificate of Anianus, the king's referendary, but unlike the code of Justinian, from which the writings of jurists were excluded, it comprises both imperial constitutions (*leges*) and juridical treatises (*jura*). From the circumstance that the Breviarium has prefixed to it a royal rescript (*commonitorium*) directing that copies of it, certified under the hand of Anianus, should be received exclusively as law throughout the kingdom of the Visigoths, the compilation of the code has been attributed to Anianus by many writers, and it is frequently designated the Breviary of Anianus (Breviarium Aniani). The code, however, appears to have been known amongst the Visigoths by the title of "Lex Romana," or "Lex Theodosii," and it was not until the 16th century that the title of "Breviarium" was introduced to distinguish it from a recast of the code, which was introduced into northern Italy in the 9th century for the use of the Romans in Lombardy. This recast of the Visigothic code has been preserved in a MS. known as the Codex Utinensis, which was formerly kept in the archives of the cathedral of Udine, but is now lost; and it was published in the 18th century for the first time by P. Canciani in his collection of ancient laws entitled *Barbarorum Leges Antiquae*. Another MS. of this Lombard recast of the Visigothic code was discovered by Hänel in the library of St Gall. The chief value of the Visigothic code consists in the fact that it is the only collection of Roman Law in which the five first books of the Theodosian code and five books of the *Sententiae Receptae* of Julius Paulus have been preserved, and until the discovery of a MS. in the chapter library in Verona, which contained the greater part of the Institutes of Gaius, it was the only work in which any portion of the institutional writings of that great jurist had come down to us.

The most complete edition of the Breviarium will be found in the collection of Roman law published under the title of *Jus Civile Ante-Justinianum* (Berlin, 1815). See also G. Hänel's *Lex Romana Visigothorum* (Berlin, 1847-1849).

BREWER, JOHN SHERREN (1810-1879), English historian, was born in Norwich in 1810, the son of a Baptist schoolmaster. He was educated at Queen's College, Oxford, was ordained in the Church of England in 1837, and became chaplain to a central London workhouse. In 1839 he was appointed lecturer in classical literature at King's College, London, and in 1855 he became professor of English language and literature and lecturer in modern history, succeeding F.D. Maurice. Meanwhile from 1854 onwards he was also engaged in journalistic work on the *Morning Herald*, *Morning Post* and *Standard*. In 1856 he was commissioned by the master of the rolls to prepare a calendar of the state papers of Henry VIII., a work demanding a vast amount of research. He was also made reader at the Rolls, and subsequently preacher. In 1877 Disraeli secured for him the crown living of Toppesfield, Essex. There he had time to continue his task of preparing his *Letters and Papers of the Reign of King Henry VIII.*, the Introductions to which (published separately, under the title *The Reign of Henry VIII.*, in 1884) form a scholarly and authoritative history of Henry VIII.'s reign. New editions of several standard historical works were also produced under Brewer's direction. He died at Toppesfield in February 1879.

[v.04 p.0506] **BREWING,** in the modern acceptation of the term, a series of operations the object of which is to prepare an alcoholic beverage of a certain kind—to wit, beer—mainly from cereals (chiefly malted barley), hops and water. Although the art of preparing beer (*q.v.*) or ale is a very ancient one, there is very little information in the literature of the subject as to the apparatus and methods employed in early times. It seems fairly certain, however, that up to the 18th century these were of the most primitive kind. With regard to *materials*, we know that prior to the general introduction of the hop (see ALE) as a preservative and astringent, a number of other bitter and aromatic plants had been employed with this end in view. Thus J.L. Baker (*The Brewing Industry*) points out that the Cimbri used the *Tamarix germanica*, the Scandinavians the fruit of the sweet gale (*Myrica gale*), the Cauchi the fruit and the twigs of the chaste tree (*Vitex agrius castus*), and the Icelanders the yarrow (*Achillea millefolium*).

The preparation of beer on anything approaching to a manufacturing scale appears, until about the 12th or 13th century, to have been carried on in England chiefly in the monasteries; but as the brewers of London combined to form an association in the reign of Henry IV., and were

granted a charter in 1445, it is evident that brewing as a special trade or industry must have developed with some rapidity. After the Reformation the ranks of the trade brewers were swelled by numbers of monks from the expropriated monasteries. Until the 18th century the professional brewers, or brewers for sale, as they are now called, brewed chiefly for the masses, the wealthier classes preparing their own beer, but it then became gradually apparent to the latter (owing no doubt to improved methods of brewing, and for others reasons) that it was more economical and less troublesome to have their beer brewed for them at a regular brewery. The usual charge was 30s. per barrel for bitter ale, and 8s. or so for small beer. This tendency to centralize brewing operations became more and more marked with each succeeding decade. Thus during 1895-1905 the number of private brewers declined from 17,041 to 9930. Of the private brewers still existing, about four-fifths were in the class exempted from beer duty, *i.e.* farmers occupying houses not exceeding £10 annual value who brew for their labourers, and other persons occupying houses not exceeding £15 annual value. The private houses subject to both beer and licence duty produced less than 20,000 barrels annually. There are no official figures as to the number of "cottage brewers," that is, occupiers of dwellings not exceeding £8 annual value; but taking everything into consideration it is probable that more than 99% of the beer produced in the United Kingdom is brewed by public brewers (brewers for sale). The disappearance of the smaller public brewers or their absorption by the larger concerns has gone hand-in-hand with the gradual extinction of the private brewer. In the year 1894-1895 8863 licences were issued to brewers for sale, and by 1904-1905 this number had been reduced to 5164. There are numerous reasons for these changes in the constitution of the brewing industry, chief among them being (*a*) the increasing difficulty, owing partly to licensing legislation and its administration, and partly to the competition of the great breweries, of obtaining an adequate outlet for retail sale in the shape of licensed houses; and (*b*) the fact that brewing has continuously become a more scientific and specialized industry, requiring costly and complicated plant and expert manipulation. It is only by employing the most up-to-date machinery and expert knowledge that the modern brewer can hope to produce good beer in the short time which competition and high taxation, &c., have forced upon him. Under these conditions the small brewer tends to extinction, and the public are ultimately the gainers. The relatively non-alcoholic, lightly hopped and bright modern beers, which the small brewer has not the means of producing, are a great advance on the muddy, highly hopped and alcoholized beverages to which our ancestors were accustomed.

The brewing trade has reached vast proportions in the United Kingdom. The maximum production was 37,090,986 barrels in 1900, and while there has been a steady decline since that year, the figures for 1905-1906—34,109,263 barrels—were in excess of those for any year preceding 1897. It is interesting in this connexion to note that the writer of the article on Brewing in the 9th edition of the *Encyclopaedia Britannica* was of the opinion that the brewing industry—which was then (1875) producing, roughly, 25,000,000 barrels—had attained its maximum development. In the year ending 30th September 1905 the beer duty received by the exchequer amounted to £13,156,053. The number of brewers for sale was 5180. Of these one firm, namely, Messrs Guinness, owning the largest brewery in the world, brewed upwards of two million barrels, paying a sum of, roughly, one million sterling to the revenue. Three other firms brewed close on a million barrels or upwards. The quantity of malt used was 51,818,697 bushels; of unmalted corn, 125,671 bushels; of rice, flaked maize and similar materials, 1,348,558 cwt.; of sugar, 2,746,615 cwt.; of hops, 62,360,817 lb; and of hop substitutes, 49,202 lb. The average specific gravity of the beer produced in 1905-1906 was 1053.24. The quantity of beer exported was 520,826; of beer imported, 57,194 barrels. It is curious to note that the figures for exports and imports had remained almost stationary for the last thirty years. By far the greater part of the beer brewed is consumed in England. Thus of the total quantity retained for consumption in 1905-1906, 28,590,563 barrels were consumed in England, 1,648,463 in Scotland, and 3,265,084 in Ireland. In 1871 it was calculated by Professor Leone Levi that the capital invested in the liquor trade in the United Kingdom was £117,000,000. In 1908 this figure might be safely doubled. A writer in the *Brewers' Almanack* for 1906 placed the capital invested in limited liability breweries alone at £185,000,000. If we allow for over-capitalization, it seems fairly safe to say that, prior to the introduction of the Licensing Bill of 1908, the market value of the breweries in the United Kingdom, together with their licensed property, was in the neighbourhood of £120,000,000, to which might be added another £20,000,000 for the value of licences not included in the above calculation; the total capital actually sunk in the whole liquor trade (including the wine and spirit industries and trades) being probably not far short of £250,000,000, and the number of persons directly engaged in or dependent on the liquor trade being under-estimated at 2,000,000. (For comparative production and consumption see Beer.)

Taxation and Regulations.—The development of the brewing industry in England is intimately interwoven with the history of its taxation, and the regulations which have from time to time been formed for the safeguarding of the revenue. The first duty on beer in the United Kingdom was imposed in the reign of Charles II. (1660), namely 2s. 6d. per barrel on strong and 6d. per barrel on weak beer. This was gradually increased, amounting to 4s. 9d. on strong and 1s. 3d. on weak beer in the last decade of the 17th century, and to 8s. to 10s. in the year 1800, at which rate it continued until the repeal of the beer duty in 1830. A duty on malt was first imposed in the reign of William III. (1697), and from that date until 1830 both beer duty and malt tax were charged. The rate at first was under 7d. per bushel, but this was increased up to 2s. 7d. prior to the first repeal of the beer duty (1830), and to 4s. 6d. after the repeal. In 1829 the joint beer and malt taxes amounted to no less than 13s. 8d. per barrel, or 4½d. per gallon, as against 2½d. at the present day. From 1856 until the abolition of the malt tax, the latter remained constant at a fraction under 2s. 8½d. A *hop duty* varying from 1d. to 2½d. per pound was in existence between

1711 and 1862. One of the main reasons for the abolition of the hop duty was the fact that, owing to the uncertainty of the crop, the amount paid to the revenue was subject to wide fluctuations. Thus in 1855 the revenue from this source amounted to £728,183, in 1861 to only £149,700.

It was not until 1847 that the use of sugar in brewing was permitted, and in 1850 the first sugar tax, amounting to 1s. 4d. per cwt., was imposed. It varied from this figure up to 6s. 6d. in 1854, and in 1874, when the general duty on sugar was repealed, it was raised to 11s. 6d., at which rate it remained until 1880, when it was repealed simultaneously with the malt duty. In 1901 a general sugar tax of 4s. 2d. and under (according to the percentage of actual sugar contained) was imposed, but no drawback was allowed to brewers using sugar, and therefore—and this obtains at the present day—sugar used in brewing pays the general tax and also the beer duty.

By the Free Mash-Tun Act of 1880, the duty was taken off the malt and placed on the beer, or, more properly speaking, on the wort; maltsters' and brewers' licences were repealed, and in lieu thereof an annual licence duty of £1 payable by every brewer for sale was imposed. The chief feature of this act was that, on and after the 1st of October 1880, a beer duty was imposed in lieu of the old malt tax, at the rate of 6s. 3d. per barrel of 36 gallons, at a specific gravity of 1.057, and the regulations for charging the duty were so framed as to leave the brewer practically unrestricted as to the description of malt or corn and sugar, or other description of saccharine substitutes (other than deleterious articles or drugs), which he might use in the manufacture or colouring of beer. This freedom in the choice of materials has continued down to the present time, except that the use of "saccharin" (a product derived from coal-tar) was prohibited in 1888, the reason being that this substance gives an apparent palate-fulness to beer equal to roughly 4° in excess of its real gravity, the revenue suffering thereby. In 1889 the duty on beer was increased by a reduction in the standard of gravity from 1.057 to 1.055, and in 1894 a further 6d. per barrel was added. The duty thus became 6s. 9d. per barrel, at a gravity of 1.055, which was further increased to 7s. 9d. per barrel by the war budget of 1900, at which figure it stood in 1909. (See also Liquor Laws.)

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Prior to 1896, rice, flaked maize (see below), and other similar preparations had been classed as malt or corn in reference to their wort-producing powers, but after that date they were deemed sugar[1] in that regard. By the new act (1880) 42 lb weight of corn, or 28 lb weight of sugar, were to be deemed the equivalent of a bushel of malt, and a brewer was expected by one of the modes of charge to have brewed at least a barrel (36 gallons) of worts (less 4% allowed for wastage) at the standard gravity for every two bushels of malt (or its equivalents) used by him in brewing; but where, owing to lack of skill or inferior machinery, a brewer cannot obtain the standard quantity of wort from the standard equivalent of material, the charge is made not on the wort, but directly on the material. By the new act, licences at the annual duty of £1 on brewers for sale, and of 6s. (subsequently modified by 44 Vict. c. 12, and 48 and 49 Vict. c. 5, &c., to 4s.) or 9s., as the case might be, on any other brewers, were required. The regulations dealing with the mashing operations are very stringent. Twenty-four hours at least before mashing the brewer must enter in his brewing book (provided by the Inland Revenue) the day and hour for commencing to mash malt, corn, &c., or to dissolve sugar; and the date of making such entry; and also, two hours at least before the notice hour for mashing, the quantity of malt, corn, &c., and sugar to be used, and the day and hour when all the worts will be drawn off the grains in the mash-tun. The worts of each brewing must be collected within twelve hours of the commencement of the collection, and the brewer must within a given time enter in his book the quantity and gravity of the worts before fermentation, the number and name of the vessel, and the date of the entry. The worts must remain in the same vessel undisturbed for twelve hours after being collected, unless previously taken account of by the officer. There are other regulations, *e.g.* those prohibiting the mixing of worts of different brewings unless account has been taken of each separately, the alteration of the size or shape of any gauged vessel without notice, and so on.

Taxation of Beer in Foreign Countries.—The following table shows the nature of the tax and the amount of the same calculated to English barrels.

Country.	Nature of Tax.	Amount per English Barrel (round numbers)
United States	Beer tax	5s. 9d.
Germany —		
—— N. German Customs Union	Malt tax	1s. 6d
—— Bavaria	Malt tax	3s. 5d. to 4s. 8d., according to quantity produced
Belgium	Malt tax	2s. 9d.
France	On Wort	4s. 1d.
Holland	On cubic contents of Mash-Tun or on Malt	About 1s. 9d. to 3s. 3d., according to quality
Austro-Hungarian Empire	On Wort	6s. 8d.
Russia	Malt tax	5s. to 6s. 8d.

MATERIALS USED IN BREWING.—These are water, malt (*q.v.*), hops (*q.v.*), various substitutes for the two latter, and preservatives.

Water.—A satisfactory supply of water—which, it may here be mentioned, is always called *liquor* in the brewery—is a matter of great importance to the brewer. Certain waters, for instance, those contaminated to any extent with organic matter, cannot be used at all in brewing, as they give rise to unsatisfactory fermentation, cloudiness and abnormal flavour. Others again, although suited to the production of one type of beer, are quite unfit for the brewing of another. For black beers a soft water is a desideratum, for ales of the Burton type a hard water is a necessity. For the brewing of mild ales, again, a water containing a certain proportion of chlorides is required. The presence or absence of certain mineral substances as such in the finished beer is not, apparently, a matter of any moment as regards flavour or appearance, but the importance of the rôle played by these substances in the brewing process is due to the influence which they exert on the solvent action of the water on the various constituents of the malt, and possibly of the hops. The excellent quality of the Burton ales was long ago surmised to be due mainly to the well water obtainable in that town. On analysing Burton water it was found to contain a considerable quantity of calcium sulphate—gypsum—and of other calcium and magnesium salts, and it is now a well-known fact that good bitter ales cannot be brewed except with waters containing these substances in sufficient quantities. Similarly, good mild ale waters should contain a certain quantity of sodium chloride, and waters for stout very little mineral matter, excepting perhaps the carbonates of the alkaline earths, which are precipitated on boiling.

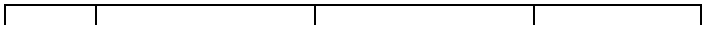
The following analyses (from W.J. Sykes, *The Principles and Practice of Brewing*) are fairly illustrative of typical brewing waters.

Burton Water (Pale Ale)	
	Grains per Gallon
Sodium Chloride	3.90
Potassium Sulphate	1.59
Sodium Nitrate	1.97
Calcium Sulphate	77.87
Calcium Carbonate	7.62
Magnesium Carbonate	21.31
Silica and Alumina	0.98
Dublin Water (Stout).	
Sodium Chloride	1.83
Calcium Sulphate	4.45
Calcium Carbonate	14.21
Magnesium Carbonate	0.90
Iron Oxide and Alumina	0.24
Silica	0.26
Mild Ale Water.	
Sodium Chloride	35.14
Calcium Chloride	3.88
Calcium Sulphate	6.23
Calcium Carbonate	4.01
Iron Oxide and Alumina	0.24
Silica	0.22

Our knowledge of the essential chemical constituents of brewing waters enables brewers in many cases to treat an unsatisfactory supply artificially in such a manner as to modify its character in a favourable sense. Thus, if a soft water only is to hand, and it is desired to brew a bitter ale, all that is necessary is to add a sufficiency of gypsum, magnesium sulphate and calcium chloride. If it is desired to convert a soft water lacking in chlorides into a satisfactory mild ale liquor, the addition of 30-40 grains of sodium chloride will be necessary. On the other hand, to convert a hard water into a soft supply is scarcely feasible for brewing purposes. To the substances used for treating brewing liquors already mentioned we may add kainite, a naturally deposited composite salt containing potassium and magnesium sulphates and magnesium chloride.

Malt Substitutes.—Prior to the repeal of the Malt Acts, the only substitute for malt allowed in the United Kingdom was sugar. The quantity of the latter employed was 295,865 cwt. in 1870, 1,136,434 cwt. in 1880, and 2,746,615 cwt. in 1905; that is to say, that the quantity used had been practically trebled during the last twenty-five years, although the quantity of malt employed had not materially increased. At the same time other substitutes, such as unmalted corn and preparations of rice and maize, had come into favour, the quantity of these substances used being in 1905 125,671 bushels of unmalted corn and 1,348,558 cwt. of rice, maize, &c.

The following statistics with regard to the use of malt substitutes in the United Kingdom are not without interest.



Year.	Quantities of Malt and Corn used in Brewing.	Quantities of Sugar, Rice, Maize, &c. used in Brewing.	Percentage of Substitutes to Total Material.
	Bushels.	Bushels.	
1878	59,388,905	3,825,148	6.05
1883	[2]51,331,451	[3]4,503,680	8.06
1890	[2]55,359,964	[3]7,904,708	12.48
1895	53,731,177	10,754,510	16.66
1905	51,942,368	15,706,413	23.22

The causes which have led to the largely increased use of substitutes in the United Kingdom are of a somewhat complex nature. In the first place, it was not until the malt tax was repealed that the brewer was able to avail himself of the surplus diastatic energy present in malt, for the purpose of transforming starch (other than that in malted grain) into sugar. The diastatic enzyme or ferment (see below, under *Mashing*) of malted barley is present in that material in great excess, and a part of this surplus energy may be usefully employed in converting the starch of unmalted grain into sugar. The brewer has found also that brewing operations are simplified and accelerated by the use of a certain proportion of substitutes, and that he is thereby enabled appreciably to increase his turn-over, *i.e.* he can make more beer in a given time from the same plant. Certain classes of substitutes, too, are somewhat cheaper than malt, and in view of the keenness of modern competition it is not to be wondered at that the brewer should resort to every legitimate means at his disposal to keep down costs. It has been contended, and apparently with much reason, that if the use of substitutes were prohibited this would not lead to an increased use of domestic barley, inasmuch as the supply of home barley suitable for malting purposes is of a limited nature. A return to the policy of "malt and hops only" would therefore lead to an increased use of foreign barley, and to a diminution in the demand for home barley, inasmuch as sugar and prepared cereals, containing as they do less nitrogen, &c. than even the well-cured, sun-dried foreign barleys, are better diluents than the latter. At the same time, it is an undoubted fact that an excessive use of substitutes leads to the production of beer of poor quality. The better class of brewer rarely uses more than 15-20%, knowing that beyond that point the loss of flavour and quality will in the long run become a more serious item than any increased profits which he might temporarily gain.

With regard to the nature of the substitutes or adjuncts for barley malt more generally employed, raw grain (unmalted barley, wheat, rice, maize, &c.) is not used extensively in Great Britain, but in America brewers employ as much as 50%, and even more, of maize, rice or similar materials. The maize and rice preparations mostly used in England are practically starch pure and simple, substantially the whole of the oil, water, and other subsidiary constituents of the grain being removed. The germ of maize contains a considerable proportion of an oil of somewhat unpleasant flavour, which has to be eliminated before the material is fit for use in the mash-tun. After degerming, the maize is unhusked, wetted, submitted to a temperature sufficient to rupture the starch cells, dried, and finally rolled out in a flaky condition. Rice is similarly treated.

The *sugars* used are chiefly cane sugar, glucose and invert sugar—the latter commonly known as "saccharum." Cane sugar is mostly used for the preparation of heavy mild ales and stouts, as it gives a peculiarly sweet and full flavour to the beer, to which, no doubt, the popularity of this class of beverage is largely due. *Invert sugar* is prepared by the action either of acid or of yeast on cane sugar. The chemical equation representing the conversion (or inversion) of cane sugar is:—

$$\underset{\text{cane sugar}}{C_{12}H_{22}O_{11}} + \underset{\text{water}}{H_2O} = \underset{\text{glucose}}{C_6H_{12}O_6} + \underset{\text{fructose}}{C_6H_{12}O_6}.$$

——invert sugar——

Invert sugar is so called because the mixture of glucose and fructose which forms the "invert" is laevo-rotatory, whereas cane sugar is dextro-rotatory to the plane of polarized light. The preparation of invert sugar by the acid process consists in treating the cane sugar in solution with a little mineral acid, removing the excess of the latter by means of chalk, and concentrating to a thick syrup. The yeast process (Tompson's), which makes use of the inverting power of one of the enzymes (invertase) contained in ordinary yeast, is interesting. The cane sugar solution is pitched with yeast at about 55° C., and at this comparatively high temperature the inversion proceeds rapidly, and fermentation is practically impossible. When this operation is completed, the whole liquid (including the yeast) is run into the boiling contents of the copper. This method is more suited to the preparation of invert in the brewery itself than the acid process, which is almost exclusively used in special sugar works. Glucose, which is one of the constituents of invert sugar, is largely used by itself in brewing. It is, however, never prepared from invert sugar for this purpose, but directly from starch by means of acid. By the action of dilute boiling acid on starch the latter is rapidly converted first into a mixture of dextrine and maltose and then into glucose. The proportions of glucose, dextrine and maltose present in a commercial glucose depend very much on the duration of the boiling, the strength of the acid, and the extent of the pressure at which the starch is converted. In England the materials from which glucose is

manufactured are generally sago, rice and purified maize. In Germany potatoes form the most common raw material, and in America purified Indian corn is ordinarily employed.

Hop substitutes, as a rule, are very little used. They mostly consist of quassia, gentian and camomile, and these substitutes are quite harmless *per se*, but impart an unpleasantly rough and bitter taste to the beer.

Preservatives.—These are generally, in fact almost universally, employed nowadays for draught ales; to a smaller extent for stock ales. The light beers in vogue to-day are less alcoholic, more lightly hopped, and more quickly brewed than the beers of the last generation, and in this respect are somewhat less stable and more likely to deteriorate than the latter were. The preservative in part replaces the alcohol and the hop extract, and shortens the brewing time. The preservatives mostly used are the bisulphites of lime and potash, and these, when employed in small quantities, are generally held to be harmless.

Brewing Operations.—The general scheme of operations in an English brewery will be readily understood if reference be made to fig. 1, which represents an 8-quarter brewery on the *gravitation system*, the principle of which is that all materials to be employed are pumped or hoisted to the highest point required, to start with, and that subsequently no further pumping or hoisting is required, the materials (in the shape of water, malt, wort or hops, &c.) being conveyed from one point to another by the force of gravity.

The malt, which is hoisted to the top floor, after cleaning and grading is conveyed to the *Malt Mill*, where it is crushed. Thence the ground malt, or "grist" as it is now called, passes to the *Grist Hopper*, and from the latter to the *Mashing Machine*, in which it is intimately mixed with hot water from the *Hot Liquor Vessel*. From the mashing machine the mixed grist and "liquor" pass to the *Mash-Tun*, where the starch of the malt is rendered soluble. From the mash-tun the clear wort passes to the *Copper*, where it is boiled with hops. From the copper the boiled wort passes to the *Hop Back*, where the insoluble hop constituents are separated from the wort. From the hop back the wort passes to the *Cooler*, from the latter to the *Refrigerator*, thence (for the purpose of enabling the revenue officers to assess the duty) to the *Collecting Vessel*,[4] and finally to the *Fermenting Vessels*, in which the wort is transformed into "green" beer. The latter is then cleansed, and finally racked and stored.

It will be seen from the above that brewing consists of seven distinct main processes, which may be classed as follows: (1) Grinding; (2) Mashing; (3) Boiling; (4) Cooling; (5) Fermenting; (6) Cleansing; (7) Racking and Storing.

[v.04 p.0509]

Grinding.—In most modern breweries the malt passes, on its way from the bins to the mill, through a cleaning and grading apparatus, and then through an automatic measuring machine. The mills, which exist in a variety of designs, are of the smooth roller type, and are so arranged that the malt is *crushed* rather than ground. If the malt is ground too fine, difficulties arise in regard to efficient drainage in the mash-tun and subsequent clarification. On the other hand, if the crushing is too coarse the subsequent extraction of soluble matter in the mash-tun is incomplete, and an inadequate yield results.

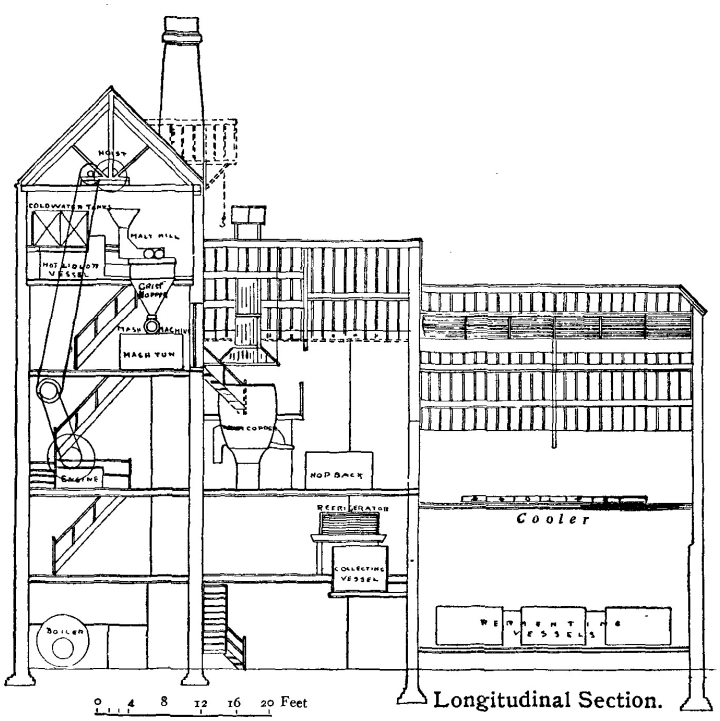


Fig. 1.—An 8-quarter Brewery (Messrs. L. Lumley & Co., Ltd.).

Mashing is a process which consists mainly in extracting, by means of water at an adequate temperature, the soluble matters pre-existent in the malt, and in converting the insoluble starch and a great part of the insoluble nitrogenous compounds into soluble and partly fermentable

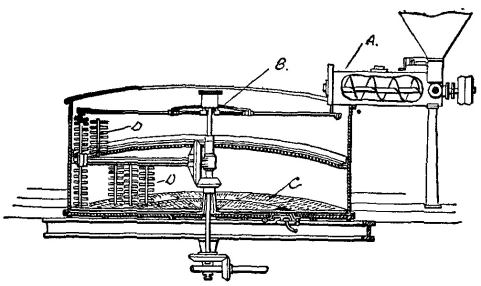


FIG. 2.—Mash-tun with mashing machine.

products. Mashing is, without a doubt, the most important of the brewing processes, for it is largely in the mash-tun that the character of the beer to be brewed is determined. In modern practice the malt and the mashing "liquor" (*i.e.* water) are introduced into the mash-tun simultaneously, by means of the mashing machine (fig. 2, A). This is generally a cylindrical metal vessel, commanding the mash-tun and provided with a central shaft and screw. The grist (as the crushed malt is called) enters the mashing machine from the grist case above, and the liquor is introduced at the back. The screw is rotated rapidly, and so a thorough mixture of the grist and liquor takes place as they travel along the mashing machine. The mash-tun (fig. 2) is a large metal or wooden vessel, fitted with a false bottom composed of plates perforated with numerous small holes or slits (C). This arrangement is necessary in order to obtain a proper separation of the "wort" (as the liquid portion of the finished mash is called) from the spent grains. The mash-tun is also provided with a stirring apparatus (the *rakes*) so that the grist and liquor may be intimately mixed (D), and an automatic sprinkler, the *sparger* (fig. 2, B, and fig. 3), which is employed in order to wash out the wort remaining in the grains. The sparger consists of a number of hollow arms radiating from a common centre and pierced by a number of small perforations. The common central vessel from which the sparge-arms radiate is mounted in such a manner that it rotates automatically when a stream of water is admitted, so that a constant fine spray covers the whole tun when the sparger is in operation. There are also pipes for admitting "liquor" to the bottom of the tun, and for carrying the wort from the latter to the "underback" or "copper."

The grist and liquor having been introduced into the tun (either by means of the mashing machine or separately), the rakes are set going, so that the mash may become thoroughly homogeneous, and after a short time the rakes are stopped and the mash allowed to rest, usually for a period of about two hours. After this, "taps are set"—*i.e.* communication is established between the mash-tun and the vessel into which the wort runs—and the sparger is started. In this manner the whole of the wort or extract is separated from the grains. The quantity of water employed is, in all, from two to three barrels to the quarter (336 lb) of malt.

In considering the process of mashing, one might almost say the process of brewing, it is essential to remember that the type and quality of the beer to be produced (see MALT) depends almost entirely (*a*) on the kind of malt employed, and (*b*) on the mashing temperature. In other words, quality may be controlled on the kiln or in the mash-tun, or both. Viewed in this light, the following theoretical methods for preparing different types of beer are possible:—(1) high kiln heats and high mashing temperatures; (2) high kiln heats and low mashing temperatures; (3) low kiln heats and high mashing temperatures; and (4) low kiln heats and low mashing temperatures. In practice all these combinations, together with many intermediate ones, are met with, and it is not too much to say that the whole science of modern brewing is based upon them. It is plain, then, that the mashing temperature will depend on the kind of beer that is to be produced, and on the kind of malt employed. For stouts and black beers generally, a mashing temperature of 148° to 150° F. is most usual; for pale or stock ales, 150° to 154° F.; and for mild running beers, 154° to 149° F. The range of temperatures employed in brewing English beers is a very limited one as compared with foreign mashing methods, and does not range further, practically speaking, than from 140° to 160° F. The effect of higher temperatures is chiefly to cripple the enzyme or "ferment" diastase, which, as already said, is the agent which converts the insoluble starch into soluble dextrin, sugar and intermediate products. The higher the mashing temperature, the more the diastase will be crippled in its action, and the more dextrinous (non-fermentable) matter as compared with maltose (fermentable sugar) will be formed. A pale or stock ale, which is a type of beer that must be "dry" and that will keep, requires to contain a relatively high proportion of dextrin and little maltose, and, in its preparation, therefore, a high mashing temperature will be employed. On the other hand, a mild running ale, which is a full, sweet beer, intended for rapid consumption, will be obtained by means of low mashing temperatures, which produce relatively little dextrin, but a good deal of maltose, *i.e.* sweet and readily fermentable matter.

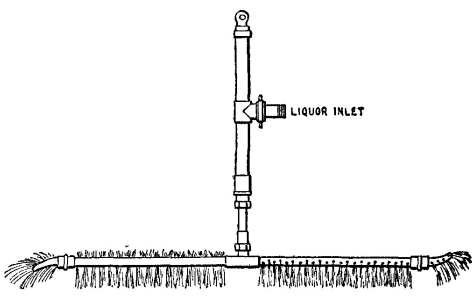


FIG. 3.—Sparger.

Diastase is not the only enzyme present in malt. There is also a ferment which renders a part of the nitrogenous matter soluble. This again is affected by temperature in much the same way as diastase. Low heats tend to produce much non-coagulable nitrogenous matter, which is undesirable in a stock beer, as it tends to produce fret and side fermentations. With regard to the kind of malt and other materials employed in producing various types of beer, pale ales are made either from pale malt (generally a mixture of English and fine foreign, such as Smyrna, California) only, or from pale malt and a little flaked maize, rice, invert sugar or glucose. Running beers (mild ale) are made from a mixture of pale and amber malts, sugar and flaked goods; stout, from a mixture of pale, amber and roasted (black) malts only, or with the addition of a little sugar or flaked maize.

[v.04 p.0510]

When raw grain is employed, the process of mashing is slightly modified. The maize, rice or other grain is usually gelatinized in a vessel (called a *converter* or *cooker*) entirely separated from the mash-tun, by means of steam at a relatively high temperature, mostly with, but occasionally without, the addition of some malt meal. After about half an hour the gelatinized mass is mixed with the main mash, and this takes place shortly before taps are set. This is possible inasmuch as the starch, being already in a highly disintegrated condition, is very rapidly converted. By working on the limited-decoction system (see below), it is possible to make use of a fair percentage of raw grain in the mash-tun proper, thus doing away with the "converter" entirely.

The Filter Press Process.—The ordinary mash-tun process, as described above, possesses the disadvantage that only coarse grists can be employed. This entails loss of extract in several ways. To begin with, the sparging process is at best a somewhat inefficient method for washing out the last portions of the wort, and again, when the malt is at all hard or "steely," starch conversion is by no means complete. These disadvantages are overcome by the filter press process, which was first introduced into Great Britain by the Belgian engineer P. Meura. The malt, in this method of brewing, is ground quite fine, and although an ordinary mash-tun may be used for mashing, the separation of the clear wort from the solid matter takes place in the filter press, which retains the very finest particles with ease. It is also a simple matter to wash out the wort from the filter cake in the presses, and experience has shown that markedly increased yields are thus obtained. In the writer's opinion, there is little doubt that in the future this, or a similar process, will find a very wide application.

Boiling.—From the mash-tun the wort passes to the *copper*. If it is not possible to arrange the plant so that the coppers are situated beneath the mash-tuns (as is the case in breweries arranged on the *gravitation system*), an intermediate collecting vessel (the underback) is interposed, and from this the wort is pumped into the copper. The latter is a large copper vessel heated by direct fire or steam. Modern coppers are generally closed in with a dome-shaped head, but many old-fashioned open coppers are still to be met with, in fact pale-ale brewers prefer open coppers. In the closed type the wort is frequently boiled under slight pressure. When the wort has been raised to the boil, the hops or a part thereof are added, and the boiling is continued generally from an hour to three hours, according to the type of beer. The objects of boiling, briefly put, are: (1) sterilization of the wort; (2) extraction from the hops of substances that give flavour and aroma to the beer; (3) the coagulation and precipitation of a part of the nitrogenous matter (the coagulable albuminoids), which, if left in, would cause cloudiness and fret, &c., in the finished beer; (4) the concentration of the wort. At least three distinct substances are extracted from the hops in boiling. First, the *hop tannin*, which, combining with a part of the proteids derived from the malt, precipitates them; second, the *hop resin*, which acts as a preservative and bitter; third, the *hop oil*, to which much of the fine aroma of beer is due. The latter is volatile, and it is customary, therefore, not to add the whole of the hops to the wort when it commences to boil, but to reserve about a third until near the end of the copper stage. The quantity of hops employed varies according to the type of beer, from about 3 lb to 15 lb per quarter (336 lb) of malt. For mild ales and porters about 3 to 4 lb, for light pale ales and light stouts 6 to 10 lb, and for strong ales and stouts 9 to 15 lb of hops are employed.

Cooling.—When the wort has boiled the necessary time, it is turned into the *hop back* to settle. A hop back is a wooden or metal vessel, fitted with a false bottom of perforated plates; the latter retain the spent hops, the wort being drawn off into the coolers. After resting for a brief period in the hop back, the bright wort is run into the *coolers*. The cooler is a very shallow vessel of great area, and the result of the exposure of the hot wort to a comparatively large volume of air is that a part of the hop constituents and other substances contained in the wort are rendered insoluble and are precipitated. It was formerly considered absolutely essential that this hot aeration should take place, but in many breweries nowadays coolers are not used, the wort being run direct from the hop back to the refrigerator. There is much to be said for this procedure, as the exposure of hot wort in the cooler is attended with much danger of bacterial and wild yeast infection, but it is still a moot point whether the cooler or its equivalent can be entirely dispensed with for all classes of beers. A rational alteration would appear to be to place the cooler in an air-tight chamber supplied with purified and sterilized air. This principle has already been applied to the refrigerator, and apparently with success. In America the cooler is frequently replaced by a cooling tank, an enclosed vessel of some depth, capable of artificial aeration. It is not practicable, in any case, to cool the wort sufficiently on the cooler to bring it to the proper temperature for the fermentation stage, and for this purpose, therefore, the *refrigerator* is employed. There are several kinds of refrigerators, the main distinction being that some are vertical, others horizontal; but the principle in each case is much the same, and consists in allowing a thin film or stream of wort to trickle over a series of pipes through which cold water circulates. Fig. 5, Plate I., shows refrigerators, employed in Messrs Allsopp's lager beer brewery, at work.

Fermenting.—By the process of fermentation the wort is converted into beer. By the action of living yeast cells (see FERMENTATION) the sugar contained in the wort is split up into alcohol and carbonic acid, and a number of subsidiary reactions occur. There are two main systems of fermentation, the *top fermentation* system, which is that employed in the United Kingdom, and the *bottom fermentation* system, which is that used for the production of beers of the continental ("lager") type. The wort, generally at a temperature of about 60° F. (this applies to all the systems excepting B [see below], in which the temperature is higher), is "pitched" with liquid yeast (or "barm," as it is often called) at the rate of, according to the type and strength of the beer to be made, 1 to 4 lb to the barrel. After a few hours a slight froth or scum makes its appearance on the surface of the liquid. At the end of a further short period this develops into a

light curly mass (*cauliflower* or *curly head*), which gradually becomes lighter and more solid in appearance, and is then known as *rocky head*. This in its turn shrinks to a compact mass—the *yeasty head*—which emits great bubbles of gas with a hissing sound. At this point the *cleansing* of the beer—*i.e.* the separation of the yeast from the liquid—has fairly commenced, and it is let down (except in the skimming and Yorkshire systems [see below]) into the pontos or unions, as the case may be. During fermentation the temperature rises considerably, and in order to prevent an excessive temperature being obtained (70-75° F. should be the maximum) the fermenting vessels are fitted with "attemperators," *i.e.* a system of pipes through which cold water may be run.

Cleansing.—In England the methods of applying the top fermentation system may be classified as follows: (A) *The Cleansing System*: (*a*) Skimming System, (*b*) Dropping System (pontos or ordinary dropping system), (*c*) Burton Union System. (B) *The Yorkshire Stone Square System*.

(A) In (*a*) the *Skimming System* the fermentation from start to finish takes place in wooden vessels (termed "squares" or "rounds"), fitted with an attemperator and a parachute or other similar skimming device for removing or "skimming" the yeast at the end of the fermentation (fig. 4). The principle of (*b*) the *Dropping System* is that the beer undergoes only the main fermentation in the "round" or "square," and is then dropped down into a second vessel or vessels, in which fermentation and cleansing are completed. The *ponto* system of dropping, which is now somewhat old-fashioned, consists in discharging the beer into a series of vat-like vessels, fitted with a peculiarly-shaped overflow lip. The yeast works its way out of the vessel over the lip, and then flows into a gutter and is collected. The pontos are kept filled with beer by means of a vessel placed at a higher level. In the *ordinary* dropping system the partly fermented beer is let down from the "squares" and "rounds" into large vessels, termed dropping or skimming "backs." These are fitted with attemperators, and parachutes for the removal of yeast, in much the same way as in the skimming system. As a rule the parachute covers the whole width of the back. (*c*) The *Burton Union System* is really an improved ponto system. A series of casks, supplied with beer at the cleansing stage from a feed vessel, are mounted so that they may rotate axially. Each cask is fitted with an attemperator, a pipe and cock at the base for the removal of the finished beer and "bottoms," and lastly with a swan neck fitting through a bung-hole and commanding a common gutter. This system yields excellent results for certain classes of beers, and many Burton brewers think it is essential for obtaining the Burton character. Fig. 6 (Plate II.) shows the process in operation in Messrs Allsopp's brewery.

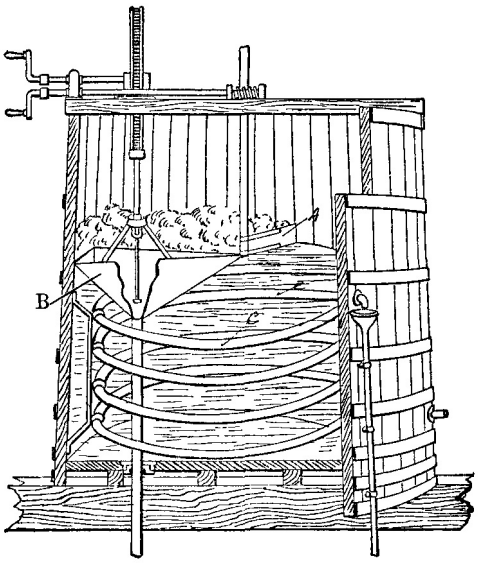


FIG. 4.—Fermenting Round.
A, Skimmer; B, Parachute; C, Attemperator.

[v.04 p.0511]

(B) *The Stone Square System*, which is only used to a certain extent (exclusively in the north of England), practically consists in pumping the fermenting wort from one to the other of two superimposed square vessels, connected with one another by means of a man-hole and a valve. These squares are built of stone and kept very cool. At the end of the fermentation the yeast (after closing the man-hole) is removed from the top square.

Racking, &c.—After the fermentation and cleansing operations are completed, the beer is racked off (sometimes after passing a few hours in a settling tank) into storage vessels or trade casks. The finest "stock" and "pale" ales are stored from six weeks to three months prior to going out, but "running" beers (mild ales, &c.) are frequently sent out of the brewery within a week or ten days of mashing. It is usual to add some hops in cask (this is called *dry hopping*) in the case of many of the better beers. Running beers, which must be put into condition rapidly, or beers that have become flat, are generally *primed*. Priming consists in adding a small quantity of sugar solution to the beer in cask. This rapidly ferments and so produces "condition."

Fining.—As a very light article is desired nowadays, and this has to be provided in a short time, artificial means must be resorted to, in order to replace the natural fining or brightening which storage brings about. *Finings* generally consist of a solution or semi-solution of isinglass in sour beer, or in a solution of tartaric acid or of sulphurous acid. After the finings are added to the beer and the barrels have been well rolled, the finings slowly precipitate (or work out through the bung-hole) and carry with them the matter which would otherwise render the beer turbid.

Bottling.—Formerly it was the general custom to brew a special beer for bottling, and this practice is still continued by some brewers. It is generally admitted that the special brew, matured by storage and an adequate secondary fermentation, produces the best beer for bottling, but the modern taste for a very light and bright bottled beer at a low cost has necessitated the introduction of new methods. The most interesting among these is the "chilling" and "carbonating" system. In this the beer, when it is ripe for racking, is first "chilled," that is, cooled to a very low temperature. As a result, there is an immediate deposition of much matter which otherwise would require prolonged time to settle. The beer is then filtered and so rendered quite bright, and finally, in order to produce immediate "condition," is "carbonated," *i.e.* impregnated under pressure with carbon dioxide (carbonic acid gas).

Foreign Brewing and Beers.—The system of brewing which differs most widely from the English *infusion* and *top fermentation* method is the *decoction* and *bottom fermentation* system, so widely employed, chiefly on the continent of Europe, for the production of beers of the "lager" type.

The method pursued in the decoction system is broadly as follows:—After the grist has been mashed with cold water until a homogeneous mixture ensues, sufficient hot water is introduced into the mash-tun to raise the temperature to 85-100° F., according to circumstances. Thereupon, about one-third of the mash (including the "goods") is transferred to the *Maisch Kessel* (mash copper), in which it is gradually brought to a temperature of (about) 165° F., and this heat is maintained until the mash becomes transparent. The *Dickmaische*, as this portion is called, is then raised to the boil, and the ebullition sustained between a quarter and three-quarters of an hour. Just sufficient of the *Dickmaische* is returned to the mash-tun proper to raise the temperature of the whole to 111-125° F., and after a few minutes a third is again withdrawn and treated as before, to form the second "thick mash." When the latter has been returned to the mash-tun the whole is thoroughly worked up, allowed to stand in order that the solids may deposit, and then another third (called the *Läutermaische* or "clear mash") is withdrawn, boiled until the coagulable albuminoids are precipitated, and finally reconveyed to the mash-tun, where the mashing is continued for some time, the final heat being rather over 160° F. The wort, after boiling with hops and cooling, much as in the English system, is subjected to the peculiar system of fermentation called *bottom fermentation*. In this system the "pitching" and fermentation take place at a very low temperature and, compared with the English system, in very small vessels. The fermenting cellars are maintained at a temperature of about 37-38° F., and the temperature of the fermenting wort does not rise above 50° F. The yeast, which is of a different type from that employed in the English system, remains at the bottom of the fermenting tun, and hence is derived the name of "bottom fermentation" (see Fermentation). The primary fermentation lasts about eleven to twelve days (as compared with three days on the English system), and the beer is then run into store (lager) casks where it remains at a temperature approaching the freezing-point of water for six weeks to six months, according to the time of the year and the class of the beer. As to the relative character and stability of decoction and infusion beers, the latter are, as a rule, more alcoholic; but the former contain more unfermented malt extract, and are therefore, broadly speaking, more nutritive. Beers of the German type are less heavily hopped and more peptonized than English beers, and more highly charged with carbonic acid, which, owing to the low fermentation and storing temperatures, is retained for a comparatively long time and keeps the beer in condition. On the other hand, infusion beers are of a more stable and stimulating character. It is impossible to keep "lager" beer on draught in the ordinary sense of the term in England. It will not keep unless placed on ice, and, as a matter of fact, the "condition" of lager is dependent to a far greater extent on the methods of distribution and storage than is the case with infusion beers. If a cask is opened it must be rapidly consumed; indeed it becomes undrinkable within a very few hours. The gas escapes rapidly when the pressure is released, the temperature rises, and the beer becomes flat and mawkish. In Germany every publican is bound to have an efficient supply of ice, the latter frequently being delivered by the brewery together with the beer.

In America the common system of brewing is one of infusion mashing combined with bottom fermentation. The method of mashing, however, though on infusion lines, differs appreciably from the English process. A very low initial heat—about 100° F.—at which the mash remains for about an hour, is employed. After this the temperature is rapidly raised to 153-156° F. by running in the boiling "cooker mash," *i.e.* raw grain wort from the converter. After a period the temperature is gradually increased to about 165° F. The very low initial heat, and the employment of relatively large quantities of readily transformable malt adjuncts, enable the American brewer to make use of a class of malt which would be considered quite unfit for brewing in an English brewery. The system of fermentation is very similar to the continental "lager" system, and the beer obtained bears some resemblance to the German product. To the English palate it is somewhat flavourless, but it is always retailed in exceedingly brilliant condition and at a proper temperature. There can be little doubt that every nation evolves a type of beer most suited to its climate and the temperament of the people, and in this respect the modern American beer is no exception. In regard to plant and mechanical arrangements generally, the modern American breweries may serve as an object-lesson to the European brewer, although there are certainly a number of breweries in the United Kingdom which need not fear comparison with the best American plants.

It is a sign of the times and further evidence as to the growing taste for a lighter type of beer, that lager brewing in its most modern form has now fairly taken root in Great Britain, and in this connexion the process introduced by Messrs Allsopp exhibits many features of interest. The following is a brief description of the plant and the methods employed:—The wort is prepared on infusion lines, and is then cooled by means of refrigerated brine before passing to a temporary store tank, which serves as a gauging vessel. From the latter the wort passes directly to the fermenting tuns, huge closed cylindrical vessels made of sheet-steel and coated with glass enamel. There the wort ferments under reduced pressure, the carbonic acid generated being removed by means of a vacuum pump, and the gas thus withdrawn is replaced by the introduction of cool sterilized air. The fermenting cellars are kept at 40° F. The yeast employed is a pure culture (see Fermentation) bottom yeast, but the withdrawal of the products of yeast metabolism and the constant supply of pure fresh air cause the fermentation to proceed far more rapidly than is the case with lager beer brewed on ordinary lines. It is, in fact, finished in about six days. Thereupon the air-supply is cut off, the green beer again cooled to 40° F. and then conveyed by means of filtered air pressure to the store tanks, where secondary fermentation,

lasting three weeks, takes place. The gases evolved are allowed to collect under pressure, so that the beer is thoroughly charged with the carbonic acid necessary to give it condition. Finally the beer is again cooled, filtered, racked and bottled, the whole of these operations taking place under counter pressure, so that no gas can escape; indeed, from the time the wort leaves the copper to the moment when it is bottled in the shape of beer, it does not come into contact with the outer air.

The preparation of the Japanese beer *saké* (*q.v.*) is of interest. The first stage consists in the preparation of *Koji*, which is obtained by treating steamed rice with a culture of *Aspergillus oryzae*. This micro-organism converts the starch into sugar. The *Koji* is converted into *moto* by adding it to a thin paste of fresh-boiled starch in a vat. Fermentation is set up and lasts for 30 to 40 days. The third stage consists in adding more rice and *Koji* to the *moto*, together with some water. A secondary fermentation, lasting from 8 to 10 days, ensues. Subsequently the whole is filtered, heated and run into casks, and is then known as *saké*. The interest of this process consists in the fact that a single micro-organism—a mould—is able to exercise the combined functions of saccharification and fermentation. It replaces the diastase of malted grain and also the yeast of a European brewery. Another liquid of interest is *Weissbier*. This, which is largely produced in Berlin (and in some respects resembles the *wheat-beer* produced in parts of England), is generally prepared from a mash of three parts of wheat malt and one part of barley malt. The fermentation is of a symbiotic nature, two organisms, namely a yeast and a fission fungus (the *lactic acid bacillus*) taking part in it. The preparation of this peculiar double ferment is assisted by the addition of a certain quantity of white wine to the yeast prior to fermentation.

Brewing Chemistry.—The principles of brewing technology belong for the most part to physiological chemistry, whilst those of the cognate industry, malting, are governed exclusively by that branch of knowledge. Alike in following the growth of barley in field, its harvesting, maturing and conversion into malt, as well as the operations of mashing malt, fermenting wort, and conditioning beer, physiological chemistry is needed. On the other hand, the consideration of the saline matter in waters, the composition of the extract of worts and beers, and the analysis of brewing materials and products generally, belong to the domain of pure chemistry. Since the extractive matters contained in wort and beer consist for the most part of the transformation products of starch, it is only natural that these should have received special attention at the hands of scientific men associated with the brewing industry. It was formerly believed that by the action of diastase on starch the latter is first converted into a gummy substance termed dextrin, which is then subsequently transformed into a sugar—glucose. F.A. Musculus, however, in 1860, showed that sugar and dextrin are simultaneously produced, and between the years 1872 and 1876 Cornelius O'Sullivan definitely proved that the sugar produced was maltose. When starch-paste, the jelly formed by treating starch with boiling water, is mixed with iodine solution, a deep blue coloration results. The first product of starch degradation by either acids or diastase, namely soluble starch, also exhibits the same coloration when treated with iodine. As degradation proceeds, and the products become more and more soluble and diffusible, the blue reaction with iodine gives place first to a purple, then to a reddish colour, and finally the coloration ceases altogether. In the same way, the optical rotating power decreases, and the cupric reducing power (towards Fehling's solution) increases, as the process of hydrolysis proceeds. C. O'Sullivan was the first to point out definitely the influence of the temperature of the mash on the character of the products. The work of Horace T. Brown (with J. Heron) extended that of O'Sullivan, and (with G.H. Morris) established the presence of an intermediate product between the higher dextrins and maltose. This product was termed maltodextrin, and Brown and Morris were led to believe that a large number of these substances existed in malt wort. They proposed for these substances the generic name "amyloins." Although according to their view they were compounds of maltose and dextrin, they had the properties of mixtures of these two substances. On the assumption of the existence of these compounds, Brown and his colleagues formulated what is known as the maltodextrin or amyloin hypothesis of starch degradation. C.J. Lintner, in 1891, claimed to have separated a sugar, isomeric with maltose, which is termed isomaltose, from the products of starch hydrolysis. A.R. Ling and J.L. Baker, as well as Brown and Morris, in 1895, proved that this isomaltose was not a homogeneous substance, and evidence tending to the same conclusion was subsequently brought forward by continental workers. Ling and Baker, in 1897, isolated the following compounds from the products of starch hydrolysis—maltodextrin-α, $C_{36}H_{62}O_{31}$, and maltodextrin-β, $C_{24}H_{42}O_{21}$ (previously named by Prior, achroodextrin III.). They also separated a substance, $C_{12}H_{22}O_{11}$, isomeric with maltose, which had, however, the characteristics of a dextrin. This is probably identical with the so-called dextrinose isolated by V. Syniewski in 1902, which yields a phenylosazone melting at 82-83° C. It has been proved by H. Ost that the so-called isomaltose of Lintner is a mixture of maltose and another substance, maltodextrin, isomeric with Ling and Baker's maltodextrin-β.

The theory of Brown and Morris of the degradation of starch, although based on experimental evidence of some weight, is by no means universally accepted. Nevertheless it is of considerable interest, as it offers a rational and consistent explanation of the phenomena known to accompany the transformation of starch by diastase, and even if not strictly correct it has, at any rate, proved itself to be a practical working hypothesis, by which the mashing and fermenting operations may be regulated and controlled. According to Brown and Morris, the starch molecule consists of five amylin groups, each of which corresponds to the molecular formula $(C_{12}H_{20}O_{10})_{20}$. Four of these amylin radicles are grouped centrally round the fifth, thus:—

$(C_{12}H_{20}O_{10})_{20}$ $(C_{12}H_{20}O_{10})_{20}$

$$\begin{array}{ccc} & \backslash\ (C_{12}H_{20}O_{10})_{20}\ / & \\ / & & \backslash \\ (C_{12}H_{20}O_{10})_{20} & & (C_{12}H_{20}O_{10})_{20} \end{array}$$

By the action of diastase, this complex molecule is split up, undergoing hydrolysis into four groups of amyloins, the fifth or central group remaining unchanged (and under brewing conditions unchangeable), forming the substance known as stable dextrin. When diastase acts on starch-paste, hydrolysis proceeds as far as the reaction represented by the following equation:—

$$5(C_{12}H_{20}O_{10})_{20} + 80\ H_2O = 80\ C_{12}H_{22}O_{11} + (C_{12}H_{20}O_{10})_{20}$$

starch. water. maltose. stable dextrin.

The amyloins are substances containing varying numbers of amylin (original starch or dextrin) groups in conjunction with a proportional number of maltose groups. They are not separable into maltose and dextrin by any of the ordinary means, but exhibit the properties of mixtures of these substances. As the process of hydrolysis proceeds, the amyloins become gradually poorer in amylin and relatively richer in maltose-groups. The final products of transformation, according to Brown and J.H. Millar, are maltose and glucose, which latter is derived from the hydrolysis of the stable dextrin. This theory may be applied in practical brewing in the following manner. If it is desired to obtain a beer of a stable character—that is to say, one containing a considerable proportion of high-type amyloins—it is necessary to restrict the action of the diastase in the mash-tun accordingly. On the other hand, for mild running ales, which are to "condition" rapidly, it is necessary to provide for the presence of sufficient maltodextrin of a low type. Investigation has shown that the type of maltodextrin can be regulated, not only in the mash-tun but also on the malt-kiln. A higher type is obtained by low kiln and high mashing temperatures than by high kiln and low mashing heats, and it is possible therefore to regulate, on scientific lines, not only the quality but also the type of amyloins which are suitable for a particular beer.

The chemistry of the nitrogenous constituents of malt is equally important with that of starch and its transformations. Without nitrogenous compounds of the proper type, vigorous fermentations are not possible. It may be remembered that yeast assimilates nitrogenous compounds in some of their simpler forms—amides and the like. One of the aims of the maltster is, therefore, to break down the protein substances present in barley to such a degree that the wort has a maximum nutritive value for the yeast. Further, it is necessary for the production of stable beer to eliminate a large proportion of nitrogenous matter, and this is only done by the yeast when the proteins are degraded. There is also some evidence that the presence of albumoses assists in producing the foaming properties of beer. It has now been established definitely, by the work of A. Fernbach, W. Windisch, F.Weiss and P. Schidrowitz, that finished malt contains at least two proteolytic enzymes (a peptic and a pancreatic enzyme).

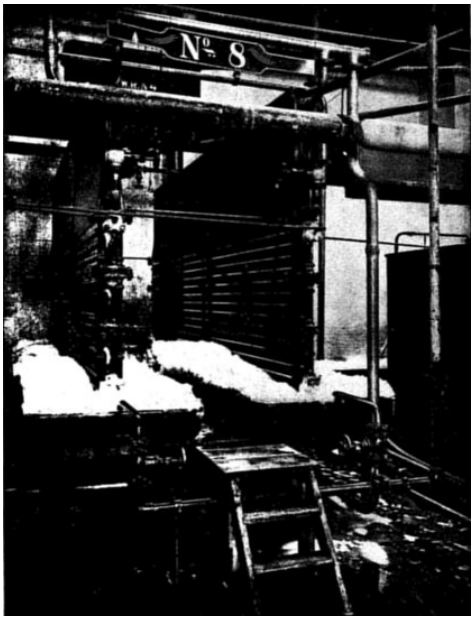


FIG. 5.—REFRIGERATORS IN "LAGER" BREWERY OF MESSRS. ALLSOPP.
The hot wort trickles over the outside of the series of pipes, and is cooled by the cold water which circulates in them. From the shallow collecting trays the cooled wort is conducted to the fermenting backs.

FIG. 6.—BURTON-UNION SYSTEM OF CLEANSING.
(MESSRS. ALLSOPP'S BREWERY.)
The green beer is filled into the casks, and the excess of yeast, &c., then works out through the swan necks into the long common gutter shown.

[v.04 p.0513] The presence of different types of phosphates in malt, and the important influence which, according to their nature, they exercise in the brewing process by way of the enzymes affected by them, have been made the subject of research mainly by Fernbach and A. Hubert, and by P.E. Petit and G. Labourasse. The number of enzymes which are now known to take part in the brewing process is very large. They may with utility be grouped as follows:—

	Name.	Rôle or Nature.
In the malt or mash-tun.	Cytase	Dissolves cell walls of of starch granules.
	Diastase A	Liquefies starch
	Diastase B	Saccharifies starch.
	Proteolytic Enzymes	(1) Peptic. (2) Pancreatic.
	Catalase	Splits peroxides.
In fermenting wort and yeast.	Invertase	Inverts cane sugar.
	Glucase	Splits maltose into glucose.
	Zymase	Splits sugar into alcohol and carbonic acid.

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(P. S.)

[1] They were classified at 28 lb in 1896, but since 1897 the standard has been at the rate of 32 lb to the bushel.

[2] Inclusive of rice and maize.

[3] Exclusive of rice and maize.

[4] As a rule there is no separate "collecting vessel," duty being assessed in the fermenting vessels.

BREWSTER, SIR DAVID (1781-1868), Scottish natural philosopher, was born on the 11th of December 1781 at Jedburgh, where his father, a teacher of high reputation, was rector of the grammar school. At the early age of twelve he was sent to the university of Edinburgh, being intended for the clerical profession. Even before this, however, he had shown a strong inclination for natural science, and this had been fostered by his intimacy with a "self-taught philosopher, astronomer and mathematician," as Sir Walter Scott called him, of great local fame—James Veitch of Inchbonny, who was particularly skilful in making telescopes. Though he duly finished his theological course and was licensed to preach, Brewster's preference for other pursuits prevented him from engaging in the active duties of his profession. In 1799 he was induced by his fellow-student, Henry Brougham, to study the diffraction of light. The results of his investigations were communicated from time to time in papers to the *Philosophical Transactions* of London and other scientific journals, and were admirably and impartially summarized by James D. Forbes in his preliminary dissertation to the eighth edition of the *Encyclopaedia Britannica*. The fact that other philosophers, notably Etienne Louis Malus and Augustin Fresnel, were pursuing the same investigations contemporaneously in France does not invalidate Brewster's claim to independent discovery, even though in one or two cases the priority must be assigned to others.

The most important subjects of his inquiries are enumerated by Forbes under the following five heads:—(1) The laws of polarization by reflection and refraction, and other quantitative laws of phenomena; (2) The discovery of the polarizing structure induced by heat and pressure; (3) The discovery of crystals with two axes of double refraction, and many of the laws of their phenomena, including the connexion of optical structure and crystalline forms; (4) The laws of metallic reflection; (5) Experiments on the absorption of light. In this line of investigation the prime importance belongs to the discovery (1) of the connexion between the refractive index and the polarizing angle, (2) of biaxial crystals, and (3) of the production of double refraction by irregular heating. These discoveries were promptly recognized. So early as the year 1807 the degree of LL.D. was conferred upon Brewster by Marischal College, Aberdeen; in 1815 he was made a member of the Royal Society of London, and received the Copley medal; in 1818 he received the Rumford medal of the society; and in 1816 the French Institute awarded him one-half of the prize of three thousand francs for the two most important discoveries in physical science made in Europe during the two preceding years. Among the non-scientific public his fame was spread more effectually by his rediscovery about 1815 of the kaleidoscope, for which there was a great demand in both England and America. An instrument of higher interest, the stereoscope, which, though of much later date (1849-1850), may be mentioned here, since along with the kaleidoscope it did more than anything else to popularize his name, was not, as has often been asserted, the invention of Brewster. Sir Charles Wheatstone discovered its principle and applied it as early as 1838 to the construction of a cumbrous but effective instrument, in which the binocular pictures were made to combine by means of mirrors. To Brewster is due the merit of suggesting the use of lenses for the purpose of uniting the dissimilar pictures; and accordingly

the lenticular stereoscope may fairly be said to be his invention. A much more valuable practical result of Brewster's optical researches was the improvement of the British lighthouse system. It is true that the dioptric apparatus was perfected independently by Fresnel, who had also the satisfaction of being the first to put it into operation. But it is indisputable that Brewster was earlier in the field than Fresnel; that he described the dioptric apparatus in 1812; that he pressed its adoption on those in authority at least as early as 1820, two years before Fresnel suggested it; and that it was finally introduced into British lighthouses mainly by his persistent efforts.

Brewster's own discoveries, important though they were, were not his only, perhaps not even his chief, service to science. He began literary work in 1799 as a regular contributor to the *Edinburgh Magazine*, of which he acted as editor at the age of twenty. In 1807 he undertook the editorship of the newly projected *Edinburgh Encyclopaedia*, of which the first part appeared in 1808, and the last not until 1830. The work was strongest in the scientific department, and many of its most valuable articles were from the pen of the editor. At a later period he was one of the leading contributors to the *Encyclopaedia Britannica* (seventh and eighth editions), the articles on Electricity, Hydrodynamics, Magnetism, Microscope, Optics, Stereoscope, Voltaic Electricity, &c., being from his pen. In 1819 Brewster undertook further editorial work by establishing, in conjunction with Robert Jameson (1774-1854), the *Edinburgh Philosophical Journal*, which took the place of the *Edinburgh Magazine*. The first ten volumes (1819-1824) were published under the joint editorship of Brewster and Jameson, the remaining four volumes (1825-1826) being edited by Jameson alone. After parting company with Jameson, Brewster started the *Edinburgh Journal of Science* in 1824, sixteen volumes of which appeared under his editorship during the years 1824-1832, with very many articles from his own pen. To the transactions of various learned societies he contributed from first to last between three and four hundred papers, and few of his contemporaries wrote so much for the various reviews. In the *North British Review* alone seventy-five articles of his appeared. A list of his larger separate works will be found below. Special mention, however, must be made of the most important of them all—his biography of Sir Isaac Newton. In 1831 he published a short popular account of the philosopher's life in Murray's *Family Library*; but it was not until 1855 that he was able to issue the much fuller *Memoirs of the Life, Writings and Discoveries of Sir Isaac Newton*, a work which embodied the results of more than twenty years' patient investigation of original manuscripts and all other available sources.

Brewster's relations as editor brought him into frequent communication with the most eminent scientific men, and he was naturally among the first to recognize the benefit that would accrue from regular intercourse among workers in the field of science. In an article in the *Quarterly Review* he threw out a suggestion for "an association of our nobility, clergy, gentry and philosophers," which was taken up by others and found speedy realization in the British [v.04 p.0514] Association for the Advancement of Science. Its first meeting was held at York in 1831; and Brewster, along with Charles Babbage and Sir John F. W. Herschel, had the chief part in shaping its constitution. In the same year in which the British Association held its first meeting, Brewster received the honour of knighthood and the decoration of the Guelphic order of Hanover. In 1838 he was appointed principal of the united colleges of St Salvator and St Leonard, St Andrews. In 1849 he acted as president of the British Association and was elected one of the eight foreign associates of the Institute of France in succession to J.J. Berzelius; and ten years later he accepted the office of principal of the university of Edinburgh, the duties of which he discharged until within a few months of his death, which took place at Allerly, Melrose, on the 10th of February 1868.

In estimating Brewster's place among scientific discoverers the chief thing to be borne in mind is that the bent of his genius was not characteristically mathematical. His method was empirical, and the laws which he established were generally the result of repeated experiment. To the ultimate explanation of the phenomena with which he dealt he contributed nothing, and it is noteworthy in this connexion that if he did not maintain to the end of his life the corpuscular theory he never explicitly adopted the undulatory theory of light. Few will be inclined to dispute the verdict of Forbes:—"His scientific glory is different in kind from that of Young and Fresnel; but the discoverer of the law of polarization of biaxial crystals, of optical mineralogy, and of double refraction by compression, will always occupy a foremost rank in the intellectual history of the age." In addition to the various works of Brewster already noticed, the following may be mentioned:—Notes and Introduction to Carlyle's translation of Legendre's *Elements of Geometry* (1824); *Treatise on Optics* (1831); *Letters on Natural Magic,* addressed to Sir Walter Scott (1831); *The Martyrs of Science, or the Lives of Galileo, Tycho Brahe, and Kepler* (1841); *More Worlds than One* (1854).

See *The Home Life of Sir David Brewster,* by his daughter Mrs Gordon.

BREWSTER, WILLIAM (c. 1566-1644), American colonist, one of the leaders of the "Pilgrims," was born at Scrooby, in Nottinghamshire, England, about 1566. After studying for a short time at Cambridge, he was from 1584 to 1587 in the service of William Davison (? 1541-1608), who in 1585 went to the Low Countries to negotiate an alliance with the states-general and in 1586 became assistant to Walsingham, Queen Elizabeth's secretary of state. Upon the disgrace of Davison, Brewster removed to Scrooby, where from 1590 until September 1607 he held the position of "Post," or postmaster responsible for the relays of horses on the post road, having previously, for a short time, assisted his father in that office. About 1602 his neighbours began to assemble for worship at his home, the Scrooby manor house, and in 1606 he joined them in organizing the Separatist church of Scrooby. After an unsuccessful attempt in 1607 (for which he was imprisoned for a short time), he, with other Separatists, removed to Holland in 1608 to

obtain greater freedom of worship. At Leiden in 1609 he was chosen ruling elder of the Congregation. In Holland he supported himself first by teaching English and afterwards in 1616-1619, as the partner of one Thomas Brewer, by secretly printing, for sale in England, books proscribed by the English government, thus, says Bradford, having "imploymente inough." In 1619 their types were seized and Brewer was arrested by the authorities of the university of Leiden, acting on the instance of the British ambassador, Sir Dudley Carleton. Brewster, however, escaped, and in the same year, with Robert Cushman (c. 1580-1625), obtained in London, on behalf of his associates, a land patent from the Virginia Company. In 1620 he emigrated to America on the "Mayflower," and was one of the founders of the Plymouth Colony. Here besides continuing until his death to act as ruling elder, he was also—regularly until the arrival of the first pastor, Ralph Smith (d. 1661), in 1629 and irregularly afterward—a "teacher," preaching "both powerfully and profitably to ye great contentment of ye hearers and their comfortable edification." By many he is regarded as pre-eminently the leader of the "Pilgrims." He died, probably on the 10th of April 1644.

See Ashbel Steele's *Chief of the Pilgrims; or the Life and Time of William Brewster* (Philadelphia, 1857); and a sketch in William Bradford's *History of the Plimouth Plantation* (new ed., Boston, 1898).

BRÉZÉ the name of a noble Angevin family, the most famous member of which was Pierre de Brézé (*c.* 1410-1465), one of the trusted soldiers and statesmen of Charles VII. He had made his name as a soldier in the English wars when in 1433 he joined with Yolande, queen of Sicily, the constable Richmond and others, in chasing from power Charles VII.'s minister La Trémoille. He was knighted by Charles of Anjou in 1434, and presently entered the royal council. In 1437 he became seneschal of Anjou, and in 1440 of Poitou. During the Praguerie he rendered great service to the royal cause against the dauphin Louis and the revolted nobles, a service which was remembered against him after Louis's accession to the throne. He fought against the English in Normandy in 1440-1441, and in Guienne in 1442. In the next year he became chamberlain to Charles VII., and gained the chief power in the state through the influence of Agnes Sorel, superseding his early allies Richmond and Charles of Anjou. The six years (1444-1450) of his ascendancy were the most prosperous period of the reign of Charles VII. His most dangerous opponent was the dauphin Louis, who in 1448 brought against him accusations which led to a formal trial resulting in a complete exoneration of Brézé and his restoration to favour. He fought in Normandy in 1450-1451, and became seneschal of the province after the death of Agnes Sorel and the consequent decline of his influence at court. He made an ineffective descent on the English coast at Sandwich in 1457, and was preparing an expedition in favour of Margaret of Anjou when the accession of Louis XI. brought him disgrace and a short imprisonment. In 1462, however, his son Jacques married Louis's half-sister, Charlotte de Valois, daughter of Agnes Sorel. In 1462 he accompanied Margaret to Scotland with a force of 2000 men, and after the battle of Hexham he brought her back to Flanders. On his return he was reappointed seneschal of Normandy, and fell in the battle of Montlhéry on the 16th of July 1465. He was succeeded as seneschal of Normandy by his eldest son Jacques de Brézé (*c.* 1440-1490), count of Maulevrier; and by his grandson, husband of the famous Diane de Poitiers, Louis de Brézé (d. 1531), whose tomb in Rouen cathedral, attributed to Jean Goujon and Jean Cousin, is a splendid example of French Renaissance work.

The lordship of Brézé passed eventually to Claire Clémence de Maillé, princess of Condé, by whom it was sold to Thomas Dreux, who took the name of Dreux Brézé, when it was erected into a marquisate. Henri Evrard, marquis de Dreux-Brézé (1762-1829), succeeded his father as master of the ceremonies to Louis XVI. in 1781. On the meeting of the states-general in 1789 it fell to him to regulate the questions of etiquette and precedence between the three estates. That as the immediate representative of the crown he should wound the susceptibilities of the deputies was perhaps inevitable, but little attempt was made to adapt traditional etiquette to changed circumstances. Brézé did not formally intimate to President Bailly the proclamation of the royal séance until the 20th of June, when the carpenters were about to enter the hall to prepare for the event, thus provoking the session in the tennis court. After the royal séance Brézé was sent to reiterate Louis's orders that the estates should meet separately, when Mirabeau replied that the hall could not be cleared except by force. After the fall of the Tuileries Brézé emigrated for a short time, but though he returned to France he was spared during the Terror. At the Restoration he was made a peer of France, and resumed his functions as guardian of an antiquated ceremonial. He died on the 27th of January 1829, when he was succeeded in the peerage and at court by his son Scipion (1793-1845).

The best contemporary account of Pierre de Brézé is given in the *Chroniques* of the Burgundian chronicler, Georges Chastellain, who had been his secretary. Chastellain addressed a *Déprécation* to Louis XI. on his behalf at the time of his disgrace.

[v.04 p.0515] **BRIALMONT, HENRI ALEXIS** (1821-1903), Belgian general and military engineer, son of General Laurent Mathieu Brialmont (d. 1885), was born at Venlo in Limburg on the 25th of May 1821. Educated at the Brussels military school, he entered the army as sub-lieutenant of engineers in 1843, and became lieutenant in 1847. From 1847 to 1850 he was private secretary to the war minister, General Baron Chazal. In 1855 he entered the staff corps, became major in 1861, lieutenant-colonel 1864, colonel in 1868 and major-general 1874. In this rank he held at first the position of director of fortifications in the Antwerp district (December 1874), and nine months later he became inspector-general of fortifications and of the corps of engineers. In 1877 he became lieutenant-general. His far-reaching schemes for the fortification of the Belgian places

met with no little opposition, and Brialmont seems to have felt much disappointment in this; at any rate he went in 1883 to Rumania to advise as to the fortification works required for the defence of the country, and presided over the elaboration of the scheme by which Bucharest was to be made a first-class fortress. He was thereupon placed *en disponibilité* in his own service, as having undertaken the Bucharest works without the authorization of his sovereign. This was due in part to the suggestion of Austria, which power regarded the Bucharest works as a menace to herself. His services were, however, too valuable to be lost, and on his return to Belgium in 1884 he resumed his command of the Antwerp military district. He had, further, while in eastern Europe, prepared at the request of the Hellenic government, a scheme for the defence of Greece. He retired in 1886, but continued to supervise the Rumanian defences. He died on the 21st of September 1903.

In the first stage of his career as an engineer Brialmont's plans followed with but slight modification the ideas of Vauban; and his original scheme for fortifying Antwerp provided for both enceinte and forts being on a bastioned trace. But in 1859, when the great entrenched camp at Antwerp was finally taken in hand, he had already gone over to the school of polygonal fortification and the ideas of Montalembert. About twenty years later Brialmont's own types and plans began to stand out amidst the general confusion of ideas on fortification which naturally resulted from the introduction of long-range guns, and from the events of 1870-71. The extreme detached forts of the Antwerp region and the fortifications on the Meuse at Liége and Namur were constructed in accordance with Brialmont's final principles, viz. the lavish use of armour to protect the artillery inside the forts, the suppression of all artillery positions open to overhead fire, and the multiplication of intermediate batteries (see FORTIFICATION AND SIEGECRAFT). In his capacity of inspector-general Brialmont drafted and carried out the whole scheme for the defences of Belgium. He was an indefatigable writer, and produced, besides essays, reviews and other papers in the journals, twenty-three important works and forty-nine pamphlets. In 1850 he originated the *Journal de l'armée Belge*. His most important publications were *La Fortification du temps présent* (Brussels, 1885); *Influence du tir plongeant et des obus-torpilles sur la fortification* (Brussels, 1888); *Les Régions fortifiées* (Brussels, 1890); *La Défense des états et la fortification à la fin du XIX*^{e} *siècle* (Brussels, 1895); *Progrès de la défense des états et de la fortification permanente depuis Vauban* (Brussels, 1898).

BRIAN (926-1014), king of Ireland, known as BRIAN BORU, BOROMA, or BOROIMHE (from *boroma*, an Irish word for tribute), was a son of a certain Kennedy or Cenneide (d. 951). He passed his youth in fighting against the Danes, who were constantly ravaging Munster, the northern part of which district was the home of Brian's tribe, and won much fame in these encounters. In 976 his brother, Mathgamhain or Mahon, who had become king of Thomond about 951 and afterwards king of Munster, was murdered; Brian avenged this deed, became himself king of Munster in 978, and set out upon his career of conquest. He forced the tribes of Munster and then those of Leinster to own his sovereignty, defeated the Danes, who were established around Dublin, in Wicklow, and marched into Dublin, and after several reverses compelled Malachy (Maelsechlainn), the chief king of Ireland, who ruled in Meath, to bow before him in 1002. Connaught was his next objective. Here and also in Ulster he was successful, everywhere he received hostages and tribute, and he was generally recognized as the *ardri*, or chief king of Ireland. After a period of comparative quiet Brian was again at war with the Danes of Dublin, and on the 23rd of April 1014 his forces gained a great victory over them at Clontarf. After this battle, however, the old king was slain in his tent, and was buried at Armagh. Brian has enjoyed a great and not undeserved reputation. One of his charters is still preserved in Trinity College, Dublin.

See E.A. D'Alton, *History of Ireland*, vol. i. (1903).

BRIANÇON, a strongly fortified town in the department of Hautes-Alpes in S.E. France. It is built at a height of 4334 ft. on a plateau which dominates the junction of the Durance with the Guisane. The town itself is formed of very steep and narrow, though picturesque streets. As it lies at the foot of the descent from the Mont Genèvre Pass, giving access to Turin, a great number of fortifications have been constructed on the heights around Briançon, especially towards the east. The Fort Janus is no less than 4000 ft. above the town. The parish church, with its two towers, was built 1703-1726, and occupies a very conspicuous position. The Pont d'Asfeld, E. of the town, was built in 1734, and forms an arch of 131 ft. span, thrown at a height of 184 ft. across the Durance. The modern town extends in the plain at the S.W. foot of the plateau on which the old town is built and forms the suburb of Ste Catherine, with the railway station, and an important silk-weaving factory. Briançon is 51½ m. by rail from Gap. The commune had a civil population in 1906 of 4883 (urban population 3130), while the permanent garrison was 2641—in all 7524 inhabitants.

Briançon was the *Brigantium* of the Romans and formed part of the kingdom of King Cottius. About 1040 it came into the hands of the counts of Albon (later dauphins of the Viennois) and thenceforth shared the fate of the Dauphiné. The Briançonnais included not merely the upper valley of the Durance (with those of its affluents, the Gyronde and the Guil), but also the valley of the Dora Riparia (Césanne, Oulx, Bardonnèche and Exilles), and that of the Chisone (Fénestrelles, Pérouse, Pragelas)—these glens all lying on the eastern slope of the chain of the Alps. But by the treaty of Utrecht (1713) all these valleys were handed over to Savoy in exchange for that of Barcelonnette, on the west slope of the Alps. In 1815 Briançon successfully withstood a siege of three months at the hands of the Allies, a feat which is commemorated by an inscription on one of its gates, *Le passé répond de l'avenir*.

(W. A. B. C.)

BRIAND, ARISTIDE (1862-), French statesman, was born at Nantes, of a bourgeois family. He studied law, and while still young took to politics, associating himself with the most advanced movements, writing articles for the anarchist journal *Le Peuple*, and directing the *Lanterne* for some time. From this he passed to the *Petite République*, leaving it to found, with Jean Jaurès, *L'Humanité*. At the same time he was prominent in the movement for the formation of labour unions, and at the congress of working men at Nantes in 1894 he secured the adoption of the labour union idea against the adherents of Jules Guesde. From that time, Briand became one of the leaders of the French Socialist party. In 1902, after several unsuccessful attempts, he was elected deputy. He declared himself a strong partisan of the union of the Left in what is known as the *Bloc*, in order to check the reactionary deputies of the Right. From the beginning of his career in the chamber of deputies, Briand was occupied with the question of the separation of church and state. He was appointed reporter of the commission charged with the preparation of the law, and his masterly report at once marked him out as one of the coming leaders. He succeeded in carrying his project through with but slight modifications, and without dividing the parties upon whose support he relied. He was the principal author of the law of separation, but, not content with preparing it, he wished to apply it as well, especially as the existing Rouvier
[v.04 p.0516] ministry allowed disturbances to occur during the taking of inventories of church property, a clause of the law for which Briand was not responsible. Consequently he accepted the portfolio of public instruction and worship in the Sarrien ministry (1906). So far as the chamber was concerned his success was complete. But the acceptance of a portfolio in a bourgeois ministry led to his exclusion from the Unified Socialist party (March 1906). As opposed to Jaurès, he contended that the Socialists should co-operate actively with the Radicals in all matters of reform, and not stand aloof to await the complete fulfilment of their ideals.

BRIANZA, a district of Lombardy, Italy, forming the south part of the province of Como, between the two southern arms of the lake of that name. It is thickly populated and remarkable for its fertility; and being hilly is a favourite summer resort of the Milanese.

BRIARE, a town of north-central France in the department of Loiret on the right bank of the Loire, 45½ m. S.E. of Orléans on the railway to Nevers. Pop. (1906) 4613. Briare, the *Brivodorum* of the Romans, is situated at the extremity of the Canal of Briare, which unites the Loire and its lateral canal with the Loing and so with the Seine. The canal of Briare was constructed from 1605 to 1642 and is about 36 m. long. The industries include the manufacture of fine pottery, and of so-called porcelain buttons made of felspar and milk by a special process; its inventor, Bapterosses, has a bust in the town. The canal traffic is in wood, iron, coal, building materials, &c. A modern hospital and church, and the hôtel de ville installed in an old moated château, are the chief buildings. The lateral canal of the Loire crosses the Loire near Briare by a fine canal-bridge 720 yds. in length.

BRIAREUS, or AEGAEON, in Greek mythology, one of the three hundred-armed, fifty-headed Hecatoncheires, brother of Cottus and Gyges (or Gyes). According to Homer (*Iliad* i. 403) he was called Aegaeon by men, and Briareus by the gods. He was the son of Poseidon (or Uranus) and Gaea. The legends regarding him and his brothers are various and somewhat contradictory. According to the most widely spread myth, Briareus and his brothers were called by Zeus to his assistance when the Titans were making war upon Olympus. The gigantic enemies were defeated and consigned to Tartarus, at the gates of which the three brothers were placed (Hesiod, *Theog.* 624, 639, 714). Other accounts make Briareus one of the assailants of Olympus, who, after his defeat, was buried under Mount Aetna (Callimachus, *Hymn to Delos*, 141). Homer mentions him as assisting Zeus when the other Olympian deities were plotting against the king of gods and men (*Iliad* i. 398). Another tradition makes him a giant of the sea, ruler of the fabulous Aegaea in Euboea, an enemy of Poseidon and the inventor of warships (Schol. on Apoll. Rhod. i. 1165). It would be difficult to determine exactly what natural phenomena are symbolized by the Hecatoncheires. They may represent the gigantic forces of nature which appear in earthquakes and other convulsions, or the multitudinous motion of the sea waves (Mayer, *Die Giganten und Titanen*, 1887).

BRIBERY (from the O. Fr. *briberie*, begging or vagrancy, *bribe*, Mid. Lat. *briba*, signifying a piece of bread given to beggars; the Eng. "bribe" has passed through the meanings of alms, blackmail and extortion, to gifts received or given in order to influence corruptly). The public offence of bribery may be defined as the offering or giving of payment in some shape or form that it may be a motive in the performance of functions for which the proper motive ought to be a conscientious sense of duty. When this is superseded by the sordid impulses created by the bribe, a person is said to be corrupted, and thus corruption is a term sometimes held equivalent to bribery. The offence may be divided into two great classes—the one where a person invested with power is induced by payment to use it unjustly; the other, where power is obtained by purchasing the suffrages of those who can impart it. It is a natural propensity, removable only by civilization or some powerful counteracting influence, to feel that every element of power is to be employed as much as possible for the owner's own behoof, and that its benefits should be conferred not on those who best deserve them, but on those who will pay most for them. Hence judicial corruption is an inveterate vice of imperfect civilization. There is, perhaps no other crime on which the force of law, if unaided by public opinion and morals, can have so little influence; for in other crimes, such as violence or fraud, there is generally some person immediately injured by the act, who can give his aid in the detection of the offender, but in the perpetration of the offence of bribery all the immediate parties obtain what they desire, and are satisfied.

The purification of the bench from judicial bribery has been gradual in most of the European countries. In France it received an impulse in the 16th century from the high-minded chancellor, Michel de L'Hôpital. In England judicial corruption has been a crime of remarkable rarity. Indeed, with the exception of a statute of 1384 (repealed by the Statute Law Revision Act 1881) there has been no legislation relating to judicial bribery. The earliest recorded case was that of Sir William Thorpe, who in 1351 was fined and removed from office for accepting bribes. Other celebrated cases were those of Michael de la Pole, chancellor of England, in 1387; Lord Chancellor Bacon in 1621; Lionel Cranfield, earl of Middlesex, in 1624; and Sir Thomas Parker, 1st earl of Macclesfield, in 1725. In Scotland for some years after the Revolution the bench was not without a suspicion of interested partiality; but since the beginning of the 19th century, at least, there has been in all parts of the empire a perfect reliance on its purity. The same may be said of the higher class of ministerial officers. There is no doubt that in the period from the Revolution to the end of Queen Anne's reign, when a speaker of the House of Commons was expelled for bribery, and the great Marlborough could not clear his character from pecuniary dishonesty, there was much corruption in the highest official quarters. The level of the offence of official bribery has gradually descended, until it has become an extremely rare thing for the humbler officers connected with the revenue to be charged with it. It has had a more lingering existence with those who, because their power is more of a constitutional than an official character, have been deemed less responsible to the public. During Walpole's administration there is no doubt that members of parliament were paid in cash for votes; and the memorable saying, that every man has his price, has been preserved as a characteristic indication of his method of government. One of the forms in which administrative corruption is most difficult of eradication is the appointment to office. It is sometimes maintained that the purity which characterizes the administration of justice is here unattainable, because in giving a judgment there is but one form in which it can be justly given, but when an office has to be filled many people may be equally fitted for it, and personal motives must influence a choice. It very rarely happens, however, that direct bribery is supposed to influence such appointments. It does not appear that bribery was conspicuous in England until, in the early part of the 18th century, constituencies had thrown off the feudal dependence which lingered among them; and, indeed, it is often said, that bribery is essentially the defect of a free people, since it is the sale of that which is taken from others without payment.

In English law bribery of a privy councillor or a juryman (see Embracery) is punishable as a misdemeanour, as is the taking of a bribe by any judicial or ministerial officer. The buying and selling of public offices is also regarded at common law as a form of bribery. By the Customs Consolidation Act 1876, any officer in the customs service is liable to instant dismissal and a penalty of £500 for taking a bribe, and any person offering or promising a bribe or reward to an officer to neglect his duty or conceal or connive at any act by which the customs may be evaded shall forfeit the sum of £200. Under the Inland Revenue Regulations Act 1890, the bribery of commissioners, collectors, officers or other persons employed in relation to the Inland Revenue involves a fine of £500. The Merchant Shipping Act 1894, ss. 112 and 398, makes provision for
[v.04 p.0517] certain offences in the nature of bribery. Bribery is, by the Extradition Act 1906, an extraditable offence. Administrative corruption was dealt with in the Public Bodies' Corrupt Practices Act 1889. The public bodies concerned are county councils, town or borough councils, boards, commissioners, select vestries and other bodies having local government, public health or poor law powers, and having for those purposes to administer rates raised under public general acts. The giving or receiving, promising, offering, soliciting or agreeing to receive any gift, fee, loan or advantage by any person as an inducement for any act or forbearance by a member, officer or servant of a public body in regard to the affairs of that body is made a misdemeanour in England and Ireland and a crime and offence in Scotland. Prosecution under the act requires the consent of the attorney or solicitor-general in England or Ireland and of the lord advocate in Scotland. Conviction renders liable to imprisonment with or without hard labour for a term not exceeding two years, and to a fine not exceeding £500, in addition to or in lieu of imprisonment. The offender may also be ordered to pay to the public body concerned any bribe received by him; he may be adjudged incapable for seven years of holding public office, *i.e.* the position of member, officer or servant of a public body; and if already an officer or servant, besides forfeiting his place, he is liable at the discretion of the court to forfeit his right to compensation or pension. On a second conviction he may be adjudged forever incapable of holding public office, and for seven years incapable of being registered or of voting as a parliamentary elector, or as an elector of members of a public body. An offence under the act may be prosecuted and punished under any other act applicable thereto, or at common law; but no person is to be punished twice for the same offence. Bribery at political elections was at common law punishable by indictment or information, but numerous statutes have been passed dealing with it as a "corrupt practice." In this sense, the word is elastic in meaning and may embrace any method of corruptly influencing another for the purpose of securing his vote (see Corrupt Practices). Bribery at elections of fellows, scholars, officers and other persons in colleges, cathedral and collegiate churches, hospitals and other societies was prohibited in 1588-1589 by statute (31 Eliz. c. 6). If a member receives any money, fee, reward or other profit for giving his vote in favour of any candidate, he forfeits his own place; if for any such consideration he resigns to make room for a candidate, he forfeits double the amount of the bribe, and the candidate by or on whose behalf a bribe is given or promised is incapable of being elected on that occasion. The act is to be read at every election of fellows, &c., under a penalty of £40 in case of default. By the same act any person for corrupt consideration presenting, instituting or inducting to an ecclesiastical benefice or dignity forfeits two years' value of the benefice or dignity; the corrupt presentation is void, and the right to present lapses for that turn to the crown, and the corrupt presentee is disabled from thereafter

holding the same benefice or dignity; a corrupt institution or induction is void, and the patron may present. For a corrupt resignation or exchange of a benefice the giver and taker of a bribe forfeit each double the amount of the bribe. Any person corruptly procuring the ordaining of ministers or granting of licenses to preach forfeits £40, and the person so ordained forfeits £10 and for seven years is incapacitated from holding any ecclesiastical benefice or promotion.

In the United States the offence of bribery is very severely dealt with. In many states, bribery or the attempt to bribe is made a felony, and is punishable with varying terms of imprisonment, in some jurisdictions it may be with a period not exceeding ten years. The offence of bribery at elections is dealt with on much the same lines as in England, voiding the election and disqualifying the offender from holding any office.

Bribery may also take the form of a secret commission (*q.v.*), a profit made by an agent, in the course of his employment, without the knowledge of his principal.

BRIC À BRAC (a French word, formed by a kind of onomatopoeia, meaning a heterogeneous collection of odds and ends; cf. *de bric et de broc*, corresponding to our "by hook or by crook"; or by reduplication from *brack*, refuse), objects of "virtu," a collection of old furniture, china, plate and curiosities.

BRICK (derived according to some etymologists from the Teutonic *bricke*, a disk or plate; but more authoritatively, through the French *brique*, originally a "broken piece," applied especially to bread, and so to clay, from the Teutonic *brikan*, to break), a kind of artificial stone generally made of burnt clay, and largely used as a building material.

History.—The art of making bricks dates from very early times, and was practised by all the civilized nations of antiquity. The earliest burnt bricks known are those found on the sites of the ancient cities of Babylonia, and it seems probable that the method of making strong and durable bricks, by burning blocks of dried clay, was discovered in this corner of Asia. We know at least that well-burnt bricks were made by the Babylonians more than 6000 years ago, and that they were extensively used in the time of Sargon of Akkad (*c.* 3800 B.C.). The site of the ancient city of Babylon is still marked by huge mounds of bricks, the ruins of its great walls, towers and palaces, although it has been the custom for centuries to carry away from these heaps the bricks required for the building of the modern towns in the surrounding country. The Babylonians and Assyrians attained to a high degree of proficiency in brickmaking, notably in the manufacture of bricks having a coating of coloured glaze or enamel, which they largely used for wall decoration. The Chinese claim great antiquity for their clay industries, but it is not improbable that the knowledge of brickmaking travelled eastwards from Babylonia across the whole of Asia. It is believed that the art of making glazed bricks, so highly developed afterwards by the Chinese, found its way across Asia from the west, through Persia and northern India, to China. The great wall of China was constructed partly of brick, both burnt and unburnt; but this was built at a comparatively late period (*c.* 210 B.C.), and there is nothing to show that the Chinese had any knowledge of burnt bricks when the art flourished in Babylonia.

Brickmaking formed the chief occupation of the Israelites during their bondage in Egypt, but in this case the bricks were probably sun-dried only, and not burnt. These bricks were made of a mixture of clay and chopped straw or reeds, worked into a stiff paste with water. The clay was the river mud from the banks of the Nile, and as this had not sufficient cohesion in itself, the chopped straw (or reeds) was added as a binding material. The addition of such substances increases the plasticity of wet clay, especially if the mixture is allowed to stand for some days before use; so that the action of the chopped straw was twofold; a fact possibly known to the Egyptians. These sun-dried bricks, or "adobes," are still made, as of old, on the banks of the Nile by the following method:—A shallow pit or bed is prepared, into which are thrown the mud, chopped straw and water in suitable proportions, and the whole mass is tramped on until it is thoroughly mixed and of the proper consistence. This mixture is removed in lumps and shaped into bricks, in moulds or by hand, the bricks being simply sun-dried.

Pliny mentions that three kinds of bricks were made by the Greeks, but there is no indication that they were used to any great extent, and probably the walls of Athens on the side towards Mount Hymettus were the most important brick-structures in ancient Greece. The Romans became masters of the brickmaker's art, though they probably acquired much of their knowledge in the East, during their occupation of Egypt and Greece. In any case they revived and extended the manufacture of bricks about the beginning of the Christian era; exercising great care in the selection and preparation of their clay, and introducing the method of burning bricks in kilns. They carried their knowledge and their methods throughout western Europe, and there is abundant evidence that they made bricks extensively in Germany and in Britain.

Although brickmaking was thus introduced into Britain nearly 2000 years ago, the art seems to have been lost when the Romans withdrew from the country, and it is doubtful whether any burnt bricks were made in England from that time until the 13th century. Such bricks as were used during this long period were generally taken from the remains of Roman buildings, as at Colchester and St Albans Abbey. One of the earliest existing brick buildings, erected after the revival of brickmaking in England, is Little Wenham Hall, in Suffolk, built about A.D. 1210; but it was not until the 15th century that bricks came into general use again, and then only for important edifices. During the reign of Henry VIII. brickmaking was brought to great perfection, probably by workmen brought from Flanders, and the older portions of St James's Palace and Hampton Court Palace remain to testify to the skill then attained. In the 16th century bricks were

increasingly used, but down to the Great Fire of London, in 1666, the smaller buildings, shops and dwelling-houses, were constructed of timber framework filled in with lath and plaster. In the rebuilding of London after the fire, bricks were largely used, and from the end of the 17th century to the present day they have been almost exclusively used in all ordinary buildings throughout the country, except in those districts where building stone is plentiful and good brick-clay is not readily procurable. The bricks made in England before 1625 were of many sizes, there being no recognized standard; but in that year the sizes were regulated by statute, and the present standard size was adopted, viz. 9 x 4½ x 3 in. In 1784 a tax was levied on bricks, which was not repealed until 1850. The tax averaged about 4s. 7d. per thousand on ordinary bricks, and special bricks were still more heavily taxed.

The first brick buildings in America were erected on Manhattan Island in the year 1633 by a governor of the Dutch West India Company. These bricks were made in Holland, where the industry had long reached great excellence; and for many years bricks were imported into America from Holland and from England. In America burnt bricks were first made at New Haven about 1650, and the manufacture slowly spread through the New England states; but for many years the home-made article was inferior to that imported from Europe.

The Dutch and the Germans were the great brickmakers of Europe during the middle ages, although the Italians, from the 14th to the 15th century, revived and developed the art of decorative brick-work or terra-cotta, and discovered the method of applying coloured enamels to these materials. Under the Della Robbias, in the 15th century, some of the finest work of this class that the world has seen was executed, but it can scarcely be included under brickwork.

Brick Clays.—All clays are the result of the denudation and decomposition of felspathic and siliceous rocks, and consist of the fine insoluble particles which have been carried in suspension in water and deposited in geologic basins according to their specific gravity and degree of fineness (see Clay). These deposits have been formed in all geologic epochs from the "Recent" to the "Cambrian," and they vary in hardness from the soft and plastic "alluvial" clays to the hard and rock-like shales and slates of the older formations. The alluvial and drift clays (which were alone used for brickmaking until modern times) are found near the surface, are readily worked and require little preparation, whereas the older sedimentary deposits are often difficult to work and necessitate the use of heavy machinery. These older shales, or rocky clays, may be brought into plastic condition by long weathering (*i.e.* by exposure to rain, frost and sun) or by crushing and grinding in water, and they then resemble ordinary alluvial clays in every respect.

The clays or earths from which burnt bricks are made may be divided into two principal types, according to chemical composition: (1) Clays or shales containing only a small percentage of carbonate of lime and consisting chiefly of hydrated aluminium silicates (the "true clay substance") with more or less sand, undecomposed grains of felspar, and oxide or carbonate of iron; these clays usually burn to a buff, salmon or red colour; (2) Clays containing a considerable percentage of carbonate of lime in addition to the substances above mentioned. These latter clay deposits are known as "marls,"[1] and may contain as much as 40% of chalk. They burn to a sulphur-yellow colour which is quite distinctive.

Brick clays of class (1) are very widely distributed, and have a more extensive geological range than the marls, which are found in connexion with chalk or limestone formations only. These ordinary brick clays vary considerably in composition, and many clays, as they are found in nature, are unsuitable for brickmaking without the addition of some other kind of clay or sand. The strongest brick clays, *i.e.* those possessing the greatest plasticity and tensile strength, are usually those which contain the highest percentage of the hydrated aluminium silicates, although the exact relation of plasticity to chemical composition has not yet been determined. This statement cannot be applied indiscriminately to all clays, but may be taken as fairly applicable to clays of one general type (see Clay). All clays contain more or less free silica in the form of sand, and usually a small percentage of undecomposed felspar. The most important ingredient, after the clay-substance and the sand, is oxide of iron; for the colour, and, to a less extent, the hardness and durability of the burnt bricks depend on its presence. The amount of oxide of iron in these clays varies from about 2 to 10%, and the colour of the bricks varies accordingly from light buff to chocolate; although the colour developed by a given percentage of oxide of iron is influenced by the other substances present and also by the method of firing. A clay containing from 5 to 8% of oxide of iron will, under ordinary conditions of firing, produce a red brick; but if the clay contains 3 to 4% of alkalis, or the brick is fired too hard, the colour will be darker and more purple. The actions of the alkalis and of increased temperature are probably closely related, for in either case the clay is brought nearer to its fusion point, and ferruginous clays generally become darker in colour as they approach to fusion. Alumina acts in the opposite direction, an excess of this compound tending to make the colour lighter and brighter. It is impossible to give a typical composition for such clays, as the percentages of the different constituents vary through such wide ranges. The clay substance may vary from 15 to 80%, the free silica or sand from 5 to 80%, the oxide of iron from 1 to 10%, the carbonates of lime and magnesia together, from 1 to 5%, and the alkalis from 1 to 4%. Organic matter is always present, and other impurities which frequently occur are the sulphates of lime and magnesia, the chlorides and nitrates of soda and potash, and iron-pyrites. The presence of organic matter gives the wet clay a greater plasticity, probably because it forms a kind of mucilage which adds a certain viscosity and adhesiveness to the natural plasticity of the clay. In some of the coal-measure shales the amount of organic matter is very considerable, and may render the clay useless for brickmaking. The other impurities, all of which, except the pyrites, are soluble in water, are undesirable, as they give rise

to "scum," which produces patchy colour and pitted faces on the bricks. The commonest soluble impurity is calcium sulphate, which produces a whitish scum on the face of the brick in drying, and as the scum becomes permanently fixed in burning, such bricks are of little use except for common work. This question of "scumming" is very important to the maker of high-class facing and moulded bricks, and where a clay containing calcium sulphate must be used, a certain percentage of barium carbonate is nowadays added to the wet clay. By this means the calcium sulphate is converted into calcium carbonate which is insoluble in water, so that it remains distributed throughout the mass of the brick instead of being deposited on the surface. The presence of magnesium salts is also very objectionable, as these generally remain in the burnt brick as magnesium sulphate, which gives rise to an efflorescence of fine white crystals after the bricks are built into position. Clays which are strong or plastic are known as "fat" clays, and they always contain a high percentage of true "clay substance," and, consequently, a low percentage of sand. Such clays take up a considerable amount of water in "tempering"; they dry slowly, shrink greatly, and so become liable to lose their shape and develop cracks in drying and firing.
[v.04 p.0519] "Fat" clays are greatly improved by the addition of coarse sharp sand, which reduces the time of drying and the shrinkage, and makes the brick more rigid during the firing. Coarse sand, unlike clay-substance, is practically unaffected during the drying and firing, and is a desirable if not a necessary ingredient of all brick clays. The best brick-clays feel gritty between the fingers; they should, of course, be free from pebbles, sufficiently plastic to be moulded into shape and strong enough when dry to be safely handled. All clays are greatly improved by being turned over and exposed to the weather, or by standing for some months in a wet condition. This "weathering" and "ageing" of clay is particularly important where bricks are made from tempered clay, *i.e.* clay in the wet or plastic state; where bricks are made from shale, in the semi-plastic condition, weathering is still of importance.

The lime clays or "marls" of class (2), which contain essentially a high percentage of chalk or limestone, are not so widely distributed as the ordinary brick-clays, and in England the natural deposits of these clays have been largely exhausted. A very fine chalk-clay, or "malm" as it was locally called, was formerly obtained from the alluvium in the vicinity of London; but the available supply of this has been used up, and at the present time an artificial "malm" is prepared by mixing an ordinary brick-clay with ground chalk. For the best London facing-bricks the clay and chalk are mixed in water. The chalk is ground on grinding-pans, and the clay is mixed with water and worked about until the mixture has the consistence of cream. The mixture of these "pulps" is run through a grating or coarse sieve on to a drying-kiln or "bed," where it is allowed to stand until stiff enough to walk on. A layer of fine ashes is then spread over the clay, and the mass is turned over and mixed by spade, and tempered by the addition of water. In other districts, where clays containing limestone are used, the marl is mixed with water on a wash-pan and the resulting creamy fluid passed through coarse sieves on to a drying-bed. If necessary, coarse sand is added to the clay in the wash-pan, and such addition is often advisable because the washed clays are generally very fine in grain. Another method of treating these marls, when they are in the plastic condition, is to squeeze them by machinery through iron gratings, which arrest and remove the pebbles. In other cases the marl is passed through a grinding-mill having a solid bottom and heavy iron rollers, by which means the limestone pebbles are crushed sufficiently and mixed through the whole mass. The removal of limestone pebbles from the clay is of great importance, as during the firing they would be converted into quicklime, which has a tendency to shatter the brick on exposure to the weather. As before stated, these marls (which usually contain from 15 to 30% of calcium carbonate) burn to a yellow colour which is quite distinctive, although in some cases, where the percentage of limestone is very high, over 40%, the colour is grey or a very pale buff. The action of lime in bleaching the ferric oxide and producing a yellow instead of a red brick, has not been thoroughly investigated, but it seems probable that some compound is produced, between the lime and the oxide of iron, or between these two oxides and the free silica, entirely different from that produced by oxide of iron in the absence of lime. Such marls require a harder fire than the ordinary brick-clays in order to bring about the reaction between the lime and the other ingredients. Magnesia may replace lime to some extent in such marls, but the firing temperature must be higher when magnesia is present. Marls usually contract very little, if at all, in the burning, and generally produce a strong, square brick of fine texture and good colour. When under-fired, marl bricks are very liable to disintegrate under the action of the weather, and great care must be exercised in burning them at a sufficiently high temperature.

Brickmaking.—Bricks made of tempered clay may be made by hand or by machine, and the machines may be worked by hand or by mechanical power. Bricks made of semi-plastic clay (*i.e.* ground clay or shale sufficiently damp to adhere under pressure) are generally machine-made throughout. The method of making bricks by hand is the same, with slight variation, the world over. The tempered clay is pressed by hand into a wooden or metal mould or four-sided case (without top or bottom) which is of the desired shape and size, allowance being made for the shrinkage of the brick in drying and firing. The moulder stands at the bench or table, dips the mould in water, or water and then sand, to prevent the clay from sticking, takes a rudely shaped piece of clay from an assistant, and dashes this into the mould which rests on the moulding bench. He then presses the clay into the corners of the mould with his fingers, scrapes off any surplus clay and levels the top by means of a strip of wood called a "strike," and then turns the brick out of the mould on to a board, to be carried away by another assistant to the drying-ground. The mould may be placed on a special piece of wood, called the stock-board, provided with an elevated tongue of wood in the centre, which produces the hollow or "frog" in the bottom of the brick.

Machine-made bricks may be divided into two kinds, plastic and semi-plastic, although the same type of machine is often used for both kinds.

The machine-made plastic bricks are made of tempered clay, but generally the tempering and working of the clay are effected by the use of machinery, especially when the harder clays and shales are used. The machines used in the preparation of such clays are grinding-mills and pug-mills. The grinding-mills are either a series of rollers with graduated spaces between, through which the clay or shale is passed, or are of the ordinary "mortar pan" type, having a solid or perforated iron bottom on which the clay or shale is crushed by heavy rollers. Shales are sometimes passed through a grinding-mill before they are exposed to the action of the weather, as the disintegration of the hard lumps of shale greatly accelerates the "weathering." In the case of ordinary brick-clay, in the plastic condition, grinding-mills are only used when pebbles more than a quarter of an inch in diameter are present, as otherwise the clay may be passed directly through the pug-mill, a process which may be repeated if necessary. The pug-mill consists of a box or trough having a feed hole at one end and a delivery hole or nose at the other end, and provided with a central shaft which carries knives and cutters so arranged that when the shaft revolves they cut and knead the clay, and at the same time force it towards and through the delivery nose. The cross section of this nose of the pug-mill is approximately the same as that of the required brick (9 in. × 4½ in. plus contraction, for ordinary bricks), so that the pug delivers a solid or continuous mass of clay from which bricks may be made by merely making a series of square cuts at the proper distances apart. In practice, the clay is pushed from the pug along a smooth iron plate, which is provided with a wire cutting frame having a number of tightly stretched wires placed at certain distances apart, arranged so that they can be brought down upon, and through, the clay, and so many bricks cut off at intervals. The frame is sometimes in the form of a skeleton cylinder, the wires being arranged radially (or the wires may be replaced by metal disks); but in all cases bricks thus made are known as "wire-cuts." In order to obtain a better-shaped and more compact brick, these wire-cuts may be placed under a brick press and there squeezed into iron moulds under great pressure. These two processes are now generally performed by one machine, consisting of pug-mill and brick press combined. The pug delivers the clay, downwards, into the mould; the proper amount of clay is cut off; and the mould is made to travel into position under the ram of the press, which squeezes the clay into a solid mass.

There are many forms of brick press, a few for hand power, but the most adapted for belt-driving; although in recent years hydraulic presses have come more and more into use, especially in Germany and America. The essential parts of a brick press are: (1) a box or frame in which the clay is moulded; (2) a plunger or die carried on the end of a ram, which gives the necessary pressure; (3) an arrangement for pushing the pressed brick out of the moulding box. Such presses are generally made of iron throughout, although other metals are used, occasionally, for the moulds and dies. The greatest variations found in brick presses are in the means adopted for actuating the ram; and many ingenious mechanical devices have been applied to this end, each claiming some particular advantage over its predecessors. In many recent presses, especially where semi-plastic clay is used, the brick is pressed simultaneously from top and bottom, a second ram, working upwards from beneath, giving the additional pressure.

Although the best bricks are still pressed from tempered or plastic clay, there has recently been a great development in the manufacture of semi-plastic or dust-made bricks, especially in those districts where shales are used for brickmaking. These semi-plastic bricks are stamped out of ground shale that has been sufficiently moistened with water to enable it to bind together. The hard-clay, or shale, is crushed under heavy rollers in an iron grinding-pan having a perforated bottom through which the crushed clay passes, when sufficiently fine, into a small compartment underneath. This clay powder is then delivered, by an elevator, into a sieve or screen, which retains the coarser particles for regrinding. Sets of rollers may also be used for crushing shales that are only moderately hard, the ground material being sifted as before. The material, as fed into the mould of the press, is a coarse, damp powder which becomes adhesive under pressure, producing a so-called "semi-plastic" brick. The presses used are similar to those employed for plastic clay, but they are generally more strongly and heavily built, and are capable of applying a greater pressure.

[v.04 p.0520]

The semi-plastic method has many advantages where shales are used, although the bricks are not as strong nor as perfect as the best "plastic" bricks. The method, however, enables the brickmaker to make use of certain kinds of clay-rock, or shale, that would be impracticable for plastic bricks; and the weathering, tempering and "ageing" may be largely or entirely dispensed with. The plant required is heavier and more costly, but the brickyard becomes more compact, and the processes are simpler than with the "plastic" method.

The drying of bricks, which was formerly done in the open, is now, in most cases, conducted in a special shed heated by flues along which the heated gases from the kilns pass on their way to the chimney. It is important that the atmosphere of the drying-shed should be fairly dry, to which end suitable means of ventilation must be arranged (by fans or otherwise). If the atmosphere is too moist the surface of the brick remains damp for a considerable time, and the moisture from the interior passes to the surface as water, carrying with it the soluble salts, which are deposited on the surface as the water slowly evaporates. This deposit produces the "scum" already referred to. When the drying is done in a dry atmosphere the surface quickly dries and hardens, and the moisture from the interior passes to the surface as vapour, the soluble salts being left distributed through the whole mass, and consequently no "scum" is produced. Plastic bricks take much longer to dry than semi-plastic; they shrink more and have a greater tendency to warp or twist.

The burning or firing of bricks is the most important factor in their production; for their strength and durability depend very largely on the character and degree of the firing to which they have been subjected. The action of the heat brings about certain chemical decompositions and re-combinations which entirely alter the physical character of the dry clay. It is important, therefore, that the firing should be carefully conducted and that it should be under proper control. For ordinary bricks the firing atmosphere should be oxidizing, and the finishing temperature should be adjusted to the nature of the clay, the object being to produce a hard strong brick, of good shape, that will not be too porous and will withstand the action of frost. The finishing temperature ranges from 900° C. to 1250° C., the usual temperature being about 1050° C. for ordinary bricks. As before mentioned, lime-clays require a higher firing temperature (usually about 1150° C. to 1200° C.) in order to bring the lime into chemical combination with the other substances present.

It is evident that the best method of firing bricks is to place them in permanent kilns, but although such kilns were used by the Romans some 2000 years ago, the older method of firing in "clamps" is still employed in the smaller brickfields, in every country where bricks are made. These clamps are formed by arranging the unfired bricks in a series of rows or walls, placed fairly closely together, so as to form a rectangular stack. A certain number of channels, or firemouths, are formed in the bottom of the clamp; and fine coal is spread in horizontal layers between the bricks during the building up of the stack. Fires are kindled in the fire-mouths, and the clamp is allowed to go on burning until the fuel is consumed throughout. The clamp is then allowed to cool, after which it is taken down, and the bricks sorted; those that are under-fired being built up again in the next clamp for refiring. Sometimes the clamp takes the form of a temporary kiln, the outside being built of burnt bricks which are plastered over with clay, and the fire-mouths being larger and more carefully formed. There are many other local modifications in the manner of building up the clamps, all with the object of producing a large percentage of well-fired bricks. Clamp-firing is slow, and also uneconomical, because irregular and not sufficiently under control; and it is now only employed where bricks are made on a small scale.

Brick-kilns are of many forms, but they can all be grouped under two main types—Intermittent kilns and Continuous kilns. The intermittent kiln is usually circular in plan, being in the form of a vertical cylinder with a domed top. It consists of a single firing-chamber in which the unfired bricks are placed, and in the walls of which are contrived a number of fire-mouths where wood or coal is burned. In the older forms known as *up-draught* kilns, the products of combustion pass from the fire-mouth, through flues, into the bottom of the firing-chamber, and thence directly upwards and out at the top. The modern plan is to introduce the products of combustion near the top, or crown, of the kiln, and to draw them downwards through holes in the bottom which lead to flues connected with an independent chimney. These *down-draught* kilns have short chimneys or "bags" built round the inside wall in connexion with the fire-mouths, which conduct the flames to the upper part of the firing-chamber, where they are reverberated and passed down through the bricks in obedience to the pull of the chimney. The "bags" may be joined together, forming an inner circular wall entirely round the firing-chamber, except at the doorway; and a number of kilns may be built in a row or group having their bottom flues connected with the same tall chimney. Down-draught kilns usually give a more regular fire and a higher percentage of well-fired bricks; and they are more economical in fuel consumption than up-draught kilns, while the hot gases, as they pass from the kiln, may be utilized for drying purposes, being conducted through flues under the floor of the drying-shed, on their way to the chimney. The method of using one tall chimney to work a group of down-draught kilns naturally led to the invention of the "continuous" kiln, which is really made up of a number of separate kilns or firing-chambers, built in series and connected up to the main flue of the chimney in such a manner that the products of combustion from one kiln may be made to pass through a number of other kilns before entering the flue. The earliest form of continuous kiln was invented by Friedrich Hoffman, and all kilns of this type are built on the Hoffman principle, although there are a great number of modifications of the original Hoffman construction. The great principle of "continuous" firing is the utilization of the waste heat from one kiln or section of a kiln in heating up another kiln or section, direct firing being applied only to finish the burning. In practice a number of kilns or firing-chambers, usually rectangular in plan, are built side by side in two parallel lines, which are connected at the ends by other kilns so as to make a complete circuit. The original form of the complete series was elliptical in plan, but the tendency in recent years has been to flatten the sides of the ellipse and bring them together, thus giving two parallel rows joined at the ends by a chamber or passage at right angles. Coal or gas is burnt in the chamber or section that is being fired-up, the air necessary for the combustion being heated on its passage through the kilns that are cooling down, and the products of combustion, before entering the chimney flue, are drawn through a number of other kilns or chambers containing unfired bricks, which are thus gradually heated up by the otherwise waste-heat from the sections being fired. Continuous kilns produce a more evenly fired product than the intermittent kilns usually do, and, of course, at much less cost for fuel. Gas firing is now being extensively applied to continuous kilns, natural gas in some instances being used in the United States of America; and the methods of construction and of firing are carried out with greater care and intelligence, the prime objects being economy of fuel and perfect control of firing. Pyrometers are coming into use for the control of the firing temperature, with the result that a constant and trustworthy product is turned put. The introduction of machinery greatly helped the brickmaking industry in opening up new sources of supply of raw material in the shales and hardened clays of the sedimentary deposits of the older geologic formations, and, with the extended use of continuous firing plants, it has led to the establishment of large concerns where everything is co-ordinated for the production of enormous

quantities of bricks at a minimum cost. In the United Kingdom, and still more in Germany and the United States of America, great improvements have been made in machinery, firing-plant and organization, so that the whole manufacture is now being conducted on more scientific lines, to the great advantage of the industry.

Blue Brick is a very strong vitreous brick of dark, slaty-blue colour, used in engineering works where great strength or impermeability is desirable. These bricks are made of clay containing front 7 to 10% of oxide of iron, and their manufacture is carried out in the ordinary way until the later stages of the firing process, when they are subjected to the strongly reducing action of a smoky atmosphere, which is produced by throwing small bituminous coal upon the fire-mouths and damping down the admission of air. The smoke thus produced reduces the red ferric oxide to blue-green ferrous oxide, or to metallic iron, which combines with the silica present to form a fusible ferrous silicate. This fusible "slag" partly combines with the other silicates present, and partly fills up the pores, and so produces a vitreous impermeable layer varying in thickness according to the duration and character of the smoking, the finishing temperature of the kiln and the texture of the brick. Particles of carbon penetrate the surface during the early stages of the smoking, and a small quantity of carbon probably enters into combination, tending to produce a harder surface and darker colour.

Floating Bricks were first mentioned by Strabo, the Greek geographer, and afterwards by Pliny as being made at Pitane in the Troad. The secret of their manufacture was lost for many centuries, but was rediscovered in 1791 by Fabroni, an Italian, who made them from the fossil meal (diatomaceous earth) found in Tuscany. These bricks are very light, fairly strong, and being poor conductors of heat, have been employed for the construction of powder-magazines on board ship, &c.

Mortar Bricks belong to the class of unburnt bricks, and are, strictly speaking, blocks of artificial stone made in brick moulds. These bricks have been made for many years by moulding a mixture of sand and slaked lime and allowing the blocks thus made to harden in the air. This hardening is brought about partly by evaporation of the water, but chiefly by the conversion of the calcium hydrate, or slaked lime, into calcium carbonate by the action of the carbonic acid in the atmosphere. A small proportion of the lime enters into combination with the silica and water present to form hydrated calcium silicate, and probably a little hydrated basic carbonate of lime is also formed, both of which substances are in the nature of cement. This process of natural hardening by exposure to the air was a very long one, occupying from six to eighteen months, and many improvements were introduced during the latter half of the 19th century to improve
[v.04 p.0521] the strength of the bricks and to hasten the hardening. Mixtures of sand, lime and cement (and of certain ground blast-furnace slags and lime) were introduced; the moulding was done under hydraulic presses and the bricks afterwards treated with carbon dioxide under pressure, with or without the application of mild heat. Some of these mixtures and methods are still in use, but a new type of mortar brick has come into use during recent years which has practically superseded the old mortar brick.

Sand-lime Bricks.—In the early 'eighties of the 19th century, Dr Michaelis of Berlin patented a new process for hardening blocks made of a mixture of sand and lime by treating them with high-pressure steam for a few hours, and the so-called *sand-lime* bricks are now made on a very extensive scale in many countries. There are many differences of detail in the manufacture, but the general method is in all cases the same. Dry sand is intimately mixed with about one-tenth of its weight of powdered slaked lime, the mixture is then slightly moistened with water and afterwards moulded into bricks under powerful presses, capable of exerting a pressure of about 60 tons per sq. in. After removal from the press the bricks are immediately placed in huge steel cylinders usually 60 to 80 ft. long and about 7 ft. in diameter, and are there subjected to the action of high-pressure steam (120 lb to 150 lb per sq. in.) for from ten to fifteen hours. The proportion of slaked lime to sand varies according to the nature of the lime and the purity and character of the sand, one of lime to ten of sand being a fair average. The following is an analysis of a typical German sand-lime brick: silica (SiO_2), 84%; lime (CaO), 7%; alumina and oxide of iron, 2%; water, magnesia and alkalis, 7%. Under the action of the high-pressure steam the lime attacks the particles of sand, and a chemical compound of water, lime and silica is produced which forms a strong bond between the larger particles of sand. This bond of hydrated calcium silicate is evidently different from, and of better type than, the filling of calcium carbonate produced in the mortar-brick, and the sand-lime brick is consequently much stronger than the ordinary mortar-brick, however the latter may be made. The sand-lime brick is simple in manufacture, and with reasonable care is of constant quality. It is usually of a light-grey colour, but may be stained by the addition of suitable colouring oxides or pigments unaffected by lime and the conditions of manufacture.

Strength of Brick.—The following figures indicate the crushing load for bricks of various types in tons per sq. in.:—

Common hand-made	from	0.4	to	0.9
" machine-made	"	0.9	"	1.2
London stock	"	0.7	"	1.3
Staffordshire blue	"	2.8	"	3.3

Sand-lime	"	2.9	"	3.4

See also BRICKWORK.

(J. B.*; W. B.*)

[1] The term "marl" has been wrongly applied to many fire-clays. It should be restricted to natural mixtures of clay and chalk such as those of the Paris and London basins.

BRICKFIELDER, a term used in Australia for a hot scorching wind blowing from the interior, where the sandy wastes, bare of vegetation in summer, are intensely heated by the sun. This hot wind blows strongly, often for several days at a time, defying all attempts to keep the dust down, and parching all vegetation. It is in one sense a healthy wind, as, being exceedingly dry and hot, it destroys many injurious germs of disease. The northern brickfielder is almost invariably followed by a strong "southerly buster," cloudy and cool from the ocean. The two winds are due to the same cause, viz. a cyclonic system over the Australian Bight. These systems frequently extend inland as a narrow V-shaped depression (the apex northward), bringing the winds from the north on their eastern sides and from the south on their western. Hence as the narrow system passes eastward the wind suddenly changes from north to south, and the thermometer has been known to fall fifteen degrees in twenty minutes.

BRICKWORK, in building, the term applied to constructions made of bricks. The tools and implements employed by the bricklayer are:—the trowel for spreading the mortar; the plumb-rule to keep the work perpendicular, or in the case of an inclined or battering wall, to a regular batter, for the plumb-rule may be made to suit any required inclination; the spirit-level to keep the work horizontal, often used in conjunction with a straight-edge in order to test a greater length; and the gauge-rod with the brick-courses marked on it. The quoins or angles are first built up with the aid of the gauge-rod, and the intermediate work is kept regular by means of the line and line pins fixed in the joints. The raker, jointer, pointing rule and Frenchman are used in pointing joints, the pointing staff being held on a small board called the hawk. For roughly cutting bricks the large trowel is used; for neater work such as facings, the bolster and club-hammer; the cold chisel is for general cutting away, and for chases and holes. When bricks require to be cut, the work is set out with the square, bevel and compasses. If the brick to be shaped is a hard one it is placed on a V-shaped cutting block, an incision made where desired with the tin saw, and after the bolster and club-hammer have removed the portion of the brick, the scutch, really a small axe, is used to hack off the rough parts. For cutting soft bricks, such as rubbers and malms, a frame saw with a blade of soft iron wire is used, and the face is brought to a true surface on the rubbing stone, a slab of Yorkshire stone.

In ordinary practice a scaffold is carried up with the walls and made to rest on them. Having built up as high as he can reach from the ground, the scaffolder erects a scaffold with standards, ledgers and putlogs to carry the scaffold boards (see SCAFFOLD, SCAFFOLDING). Bricks are carried to the scaffold on a hod which holds twenty bricks, or they may be hoisted in baskets or boxes by means of a pulley and fall, or may be raised in larger numbers by a crane. The mortar is taken up in a hod or hoisted in pails and deposited on ledged boards about 3 ft. square, placed on the scaffold at convenient distances apart along the line of work. The bricks are piled on the scaffold between the mortar boards, leaving a clear way against the wall for the bricklayers to move along. The workman, beginning at the extreme left of his section, or at a quoin, advances to the right, carefully keeping to his line and frequently testing his work with the plumb-rule, spirit-level and straight-edge, until he reaches another angle, or the end of his section. The pointing is sometimes finished off as the work proceeds, but in other cases the joints are left open until the completion, when the work is pointed down, perhaps in a different mortar. When the wall has reached a height from the scaffold beyond which the workman cannot conveniently reach, the scaffolding is raised and the work continued in this manner from the new level.

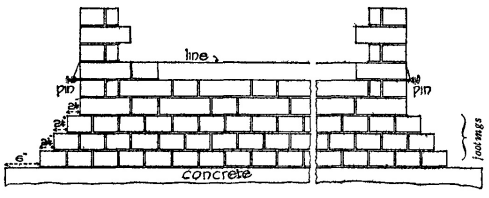

FIG. 1.

It is most important that the brickwork be kept perfectly plumb, and that every course be perfectly horizontal or level, both longitudinally and transversely. Strictest attention should be paid to the levelling of the lowest course of footings of a wall, for any irregularity will necessitate the inequality being made up with mortar in the courses above, thus inducing a liability for the wall to settle unequally, and so perpetuate the infirmity. To save the trouble of keeping the plumb-rule and level constantly in his hands and yet ensure correct work, the bricklayer, on clearing the footings of a wall, builds up six or eight courses of bricks at the external angles (see fig. 1), which he carefully plumbs and levels across. These form a gauge for the intervening work, a line being tightly strained between and fixed with steel pins to each angle at a level with the top of the next course to be laid, and with this he makes his work range. If, however, the length between the quoins be great, the line will of course sag, and it must, therefore, be carefully supported at intervals to the proper level. Care must be taken to keep the "perpends," or vertical joints, one immediately over the other. Having been carried up three or four courses to a level with the guidance of the line which is raised course by course, the work should be proved with the level and plumb-rule, particularly with the latter at the quoins and reveals, as well as over the face. A smart tap with the end of the handle of the trowel will suffice to make a brick yield what little it may be out of truth, while the work is green, and not injure it. The work of an efficient craftsman, however, will need but little

adjustment.

[v.04 p.0522] For every wall of more than one brick (9 in) thick, two men should be employed at the same time, one on the outside and the other inside; one man cannot do justice from one side to even a 14-in. wall. When the wall can be approached from one side only, the work is said to be executed "overhand." In work circular on plan, besides the level and plumb-rule, a gauge mould or template, or a ranging trammel—a rod working on a pivot at the centre of the curve, and in length equalling the radius—must be used for every course, as it is evident that the line and pins cannot be applied to this in the manner just described.

Bricks should not be merely *laid*, but each should be placed frog upwards, and rubbed and pressed firmly down in such a manner as to secure absolute adhesion, and force the mortar into joints. Every brick should be well wetted before it is laid, especially in hot dry weather, in order to wash off the dust from its surface, and to obtain more complete adhesion, and prevent it from absorbing water from the mortar in which it is bedded. The bricks are wetted either by the bricklayer dipping them in water as he uses them, or by water being thrown or sprinkled on them as they lie piled on the scaffold. In bricklaying with quick-setting cements an ample use of water is of even more importance.

All the walls of a building that are to sustain the same floors and the same roof, should be carried up simultaneously; in no circumstances should more be done in one part than can be reached from the same scaffold, until all the walls are brought up to the same height. Where it is necessary for any reason to leave a portion of the wall at a certain level while carrying up the adjoining work the latter should be racked back, i.e. left in steps as shown in fig. 7, and not carried up vertically with merely the toothing necessary for the bond.

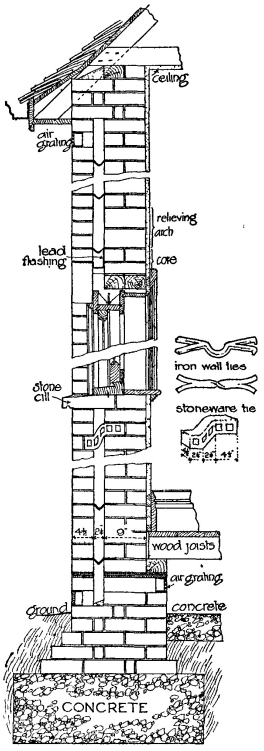

FIG. 2.—Section of a Hollow Wall.

Hollow walls. Buildings in exposed situations are frequently built with cavity-walls, consisting of the inside or main walls with an outer skin usually half a brick thick, separated from the former by a cavity of 2 or 3 in. (fig. 2). The two walls are tied together at frequent intervals by iron or stoneware ties, each having a bend or twist in the centre, which prevents the transmission of water to the inner wall. All water, therefore, which penetrates the outer wall drops to the base of the cavity, and trickles out through gratings provided for the purpose a few inches above the ground level. The base of the cavity should be taken down a course or two below the level of the damp-proof course. The ties are placed about 3 ft. apart horizontally, with 12 or 18 in. vertical intervals; they are about 8 in. long and ¾ in. wide. It is considered preferable by some architects and builders to place the thicker wall on the outside. This course, however, allows the main wall to be attacked by the weather, whereas the former method provides for its protection by a screen of brickwork. Where door and window frames occur in hollow walls, it is of the utmost importance that a proper lead or other flashing be built in, shaped so as to throw off on each side, clear of the frames and main wall, the water which may penetrate the outer shell. While building the wall it is very essential to ensure that the cavity and ties be kept clean and free from rubbish or mortar, and for this purpose a wisp of straw or a narrow board, is laid on the ties where the bricklayer is working, to catch any material that may be inadvertently dropped, this protection being raised as the work proceeds. A hollow wall tends to keep the building dry internally and the temperature equable, but it has the disadvantage of harbouring vermin, unless care be taken to ensure their exclusion. The top of the wall is usually sealed with brickwork to prevent vermin or rubbish finding its way into the cavity. Air gratings should be introduced here to allow of air circulating through the cavity; they also facilitate drying out after rain.

Hollow walls are not much used in London for two reasons, the first being that, owing to the protection from the weather afforded by surrounding buildings, one of the main reasons for their use is gone, and the other that the expense is greatly increased, owing to the authorities ignoring the outer shell and requiring the main wall to be of the full thickness stipulated in schedule I. of London Building Act 1894. Many English provincial authorities in determining the thickness of a cavity-wall, take the outer portion into consideration.

Materials and labour. In London and the surrounding counties, brickwork is measured by the *rod* of 16½ ft. square, 1½ bricks in thickness. A rod of brickwork gauged four courses to a foot with bricks 8¾ in. long, 4¼ in. wide, and 2¾ in thick, and joints ¼ in. in thickness, will require 4356 bricks, and the number will vary as the bricks are above or below the average size, and as the joints are made thinner or thicker. The quantity of mortar, also, will evidently be affected by the latter consideration, but in London it is generally reckoned at 50 cub. ft. for a ¼-in. joint, to 72 cub. ft. for a joint ⅜ in. thick. To these figures must be added an allowance of about 11 cub. ft. if the bricks are formed with frogs or hollows. Bricks weigh about 7 lb each; they are bought and sold by the thousand, which quantity weighs about 62 cwt. The weight of a rod of brickwork is 13½-15 tons, work in cement mortar being heavier than that executed in lime. Seven bricks are required to face a sq. ft.; 1 ft. of reduced brickwork—1½ bricks thick—will require 16 bricks. The number of bricks laid by a workman in a day of eight hours varies considerably with the description of work, but on straight walling a man will lay an

average of 500 in a day.

Varieties of bricks.

The absorbent properties of bricks vary considerably with the kind of brick. The ordinary London stock of good quality should not have absorbed, after twenty-four hours' soaking, more than one-fifth of its bulk. Inferior bricks will absorb as much as a third. The Romans were great users of bricks, both burnt and sun-dried. At the decline of the Roman empire, the art of brickmaking fell into disuse, but after the lapse of some centuries it was revived, and the ancient architecture of Italy shows many fine examples of brick and terra-cotta work. The scarcity of stone in the Netherlands led to the development of a brick architecture, and fine examples of brickwork abound in the Low Countries. The Romans seem to have introduced brickmaking into England, and specimens of the large thin bricks, which they used chiefly as a bond for rubble masonry, may be seen in the many remains of Roman buildings scattered about that country. During the reigns of the early Tudor kings the art of brickmaking arrived at great perfection, and some of the finest known specimens of ornamental brickwork are to be found among the work of this period. The rebuilding of London after the Great Fire of 1666 gave considerable impetus to brickmaking, most of the new buildings being of brick, and a statute was passed regulating the number of bricks in the thickness of the walls of the several rates of dwelling-houses.

The many names given to the different qualities of bricks in various parts of Great Britain are most confusing, but the following are those generally in use:—

Stocks, hard, sound, well-burnt bricks, used for all ordinary purposes.

Hard Stocks, sound but over-burnt, used in footings to walls and other positions where good appearance is not required.

Shippers, sound, hard-burnt bricks of imperfect shape. Obtain their name from being much used as ballast for ships.

Rubbers or *Cutters*, sandy in composition and suitable for cutting with a wire saw and rubbing to shape on the stone slab.

Grizzles, sound and of fair shape, but under-burnt; used for inferior work, and in cases where they are not liable to be heavily loaded.

Place-bricks, under-burnt and defective; used for temporary work.

[v.04 p.0523] *Chuffs*, cracked and defective in shape and badly burnt. *Burrs*, lumps which have vitrified or run together in the burning; used for rough walling, garden work, &c.

Pressed bricks, moulded under hydraulic pressure, and much used for facing work. They usually have a deep frog or hollow on one or both horizontal faces, which reduces the weight of the brick and forms an excellent key for the mortar.

Blue bricks, chiefly made in South Staffordshire and North Wales. They are used in engineering work, and where great compressional resistance is needed, as they are vitrified throughout, hard, heavy, impervious and very durable. Blue bricks of special shape may be had for paving, channelling and coping.

Fire-bricks, withstanding great heat, used in connexion with furnaces. They should always be laid with fire-clay in place of lime or cement mortar.

Glazed bricks, either salt-glazed or enamelled. The former, brown in colour, are glazed by throwing salt on the bricks in the kiln. The latter are dipped into a slip of the required colour before being burnt, and are used for decorative and sanitary purposes, and where reflected light is required.

Moulded bricks, for cornices, string courses, plinths, labels and copings. They are made in the different classes to many patterns; and on account of their greater durability, and the saving of the labour of cutting, are preferable in many cases to rubbers. For sewer work and arches, bricks shaped as voussoirs are supplied.

Strength of brickwork.

The strength of brickwork varies very considerably according to the kind of brick used, the position in which it is used, the kind and quality of the lime or cement mortar, and above all the quality of the workmanship. The results of experiments with short walls carried out in 1896-1897 by the Royal Institute of British Architects to determine the average loads per sq. ft. at which crushing took place, may be briefly summarized as follows: Stock brickwork in lime mortar crushed under a pressure of 18.63 tons per sq. ft., and in cement mortar under 39.29 tons per sq. ft. Gault brickwork in lime mortar crushed at 31.14 tons, and in cement mortar at 51.34 tons. Fletton brickwork in lime crushed under a load of 30.68 tons, in cement under 56.25 tons. Leicester red brickwork in lime mortar crushed at 45.36 tons per sq. ft., in cement mortar at 83.36 tons. Staffordshire blue brick work in lime mortar crushed at 114.34 tons, and in cement mortar at 135.43 tons.

The height of a brick pier should not exceed twelve times its least width. The London Building Act in the first schedule prescribes that in buildings not public, or of the warehouse class, in no storey shall any external or party walls exceed in height sixteen times the thickness. In buildings of the warehouse class, the height of these walls shall not exceed fourteen times the thickness.

In exposed situations it is necessary to strengthen the buildings by increasing the thickness of walls and parapets, and to provide heavier copings and flashings. Special precautions, too, must be observed in the fixing of copings, chimney pots, ridges and hips. The greatest wind pressure experienced in England may be taken at 56 lb on a sq. ft., but this is only in the most exposed positions in the country or on a sea front. Forty pounds is a sufficient allowance in most cases, and where there is protection by surrounding trees or buildings 28 lb per sq. ft. is all that needs to be provided against.

Mortar.

In mixing mortar, particular attention must be paid to the sand with which the lime or cement is mixed. The best sand is that obtained from the pit, being sharp and angular. It is, however, liable to be mixed with clay or earth, which must be washed away before the sand is used. Gravel found mixed with it must be removed by screening or sifting. River sand is frequently used, but is not so good as pit sand on account of the particles being rubbed smooth by attrition. Sea sand is objectionable for two reasons; it cannot be altogether freed from a saline taint, and if it is used the salt attracts moisture and is liable to keep the brickwork permanently damp. The particles, moreover, are generally rounded by attrition, caused by the movement of the sea, which makes it less efficient for mortar than if they retained their original angular forms. Blue or black mortar, often used for pointing the joints of external brickwork on account of its greater durability, is made by using foundry sand or smith's ashes instead of ordinary sand. There are many other substitutes for the ordinary sand. As an example, fine stone grit may be used with advantage. Thoroughly burnt clay or ballast, old bricks, clinkers and cinders, ground to a uniform size and screened from dust, also make excellent substitutes.

Fat limes (that is, limes which are pure, as opposed to "hydraulic" limes which are burnt from limestone containing some clay) should not be used for mortar; they are slow-setting, and there is a liability for some of the mortar, where there is not a free access of air to assist the setting, remaining soft for some considerable period, often months, thus causing unequal settlement and possibly failure. Grey stone lime is feebly hydraulic, and makes a good mortar for ordinary work. It, however, decays under the influence of the weather, and it is, therefore, advisable to point the external face of the work in blue ash or cement mortar, in order to obtain greater durability. It should never be used in foundation work, or where exposed to wet. Lias lime is hydraulic, that is, it will set firm under water. It should be used in all good class work, where Portland cement is not desired.

Of the various cements used in building, it is necessary only to mention three as being applicable to use for mortar. The first of these is Portland cement, which has sprung into very general use, not only for work where extra strength and durability are required, and for underground work, but also in general building where a small extra cost is not objected to. Ordinary lime mortar may have its strength considerably enhanced by the addition of a small proportion of Portland cement. Roman cement is rarely used for mortar, but is useful in some cases on account of the rapidity with which it sets, usually becoming hard about fifteen minutes after mixing. It is useful in tidal work and embankments, and constructions under water. It has about one-third of the strength of Portland cement, by which it is now almost entirely supplanted. Selenitic cement or lime, invented by Major-General H. Y. D. Scott (1822-1883), is lias lime, to which a small proportion of plaster of Paris has been added with the object of suppressing the action of slaking and inducing quicker setting. If carefully mixed in accordance with the instructions issued by the manufacturers, it will take a much larger proportion of sand than ordinary lime.

Lime should be slaked before being made into mortar. The lime is measured out, deposited in a heap on a wooden "bank" or platform, and after being well watered is covered with the correct proportion of sand. This retains the heat and moisture necessary to thorough slaking; the time required for this operation depends on the variety of the lime, but usually it is from a few hours to one and a half days. If the mixing is to be done by hand the materials must be screened to remove any unslaked lumps of lime. The occurrence of these may be prevented by grinding the lime shortly before use. The mass should then be well "larried," *i.e.* mixed together with the aid of a long-handled rake called the "larry." Lime mortar should be tempered for at least two days, roughly covered up with sacks or other material. Before being used it must be again turned over and well mixed together. Portland and Roman cement mortars must be mixed as required on account of their quick-setting properties. In the case of Portland cement mortar, a quantity sufficient only for the day's use should be "knocked up," but with Roman cement fresh mixtures must be made several times a day, as near as possible to the place of using. Cement mortars should never be worked up after setting has taken place. Care should be taken to obtain the proper consistency, which is a stiff paste. If the mortar be too thick, extra labour is involved in its use, and much time wasted. If it be so thin as to run easily from the trowel, a longer time is taken in setting, and the wall is liable to settle; also there is danger that the lime or cement will be killed by the excess of water, or at least have its binding power affected. It is not advisable to carry out work when the temperature is below freezing point, but in urgent cases bricklaying may be successfully done by using unslaked lime mortar. The mortar must be prepared in small quantities immediately before being used, so that binding action takes place before it cools. When the wall is left at night time the top course should be covered up to prevent the penetration of rain into the work, which would then be destroyed by the action of frost. Bricks used during frosty weather should be quite dry, and those that have been exposed to rain or frost should never be employed. The question whether there is any limit to bricklayers' work in frost is still an open one. Among the members of the Norwegian Society of Engineers and Architects, at whose meetings the subject has been frequently discussed, that limit is variously estimated at between

-6° to -8° Réaumur (18½° to 14° Fahr.) and -12° to -15° Réaumur (5° above to 1¾° below zero Fahr.). It has been proved by hydraulic tests that good bricklayers' work can be executed at the latter minimum. The conviction is held that the variations in the opinions held on this subject are attributable to the degree of care bestowed on the preparation of the mortar. It is generally agreed, however, that from a practical point of view, bricklaying should not be carried on at temperatures lower than -8° to -10° Réaumur (14° to 9½° Fahr.), for as the thermometer falls the expense of building is greatly increased, owing to a larger proportion of lime being required.

For grey lime mortar the usual proportion is one part of lime to two or three parts of sand; lias lime mortar is mixed in similar proportions, except for work below ground, when equal quantities of lime and sand should be used. Portland cement mortar is usually in the proportions of one to three, or five, of sand; good results are obtained with lime mortar fortified with cement as follows:—one part slaked lime, one part Portland cement, and seven parts sand. Roman cement mortar should consist of one or one and a half parts of cement to one part of sand. Selenitic lime mortar is usually in the proportions of one to four or five, and must be mixed in a particular manner, the lime being first ground in water in the mortar mill, and the sand gradually added. Blue or black mortar contains equal parts of foundry ashes and lime; but is improved by the addition of a proportion of cement. For setting fire-bricks fire-clay is always used. Pargetting for rendering inside chimney flues is made of one part of lime with three parts of cow dung free from straw or litter. No efficient substitute has been found for this mixture, which should be used fresh. A mortar that has found approval for tall chimney shafts is composed by grinding in a mortar-mill one part of blue lias lime with one part each of sand and foundry ashes. In the external walls of the Albert Hall the mortar used was one part Portland cement, one part grey Burham lime and six parts pit sand. The lime was slaked twenty-four hours, and after being
[v.04 p.0524] mixed with the sand for ten minutes the cement was added and the whole ground for one minute; the stuff was prepared in quantities only sufficient for immediate use. The by-laws dated 1891, made by the London County Council under section 16 of the Metropolis Management and Building Acts Amendment Act 1878, require the proportions of lime mortar to be one to three of sand or grit, and for cement mortar one to four. Clean soft water only should be used for the purpose of making mortar.

Grout is thin liquid mortar, and is legitimately used in gauged arches and other work when fine joints are desired. In ordinary work it is sometimes used every four or five courses to fill up any spaces that may have been inadvertently left between the bricks. This at the best is but doing with grout what should be done with mortar in the operation of laying the bricks; and filling or flushing up every course with mortar requires but little additional exertion and is far preferable. The use of grout is, therefore, a sign of inefficient workmanship, and should not be countenanced in good work. It is liable, moreover, to ooze out and stain the face of the brickwork.

Lime putty is pure slaked lime. It is prepared or "run," as it is termed, in a wooden tub or bin, and should be made as long a time as possible before being used; at least three weeks should elapse between preparation and use.

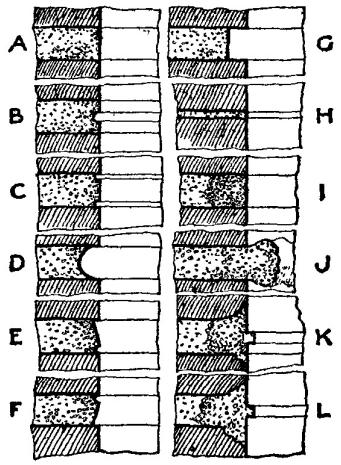

Fig. 3.—Forms of Joints.

Pointing.

The pointing of a wall, as previously mentioned, is done either with the bricklaying or at the completion of the work. If the pointing is to be of the same mortar as the rest of the work, it would probably greatly facilitate matters to finish off the work at one operation with the bricklaying, but where, as in many cases, the pointing is required to be executed in a more durable mortar, this would be done as the scaffold is taken down at the completion of the building, the joints being raked out by the bricklayer to a depth of ½ or ¾ in. By the latter method the whole face of the work is kept uniform in appearance. The different forms of joints in general use are clearly shown in fig. 3. Flat or flush joints (A) are formed by pressing the protruding mortar back flush with the face of the brickwork. This joint is commonly used for walls intended to be coated with distemper or limewhite. The flat joint jointed (two forms, B and C) is a development of the flush joint. In order to increase the density and thereby enhance the durability of the mortar, a semicircular groove is formed along the centre, or one on each side of the joint, with an iron jointer and straight-edge. Another form, rarely used, is the keyed joint shown at D, the whole width of the joint in this case being treated with the curved key. Struck or bevelled, or weathered, joints have the upper portion pressed back with the trowel to form a sloping surface, which throws off the wet. The lower edge is cut off with the trowel to a straight edge. This joint is in very common use for new work. Ignorant workmen frequently make the slope in the opposite direction (F), thus forming a ledge on the brick; this catches the water, which on being frozen rapidly causes the disintegration of the upper portion of the brick and of the joint itself. With recessed jointing, not much used, a deep shadow may be obtained. This form of joint, illustrated in G, is open to very serious objections, for it encourages the soaking of the brick with rain instead of throwing off the wet, as it seems the natural function of good pointing, and this, besides causing undue dampness in the wall, renders it liable to damage by frost. It also leaves the arrises of the bricks unprotected and liable to be damaged, and from its deep recessed form does not make for stability in the work. Gauged work has very thin joints, as shown at H, formed by dipping the side of the brick in white lime putty. The sketch I shows a joint raked out and filled in with pointing

mortar to form a flush joint, or it may be finished in any of the preceding forms. Where the wall is to be plastered the joints are either left open or raked out, or the superfluous mortar may be left protruding as shown at J. By either method an excellent key is obtained, to which the rendering firmly adheres. In tuck pointing (K) the joints are raked out and stopped, i.e. filled in flush with mortar coloured to match the brickwork. The face of the wall is then rubbed over with a soft brick of the same colour, or the work may be coloured with pigment. A narrow groove is then cut in the joints, and the mortar allowed to set. White lime putty is next filled into the groove, being pressed on with a jointing tool, leaving a white joint ⅛ to ¼ in. wide, and with a projection of about 1/16 in. beyond the face of the work. This method is not a good or a durable one, and should only be adopted in old work when the edges of the bricks are broken or irregular. In bastard tuck pointing (L), the ridge, instead of being in white lime putty, is formed of the stopping mortar itself.

Footings.

Footings, as will be seen on reference to fig. 1, are the wide courses of brickwork at the base or foot of a wall. They serve to spread the pressure over a larger area of ground, offsets 2¼ in. wide being made on each side of the wall until a width equal to double the thickness of the wall is reached. Thus in a wall 13½ in. (1½ bricks) thick, this bottom course would be 2 ft. 3 in. (3 bricks) wide. It is preferable for greater strength to double the lowest course. The foundation bed of concrete then spreading out an additional 6 in. on each side brings the width of the surface bearing on the ground to 3 ft. 3 in. The London Building Act requires the projection of concrete on each side of the brickwork to be only 4 in., but a projection of 6 in. is generally made to allow for easy working. Footings should be built with hard bricks laid principally as headers; stretchers, if necessary, should be placed in the middle of the wall.

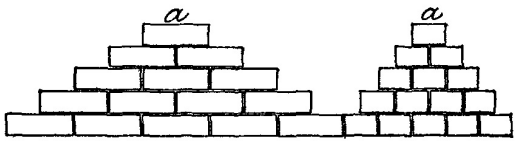

Fig. 4.—Diagram of Bonding.

Bonding.

Bond in brickwork is the arrangement by which the bricks of every course cover the joints of those in the course below it, and so tend to make the whole mass or combination of bricks act as much together, or as dependently one upon another, as possible. The workmen should be strictly supervised as they proceed with the work, for many failures are due to their ignorance or carelessness in this particular. The object of bonding will be understood by reference to fig. 4. Here it is evident from the arrangement of the bricks that any weight placed on the topmost brick (*a*) is carried down and borne alike in every course; in this way the weight on each brick is distributed over an area increasing with every course. But this forms a longitudinal bond only, which cannot extend its influence beyond the width of the brick; and a wall of one brick and a half, or two bricks, thick, built in this manner, would in effect consist of three or four half brick thick walls acting independently of each other. If the bricks were turned so as to show their short sides or ends in front instead of their long ones, certainly a compact wall of a whole brick thick, instead of half a brick, would be produced, and while the thickness of the wall would be double, the longitudinal bond would be shortened by one-half: a wall of any great thickness built in this manner would necessarily be composed of so many independent one-brick walls. To produce a transverse and yet preserve a true longitudinal bond, the bricks are laid in a definite arrangement of stretchers and headers.

In "English bond" (fig. 5), rightly considered the most perfect in use, the bricks are laid in alternate courses of headers and stretchers, thus combining the advantages of the two previous modes of arrangement. A reference to fig. 5 will show how the process of bonding is pursued in a wall one and a half bricks in thickness, and how the quoins are formed. In walls which are a multiple of a whole brick, the appearance of the same course is similar on the elevations of the front and back faces, but in walls where an odd half brick must be used to make up the thickness, as is the case in the illustration, the appearance of the opposite sides of a course is inverted. The example illustrates the principle of English bond; thicker walls are constructed in the same manner by an extension of the same methods. It will be observed that portions of a brick have to be inserted near a vertical end or a quoin, in order to start the regular bond. These portions equal a half header in width, and are called queen closers; they are placed next to the first header. A three-quarter brick is obviously as available for this purpose as a header and closer combined, but the latter method is preferred because by the use of it uniformity of appearance is preserved, and whole bricks are retained on the returns. King closers are used at rebated openings formed in walls in Flemish bond, and by reason of the greater width of the back or "tail," add strength to the work. They are cut on the splay so that the front end is half the width of a header and one side half the length of the brick. An example of their use will be seen in fig. 15. In walls of almost all thicknesses above 9 in., except in the English bond, to preserve the transverse and yet not destroy the longitudinal bond, it is frequently necessary to use half bricks. It may be taken as a general rule that a brick should never be cut if it can be worked in whole, for a new joint is thereby created in a construction, the difficulty of which consists in obviating the debility arising from the constant recurrence of joints. Great insistence must be laid on this point, especially at the junctions of walls, where the admission of closers already constitutes a

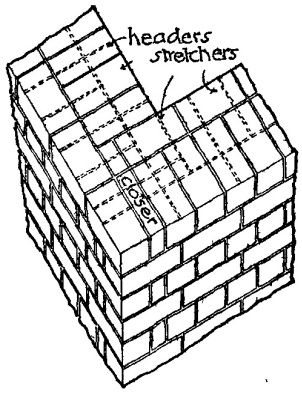

Fig. 5.—English Bond. In this and following illustration of bond in brickwork the position of bricks in the second course is indicated by dotted lines.

weakness which would only be increased by the use of other bats or fragments of bricks.

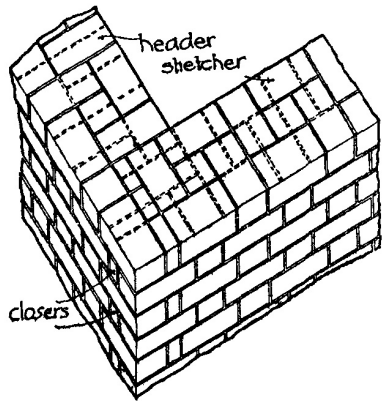

FIG. 6.—Flemish Bond.

Another method of bonding brickwork, instead of placing the bricks in alternate courses of headers and stretchers, places them alternately as headers and stretchers in the same course, the appearance of the course being the same on each face. This is called "Flemish bond." Closers are necessary to this variety of bond. From fig. 6 it will be seen that, owing to the comparative weakness of the transverse tie, and the numbers of half bricks required to be used and the thereby increased number of joints, this bond is not so perfect nor so strong as English. The arrangements of the face joints, however, presenting in Flemish bond a neater appearance than in English bond, it is generally selected for the external walls of domestic and other buildings where good effect is desirable. In buildings erected for manufacturing and similar purposes, and in engineering works where the greatest degree of strength and compactness is considered of the highest importance, English bond should have the preference.

A compromise is sometimes made between the two above-mentioned bonds. For the sake of appearance the bricks are laid to form Flemish bond on the face, while the backing is of English bond, the object being to combine the best features of the two bonds. Undoubtedly the result is an improvement on Flemish bond, obviating as it does the use of bats in the interior of the wall. This method of bonding is termed "single Flemish bond," and is shown in fig. 7.

In stretching bond, which should only be used for walls half a brick in thickness, all the bricks are laid as stretchers, a half brick being used in alternate courses to start the bond. In work curved too sharply on plan to admit of the use of stretchers, and for footings, projecting mouldings and corbels, the bricks are all laid as headers, i.e. with their ends to the front, and their length across the thickness of the wall. This is termed "heading bond."

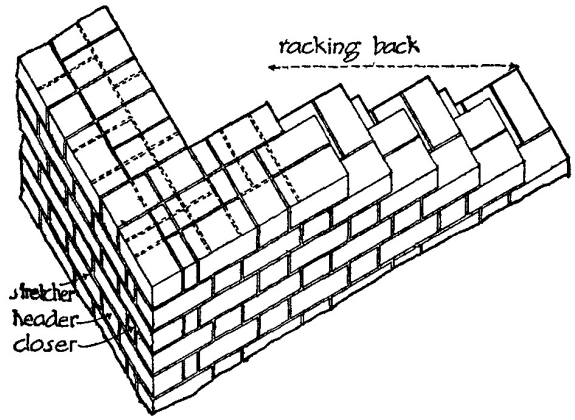

FIG. 7.—Single Flemish Bond.

In thick walls, three bricks thick and upwards, a saving of labour is effected without loss of strength, by the adoption of "herring bone" or "diagonal bond" in the interior of the wall, the outer faces of the wall being built in English and Flemish bond. This mode should not be had recourse to for walls of a less thickness than 27 in., even that being almost too thin to admit of any great advantage from it.

Hoop-iron, about 1½ in. wide and 1/16 in. thick, either galvanized or well tarred and sanded to retard rusting, is used in order to obtain additional longitudinal tie. The customary practice is to use one strip of iron for each half-brick in thickness of the wall. Joints at the angles, and where necessary in the length, are formed by bending the ends of the strips so as to hook together. A patent stabbed iron now on the market is perforated to provide a key for the mortar.

A difficulty often arises in bonding when facing work with bricks of a slightly different size from those used in "backing," as it is technically termed. As it is, of course, necessary to keep all brickwork in properly levelled courses, a difference has to be made in the thickness of the mortar joints. Apart from the extra labour involved, this obviously is detrimental to the stability of the wall, and is apt to produce unequal settlement and cracking. Too much care cannot be taken to obtain both facing and backing bricks of equal size.

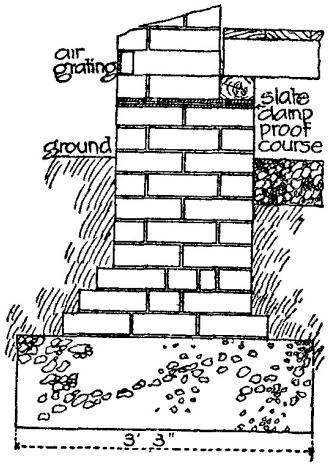

FIG. 8.

Dishonest bricklayers do not hesitate, when using for the face of a wall bricks of a quality superior to those used for the interior, to use "snapped headers," that is cutting the heading bricks in halves, one brick thus serving the purposes of two as regards outward appearance. This is a most pernicious practice, unworthy of adoption by any craftsman of repute, for a skin of brickwork 4½ in. thick is thus carried up with a straight mortar joint behind it, the proper bonding with the back of the wall by means of headers being destroyed.

American building acts describe the kind of bond to be used for ordinary walls, and the kind for faced walls. Tie courses also require an extra thickness where walls are perforated with over 30% of flues.

The importance for sanitary and other reasons of keeping walls dry is admitted by all who have observed the deleterious action of damp upon a building.

Walls are liable to become damp, (1) by wet rising up the wall from the earth; (2) by water soaking down from the top of the wall; (3) by rain being driven on to the face by wind. Dampness from the first cause may be prevented by the introduction of damp-proof courses or the construction of dry areas; from the second by means of a coping of stone, cement or other non-porous material; and from the third by covering the exterior with impervious materials or by the adoption of hollow walls.

Prevention of damp.

After the footings have been laid and the wall has been brought up to not less than 6 in. above the finished surface of the ground, and previous to fixing the plate carrying the ground floor, there should always be introduced a course of some damp-proof material to prevent the rise of moisture from the soil. There are several forms of damp-proof course. A very usual one is a double layer of roofing slates laid in neat Portland cement (fig. 8), the joints being well lapped. A course or two of Staffordshire blue bricks in cement is excellent where heavy weights have to be considered. Glazed stoneware perforated slabs about 2 in. thick are specially made for use as damp-proof courses. Asphalt (fig. 9) recently has come into great favour with architects; a layer ½ or ¾ in. thick is a good protection against damp, and not likely to crack should a settlement occur, but in hot weather it is liable to squeeze out at the joints under heavy weights. Felt covered with bitumen is an excellent substitute for asphalt, and is not liable to crack or squeeze out. Sheet lead is efficient, but very costly and also somewhat liable to squeezing. A damp-proof course has been introduced consisting of a thin sheet of lead sandwiched between layers of asphalt. Basement storeys to be kept dry require, besides the damp-proof course horizontally in the wall, a horizontal course, usually of asphalt, in the thickness of the floor, and also a vertical damp-proof course from a level below that of the floor to about 6 in. above the level of the ground, either built in the thickness of the wall or rendered on the outside between the wall and the surrounding earth (fig. 10).

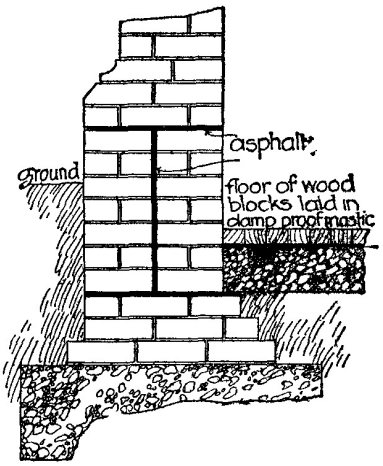

FIG. 9.

[v.04 p.0526] By means of dry areas or air drains (figs. 11 and 12), a hollow space 9 in. or more in width is formed around those portions of the walls situated below the ground, the object being to prevent them from coming into contact with the brickwork of the main walls and so imparting its moisture to the building. Arrangements should be made for keeping the area clear of vermin and for ventilating and draining it. Dry areas, being far from sanitary, are seldom adopted now, and are being superseded by asphalt or cement applied to the face of the wall.

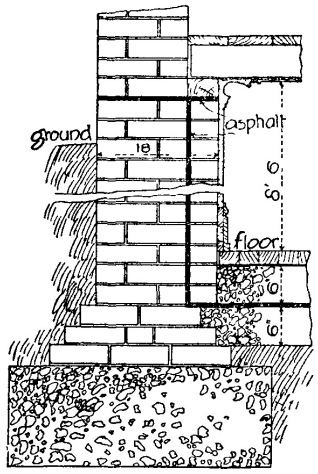

FIG. 10.

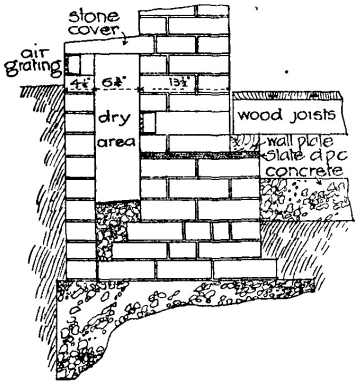

FIG. 11.

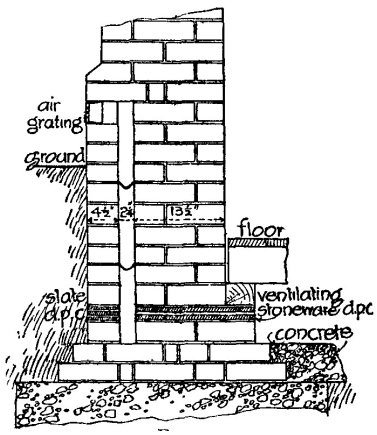

FIG. 12.

Moisture is prevented from soaking down from the top of the wall by using a covering of some impervious material in the form of a coping. This may consist of ordinary bricks set on edge in cement with a double course of tiles immediately below, called a "creasing," or of specially made non-porous coping bricks, or of stone, cast-iron, or cement sloped or "weathered" in order to throw the rain off.

The exterior of walls above the ground line may be protected by coating the surface with cement or rough cast; or covering with slates or tiles fixed on battens in a similar manner to those on a roof (fig.13).

The use of hollow walls in exposed positions has already been referred to.

The by-laws dated 1891, made by the London County Council under section 16 of the Metropolis Management and Buildings Acts Amendment Act 1878, require that "every wall of a house or building shall have a damp course composed of materials impervious to moisture approved by the district surveyor, extending throughout its whole thickness at the level of not less than 6 in. below the level of the lowest floor. Every external wall or enclosing wall of habitable rooms or

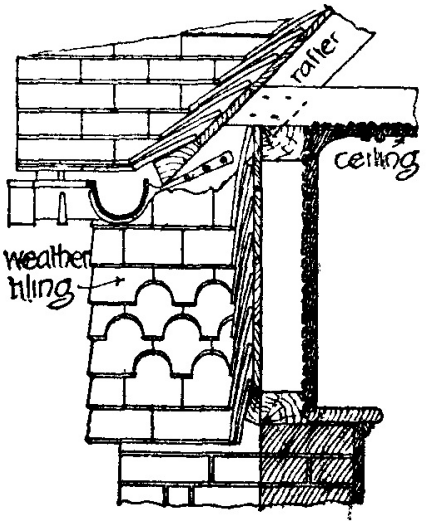

FIG. 13.

their appurtenances or cellars which abuts against the earth shall be protected by materials impervious to moisture to the satisfaction of the district surveyor..." "The top of every party-wall and parapet-wall shall be finished with one course of hard, well-burnt bricks set on edge, in cement, or by a coping of any other waterproof and fire-resisting material, properly secured."

Arches.

Arches are constructions built of wedge-shaped blocks, which by reason of their shape give support one to another, and to the super-imposed weight, the resulting load being transmitted through the blocks to the abutments upon which the ends of the arch rest. An arch should be composed of such materials and designed of such dimensions as to enable it to retain its proper shape and resist the crushing strain imposed upon it. The abutments also must be strong enough to take safely the thrust of the weighted arch, as the slightest movement in these supports will cause deflection and failure. The outward thrust of an arch decreases as it approaches the semicircular form, but the somewhat prevalent idea that in the latter form no thrusting takes place is at variance with fact.

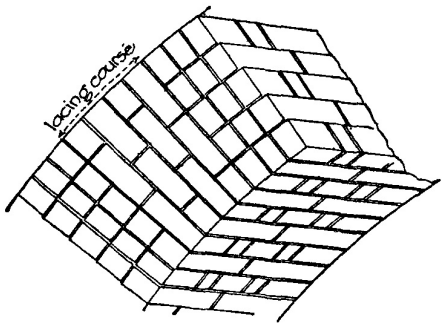

FIG. 14.

Arches in brickwork may be classed under three heads: plain arches, rough-cut and gauged. Plain arches are built of uncut bricks, and since the difference between the outer and inner periphery of the arch requires the parts of which an arch is made up to be wedge-formed, which an ordinary brick is not, the difference must be made in mortar, with the result that the joints become wedge-shaped. This obviously gives an objectionable inconsistency of material in the arch, and for this reason to obtain greatest strength it is advisable to build these arches in independent rings of half-brick thickness. The undermost rings should have thin joints, those of each succeeding ring being slightly thickened. This prevents the lowest ring from settling while those above remain in position, which would cause an ugly fissure. In work of large span bonding blocks or "lacing courses" should be built into the arch, set in cement and running through its thickness at intervals, care being taken to introduce the lacing course at a place where the joints of the various rings coincide. Stone blocks in the shape of a voussoir (fig. 14) may be used instead. Except for these lacing courses hydraulic lime mortar should be used for large arches, on account of its slightly accommodating nature.

Rough-cut arches are those in which the bricks are roughly cut with an axe to a wedge form; they are used over openings, such as doors and windows, where a strong arch of neat appearance is desired. The joints are usually made equal in width to those of the ordinary brickwork. Gauged arches are composed of specially made soft bricks, which are cut and rubbed to gauges or templates so as to form perfectly fitting voussoirs. Gauging is, of course, equally applicable to arches and walling, as it means no more than bringing every brick exactly to a certain form by cutting and rubbing. Gauged brickwork is set in lime putty instead of common mortar; the finished joints should not be more than 1/32 in. wide. To give stability the sides of the voussoirs are gauged out hollow and grouted in Portland cement, thus connecting each brick with the next by a joggle joint. Gauged arches, being for the most part but a half-brick in thickness on the soffit and not being tied by a bond to anything behind them—for behind them is the lintel with rough discharging arch over, supporting the remaining width of the wall—require to be executed with great care and nicety. It is a common fault with workmen to rub the bricks thinner behind than before to lessen the labour required to obtain a very fine face joint. This practice tends to make the work bulge outwards; it should rather be inverted if it be done at all, though the best work is that in which the bricks are gauged to exactly the same thickness at the back as at the front. The same fault occurs when a gauged arch is inserted in an old wall, on account of the difficulty of filling up with cement the space behind the bricks.

The bond of an arch obtains its name from the arrangement of headers and stretchers on its soffit. The under side of an arch built in English bond, therefore, will show the same arrangement as the face of a wall built in English bond. If the arch is in Flemish the soffit presents the same appearance as the elevation of a wall built in that bond.

Plates.

It is generally held that the building of wood into brickwork should as far as is possible be avoided. Wall plates of wood are, however, necessary where wood joists are used, and where these plates may not be supported on corbels of projecting brickwork or iron they must be let flush into the wall, taking the place of a course of bricks. They form a uniform bed for the joists, to which easy fixing is obtained. The various modes adopted for resting and fixing the ends of joists on walls are treated in the article CARPENTRY.

Lintels, which may be of iron, steel, plain or reinforced concrete, or stone, are used over square-

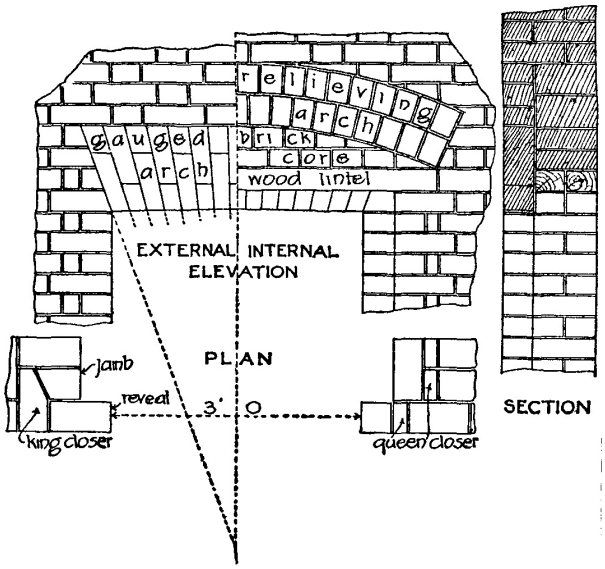

FIG. 15.

[v.04 p.0527]

headed openings instead of or in conjunction with arches. They are useful to preserve the square form and receive the joiners' fittings, but except when made of steel or of concrete reinforced with steel bars, they should have relieving arches turned immediately over them (Fig.15).

"Fixing bricks" were formerly of wood of the same size as the ordinary brick, and built into the wall as required for fixing joinery. Owing to their liability to shrinkage and decay, their use is now practically abandoned, their place being taken by bricks of coke-breeze concrete, which do not shrink or rot and hold fast nails or screws driven into them. Another method often adopted for providing a fixing for joinery is to build in wood slips the thickness of a joint and 4½ in. wide. When suitable provision for fixing has not been made, wood plugs are driven into the joints of the bricks. Great care must be taken in driving these in the joints of reveals or at the corners of walls, or damage may be done.

The name "brick-ashlar" is given to walls faced with ashlar stonework backed in with brickwork. Such constructions are liable in an aggravated degree to the unequal settling and its attendant evils pointed out as existing in walls built with different qualities of bricks. The outer face is composed of unyielding stone with few and very thin joints, which perhaps do not occupy more than a hundredth part of its height, while the back is built up of bricks with about one-eighth its height composed of mortar joints, that is, of a material that by its nature and manner of application must both shrink in drying and yield to pressure. To obviate this tendency to settle and thus cause the bulging of the face or failure of the wall, the mortar used should be composed of Portland cement and sand with a large proportion of the former, and worked as stiff as it conveniently can be. In building such work the stones should be in height equal to an exact number of brick courses. It is a common practice in erecting buildings with a facing of Kentish rag rubble to back up the stonework with bricks. Owing to the great irregularity of the stones, great difficulty is experienced in obtaining proper bond between the two materials. Through bonding stones or headers should be frequently built in, and the whole of the work executed in cement mortar to ensure stability.

Chimneys and flues.

Not the least important part of the bricklayer's art is the formation of chimney and other flues. Considerable skill is required in gathering-over properly above the fireplace so as to conduct the smoke into the smaller flue, which itself requires to be built with precision, so that its capacity may not vary in different parts. Bends must be made in gradual curves so as to offer the least possible resistance to the up-draught, and at least one bend of not less than 60° should be formed in each flue to intercept down-draughts. Every fireplace must have a separate flue. The collection of a number of flues into a "stack" is economical, and tends to increase the efficiency of the flues, the heat from one flue assisting the up-draught in those adjoining it. It is also desirable from an aesthetic point of view, for a number of single flue chimneys sticking up from various parts of the roof would appear most unsightly. The architects of the Elizabethan and later periods were masters of this difficult art of treating a stack or stacks as an architectural feature. The shaft should be carried well above the roof, higher, if possible, than adjacent buildings, which are apt to cause down-draught and make the chimney smoke. When this is found impossible, one of the many forms of patent chimney-pots or revolving cowls must be adopted. Each flue must be separated by smoke-proof "withes" or divisions, usually half a brick in thickness; connexion between them causes smoky chimneys. The size of the flue for an ordinary grate is 14×9 in.; for a kitchen stove 14×14 in. The outer wall of a chimney stack may with advantage be made 9 in. thick. Fireclay tubes, rectangular or circular in transverse section, are largely used in place of the pargetting; although more expensive than the latter they have the advantage in point of cleanliness and durability. Fireplaces generally require more depth than can be provided in the thickness of the wall, and therefore necessitate a projection to contain the fireplace and flues, called the "chimney breast." Sometimes, especially when the wall is an external one, the projection may be made on the back, thus allowing a flush wall in the room and giving more space and a more conveniently-shaped room. The projection on the outside face of the wall may be treated as an ornamental feature. The fireplace opening is covered by a brick relieving arch, which is fortified by wrought-iron bar from ½ to ¾ in. thick and 2 to 3 in. wide. It is usually bent to a "camber," and the brick arch built upon it naturally takes the same curve. Each end is "caulked," that is, split longitudinally and turned up and down. The interior of a chimney breast behind the stove should always be filled in solid with concrete or brickwork. The flooring in the chimney opening is called the "hearth"; the back hearth covers the space between the jambs of the chimney breast, and the front hearth rests upon the brick "trimmer arch" designed to support it. The hearth is now often formed in solid concrete, supported on the brick wall and fillets fixed to the floor joists, without any trimmer arch and finished in neat cement or glazed tiles instead of stone slabs.

Tall furnace chimneys should stand as separate constructions, unconnected with other buildings. If it is necessary to bring other work close up, a straight joint should be used. The shaft of the chimney will be built "overhand," the men working from the inside. Lime mortar is used, cement being too rigid to allow the chimney to rock in the wind. Not more than 3 ft. in height should be erected in one day, the work of necessity being done in small portions to allow the mortar to set before it is required to sustain much weight. The bond usually adopted is one course of headers to four of stretchers. Scaffolding is sometimes erected outside for a height of 25 or 30 ft., to facilitate better pointing, especially where the chimney is in a prominent position. The brickwork at the top must, according to the London Building Act, be 9 in. thick (it is better 14 in. in shafts over 100 ft. high), increasing half a brick in thickness for every additional 20 ft. measured downwards. "The shaft shall taper gradually from the base to the top at the rate of at least 2½ in. in 10 ft. of height. The width of the base of the shaft if square shall be at least one-tenth of the proposed height of the shaft, or if round or any other shape, then one-twelfth of the height. Firebricks built inside the lower portion of the shaft shall be provided, as additional to and independent of the prescribed thickness of brickwork, and shall not be bonded therewith." The firebrick lining should be carried up from about 25 ft. for ordinary temperatures to double that height for very great ones, a space of 1½ to 3 in. being kept between the lining and the main wall. The lining itself is usually 4½ in. thick. The cap is usually of cast iron or terra-cotta strengthened with iron bolts and straps, and sometimes of stone, but the difficulty of properly fixing this latter material causes it to be neglected in favour of one of the former. (See a paper by F.J. Bancroft on "Chimney Construction," which contains a tabulated description of nearly sixty shafts, *Proc. Civ. and Mech. Eng. Soc.*, December 1883.)

Brick paving.

The work of laying bricks or tiles as paving falls to the lot of the bricklayer. Paving formed of ordinary bricks laid flat or on their edges was once in general use, but is now almost abandoned in favour of floors of special tiles or cement paving, the latter being practically non-porous and therefore more sanitary and cleaner. Special bricks of extremely hard texture are made for stable and similar paving, having grooves worked on the face to assist drainage and afford good foothold. A bed of concrete 6 in. thick is usually provided under paving, or when the bricks are placed on edge the concrete for external paving may be omitted and the bricks bedded in sand, the ground being previously well rammed. The side joints of the bricks are grouted in with lime or cement. Dutch clinkers are small, hard paving bricks burned at a high temperature and of a light yellow colour; they are 6 in. long, 3 in. wide, 1½ in. thick. A variety of paving tile called "oven tiles" is of similar material to the ordinary red brick, and in size is 10 or 12 in. square and 1 to 2 in. thick. An immense variety of ornamental paving and walling tiles is now manufactured of different colours, sizes and shapes, and the use of these for lining sculleries, lavatories, bathrooms, provision shops, &c., makes for cleanliness and improved sanitary conditions. Besides, however, being put to these uses, tiles are often used in the ornamentation of buildings, externally as well as internally.

[v.04 p.0528]

Mosaic work is composed of small pieces of marble, stone, glass or pottery, laid as paving or wall lining, usually in some ornamental pattern or design. A firm bed of concrete is required, the pieces of material being fixed in a float of cement about half or three-quarters of an inch thick. Roman mosaic is formed with cubes of marble of various colours pressed into the float. A less costly paving may be obtained by strewing irregularly-shaped marble chips over the floated surface: these are pressed into the cement with a plasterer's hand float, and the whole is then rolled with an iron roller. This is called "terazzo mosaic." In either the Roman or terazzo method any patterns or designs that are introduced are first worked in position, the ground-work being filled in afterwards. For the use of cement for paving see PLASTER.

The principal publications on brickwork are as follows:—Rivington, *Notes on Building Construction*, vols. i. ii. iii.; Col. H.E. Seddon, *Aide Memoir*, vol. ii.; *Specification*; J.P. Allen, *Building Construction*; F.E. Kidder, *Building Construction and Superintendence*, part i. (1903); Longmans & Green, *Building Construction*; E. Dobson, *Bricks and Tiles*; Henry Adams, *Building Construction*; C.F. Mitchell, *Building Construction*, vols. i. ii.; E. Street, *Brick and Marble Architecture in Italy*.

(J. BT.)

BRICOLE (a French word of unknown origin), a military engine for casting heavy stones; also a term in tennis for a sidestroke rebounding off the wall of the court, corrupted into "brickwall" from a supposed reference to the wall, and in billiards for a stroke off the cushion to make a cannon or hazard.

BRIDAINE (or BRYDAYNE), **JACQUES** (1701-1767), French Roman Catholic preacher, was born at Chuslan in the department of Gard on the 21st of March 1701. He was educated at Avignon, first in the Jesuit college and afterwards at the Sulpician seminary of St Charles. Soon after his ordination to the priesthood in 1725, he joined the *Missions Royales*, organized to bring back to the Catholíc faith the Protestants of France. He gained their good-will and made many converts; and for over forty years he visited as a missionary preacher almost every town of central and southern France. In Paris, in 1744, his sermons created a deep impression by their eloquence and sincerity. He died at Roquemaure, near Avignon, on the 22nd of December 1767. He was the author of *Cantiques spirituels* (Montpelier, 1748, frequently reprinted, in use in most French churches); his sermons were published in 5 vols. at Avignon in 1823 (ed. Paris, 1861).

See Abbé G. Carron, *Le Modèle des prêtres* (1803).

BRIDE (a common Teutonic word, e.g. Goth. *bruths*, O.Eng. *bryd*, O.H.Ger. *prût*, Mod. Ger. *Braut*, Dut. *bruid*, possibly derived from the root *bru-*, cook, brew; from the med. latinized form *bruta*, in the sense of daughter-in-law, is derived the Fr. *bru*), the term used of a woman on her wedding-day, and applicable during the first year of wifehood. It appears in combination with many words, some of them obsolete. Thus "bridegroom" is the newly married man, and "bride-bell," "bride-banquet" are old equivalents of wedding-bells, wedding-breakfast. "Bridal" (from *Bride-ale*), originally the wedding-feast itself, has grown into a general descriptive adjective, e.g. the *bridal* party, the *bridal* ceremony. The *bride-cake* had its origin in the Roman *confarreatio*, a form of marriage, the essential features of which were the eating by the couple of a cake made of salt, water and flour, and the holding by the bride of three wheat-ears, symbolical of plenty. Under Tiberius the cake-eating fell into disuse, but the wheat ears survived. In the middle ages they were either worn or carried by the bride. Eventually it became the custom for the young girls to assemble outside the church porch and throw grains of wheat over the bride, and afterwards a scramble for the grains took place. In time the wheat-grains came to be cooked into thin dry biscuits, which were broken over the bride's head, as is the custom in Scotland to-day, an oatmeal cake being used. In Elizabeth's reign these biscuits began to take the form of small rectangular cakes made of eggs, milk, sugar, currants and spices. Every wedding guest had one at least, and the whole collection were thrown at the bride the instant she crossed the threshold. Those which lighted on her head or shoulders were most prized by the scramblers. At last these cakes became amalgamated into a large one which took on its full glories of almond paste and ornaments during Charles II.'s time. But even to-day in rural parishes, e.g. north Notts, wheat is thrown over the bridal couple with the cry "Bread for life and pudding for ever," expressive of a wish that the newly wed may be always affluent. The throwing of rice, a very ancient custom but one later than the wheat, is symbolical of the wish that the bridal may be fruitful. The *bride-cup* was the bowl or loving-cup in which the bridegroom pledged the bride, and she him. The custom of breaking this wine-cup, after the bridal couple had drained its contents, is common to both the Jews and the members of the Greek Church. The former dash it against the wall or on the ground, the latter tread it under foot. The phrase "bride-cup" was also sometimes used of the bowl of spiced wine prepared at night for the bridal couple. *Bride-favours*, anciently called bride-lace, were at first pieces of gold, silk or other lace, used to bind up the sprigs of rosemary formerly worn at weddings. These took later the form of bunches of ribbons, which were at last metamorphosed into rosettes. *Bridegroom-men* and *bridesmaids* had formerly important duties. The men were called bride-knights, and represented a survival of the primitive days of marriage by capture, when a man called his friends in to assist to "lift" the bride. Bridesmaids were usual in Saxon England. The senior of them had personally to attend the bride for some days before the wedding. The making of the bridal wreath, the decoration of the tables for the wedding feast, the dressing of the bride, were among her special tasks. In the same way the senior groomsman (the *best man*) was the personal attendant of the husband. The *bride-wain*, the wagon in which the bride was driven to her new home, gave its name to the weddings of any poor deserving couple, who drove a "wain" round the village, collecting small sums of money or articles of furniture towards their housekeeping. These were called bidding-weddings, or bid-ales, which were in the nature of "benefit" feasts. So general is still the custom of "bidding-weddings" in Wales, that printers usually keep the form of invitation in type. Sometimes as many as six hundred couples will walk in the bridal procession. The *bride's wreath* is a Christian substitute for the gilt coronet all Jewish brides wore. The crowning of the bride is still observed by the Russians, and the Calvinists of Holland and Switzerland. The wearing of orange blossoms is said to have started with the Saracens, who regarded them as emblems of fecundity. It was introduced into Europe by the Crusaders. The *bride's veil* is the modern form of the *flammeum* or large yellow veil which completely enveloped the Greek and Roman brides during the ceremony. Such a covering is still in use among the Jews and the Persians.

See Brand, *Antiquities of Great Britain* (Hazlitt's ed., 1905); Rev J. Edward Vaux, *Church Folklore* (1894).

BRIDEWELL, a district of London between Fleet Street and the Thames, so called from the well of St Bride or St Bridget close by. From William the Conqueror's time, a castle or Norman tower, long the occasional residence of the kings of England, stood there by the Fleet ditch. Henry VIII., Stow says, built there "a stately and beautiful house," specially for the housing of the emperor Charles V. and his suite in 1525. During the hearing of the divorce suit by the Cardinals at Blackfriars, Henry and Catharine of Aragon lived there. In 1553 Edward VI. made it over to the city as a penitentiary, a house of correction for vagabonds and loose women; and it was formally taken possession of by the lord mayor and corporation in 1555. The greater part of the building was destroyed in the Great Fire of 1666. New Bridewell, built in 1829, was pulled down in 1864. The term has become a synonym for any reformatory.

BRIDGE, a game of cards, developed out of the game of whist. The country of its origin is unknown. A similar game is said to have been played in Denmark in the middle of the 19th century. A game in all respects the same as bridge, except that in "no trumps" each trick counted ten instead of twelve, was played in England about 1884 under the name of Dutch whist. Some connect it with Turkey and Egypt under the name of "Khedive," or with a Russian game called "Yeralash." It was in Turkey that it first won a share of popular favour. Under the synonyms of "Biritch," "Bridge," or "Russian whist," it found its way to the London clubs about 1894, from which date its popularity rapidly increased.

[v.04 p.0529] *Ordinary Bridge.*—Bridge, in its ordinary form, differs from whist in the following respects:—Although there are four players, yet in each hand the partner of the dealer takes no part in the

play of that particular hand. After the first lead his cards are placed on the table exposed, and are played by the dealer as at dummy whist; nevertheless the dealer's partner is interested in the result of the hand equally with the dealer. The trump suit is not determined by the last card dealt, but is selected by the dealer or his partner without consultation, the former having the first option. It is further open to them to play without a trump suit. The value of tricks and honours varies with the suit declared as trumps. Honours are reckoned differently from whist, and on a scale which is somewhat involved. The score for honours does not count towards winning or losing the rubber, but is added afterwards to the trick score in order to determine the value of the rubber. There are also scores for holding no trumps ("chicane"), and for winning all the tricks or all but one ("slam").

The score has to be kept on paper. It is usual for the scoring block to have two vertical columns divided halfway by a horizontal line. The left column is for the scorers' side, and the right for the opponents'. Honours are scored above the horizontal line, and tricks below. The drawback to this arrangement is that, since the scores for each hand are not kept separately, it is generally impossible to trace an error in the score without going through the whole series of hands. A better plan, it seems, is to have four columns ruled, the inner two being assigned to tricks, the outer ones to honours. By this method a line can be reserved for each hand, and any discrepancy in the scores at once rectified.

The Portland Club, London, drew up a code of laws in 1895, and this code, with a few amendments, was in July 1895 adopted by a joint committee of the Turf and Portland Clubs. A revised code came into force in January 1905, the provisions of which are here summarized.

Each trick above 6 counts 2 points in a spade declaration, 4 in a club, 6 in a diamond, 8 in a heart, 12 in a no-trump declaration. The game consists of 30 points made by tricks alone. When one side has won two games the rubber is ended. The winners are entitled to add 100 points to their score. Honours consist of ace, king, queen, knave, ten, in a suit declaration. If a player and his partner conjointly hold 3 (or "simple") honours they score twice the value of a trick; if 4 honours, 4 times; if 5 honours, 5 times. If a player in his own hand hold 4 honours he is entitled to score 4 honours in addition to the score for conjoint honours; thus, if one player hold 4 honours and his partner the other their total score is 9 by honours. Similarly if a player hold 5 honours in his own hand he is entitled to score 10 by honours. If in a no-trump hand the partners conjointly hold 3 aces, they score 30 for honours; if 4 aces, 40 for honours. 4 aces in 1 hand count 100. On the same footing as the score for honours are the following: *chicane*, if a player hold no trump, in amount equal to simple honours; *grand slam*, if one side win all the tricks, 40 points; *little slam*, if they win 12 tricks, 20 points. At the end of the rubber the total scores, whether made by tricks, honours, chicane, slam, or rubber points, are added together, and the difference between the two totals is the number of points won.

At the opening of play, partners are arranged and the cards are shuffled, cut and dealt (the last card not being turned) as at whist; but the dealer cannot lose the deal by misdealing. After the deal is completed, the dealer makes the trump or no-trump (*sans atout*) declaration, or passes the choice to his partner without remark. If the dealer's partner make the declaration out of his turn, the adversary on the dealer's left may, without consultation, claim a fresh deal. If an adversary make a declaration, the dealer may claim a fresh deal or disregard the declaration. Then after the declaration, either adversary may double, the leader having first option. The effect of doubling is that each trick is worth twice as many points as before; but the scores for honours, chicane and slam are unaltered. If a declaration is doubled, the dealer and his partner have the right of redoubling, thus making each trick worth four times as much as at first. The declarer has the first option. The other side can again redouble, and so on; but the value of a trick is limited to 100 points. In the play of the hand the laws are nearly the same as the laws of whist, except that the dealer may expose his cards and lead out of turn without penalty; after the second hand has played, however, he can only correct this lead out of turn with the permission of the adversaries. Dummy cannot revoke. The dealer's partner may take no part in the play of the hand beyond guarding the dealer against revoking.

Advice to Players.—In the choice of a suit two objects are to be aimed at: first, to select the suit in which the combined forces have the best chance of making tricks; secondly, to select the trump so that the value of the suit agrees with the character of the hand, *i.e.* a suit of high value when the hands are strong and of low value when very weak. As the deal is a great advantage it generally happens that a high value is to be aimed at, but occasionally a low value is desirable. The task of selection should fall to the hand which has the most distinctive features, that is, either the longest suit or unusual strength or weakness. No consultation being allowed, the dealer must assume only an average amount of variation from the normal in his partner's hand. If his own hand has distinctive features beyond the average, he should name the trump suit himself, otherwise pass it to his partner. It may here be stated what is the average in these respects.

As regards the length of a suit, a player's long suit is rather more likely to be fewer than five than over five. If the dealer has in his hand a suit of five cards including two honours, it is probable that he has a better suit to make trumps than dummy; if the suit is in hearts, and the dealer has a fair hand, he ought to name the trump. As regards strength, the average hand would contain ace, king, queen, knave and ten, or equivalent strength. Hands stronger or weaker than this by the value of a king or less may be described as featureless. If the dealer's hand is a king over the average, it is more likely than not that his partner will either hold a stronger hand, or will hold such a weak hand as will counteract the player's strength. The dealer would not generally with such a hand declare no trump, especially as by making a no-trump declaration the dealer forfeits

the advantage of holding the long trumps.

Declarations by Dealer.—In calculating the strength of a hand a knave is worth two tens, a queen is worth two knaves, a king is worth a queen and knave together, and an ace is worth a king and queen together. A king unguarded is worth less than a queen guarded; a queen is not fully guarded unless accompanied by three more cards; if guarded by one small card it is worth a knave guarded. An ace also loses in value by being sole.

A hand to be strong enough for a no-trump declaration should be a king and ten above the average with all the honours guarded and all the suits protected. It must be a king and knave or two queens above the average if there is protection in three suits. It must be an ace or a king and queen above the average if only two suits are protected. An established black suit of six or more cards with a guarded king as card of entry is good enough for no trumps. With three aces no trumps can be declared. Without an ace, four kings, two queens and a knave are required in order to justify the declaration. When the dealer has a choice of declarations, a sound heart make is to be preferred to a doubtful no-trump. Four honours in hearts are to be preferred to any but a very strong no-trump declaration; but four aces counting 100 points constitute a no-trump declaration without exception.

Six hearts should be made trumps and five with two honours unless the hand is very weak; five hearts with one honour or four hearts with three honours should be declared if the hand is nearly strong enough for no trumps, also if the hand is very irregular with one suit missing or five of a black suit. Six diamonds with one honour, five with three honours or four all honours should be declared; weaker diamonds should be declared if the suits are irregular, especially if blank in hearts. Six clubs with three honours or five with four honours should be declared. Spades are practically only declared with a weak hand; with only a king in the hand a suit of five spades should be declared as a defensive measure. With nothing above a ten a suit of two or three spades can be declared, though even with the weakest hands a suit of five clubs or of six red cards will probably prove less expensive.

Declarations by Dummy.—From the fact that the call has been passed, the dealer's partner must credit the dealer with less than average strength as regards the rank of his cards, and probably a slightly increased number of black cards; he must therefore be more backward in making a high declaration whenever he can make a sound declaration of less value. On the other hand, he has not the option of passing the declaration, and may be driven to declare on less strength because the only alternative is a short suit of spades. For example, with the hand: Hearts, ace, kv. 2; diamonds, qn. 9, 7, 6, 3; clubs, kg. 10, 4; spades, 9, 2, the chances are in the dealer's favour with five trumps, but decidedly against with only two, and the diamond declaration is to be preferred to the spade. Still, a hand may be so weak that spades should be declared with two or less, but five clubs or six diamonds would be preferable with the weakest of hands.

[v.04 p.0530] *Declarations to the Score.*—When one's score is over twenty, club declarations should be made more frequently by the dealer. Spades should be declared with six at the score of twenty-six and with five at twenty-eight. When much behind in the score a risky no-trumper such as one with an established suit of seven or eight cards without a card of entry, may be declared.

Declaring to the score is often overdone; an ordinary weak no-trump declaration carries with it small chances of three by tricks unless dummy holds a no-trump hand.

Doubling.—Practically the leader only doubles a no-trump declaration when he holds what is probably an established suit of seven cards or a suit which can be established with the loss of one trick and he has good cards of re-entry. Seven cards of a suit including the ace, king and queen make sound double without any other card of value in the hand, or six cards including king, queen and knave with two aces in other suits.

Doubling by the third hand is universally understood to mean that the player has a very strong suit which he can establish. In response to the double his partner, according to different conventions, leads either a heart or his own shortest suit as the one most likely to be the third player's strongest. Under the short suit convention, if the doubler holds six of a suit headed by the ace, king and queen, it is about an even chance that his suit will be selected; he should not double with less strength. Under the heart convention it is not necessary to have such great strength; with a strong suit of six hearts and good cards of re-entry, enough tricks will be saved to compensate for the doubled value. A player should ascertain the convention followed before beginning to play.

Before doubling a suit declaration a player should feel almost certain that he is as strong as the declarer. The minimum strength to justify the declaration is generally five trumps, but it may have been made on six. If, then, a player holds six trumps with an average hand as regards the rank of his cards, or five trumps with a hand of no-trump strength, it is highly probable that he is as strong as the declarer. It must be further taken into account that the act of doubling gives much valuable information to the dealer, who would otherwise play with the expectation of finding the trumps evenly distributed; this is counterbalanced when the doubler is on the left of the declaring hand by the intimation given to his partner to lead trumps through the strong hand. In this position, then, the player should double with the strength stated above. When on the declarer's right, the player should hold much greater strength unless his hand is free from tenaces. When a spade declaration has been made by dummy, one trump less is necessary and the doubler need not be on the declarer's left. A spade declaration by the dealer can be doubled with even less strength. A declaration can be rather more freely doubled when a single trick

undoubled will take the dealer out, but even in this position the player must be cautious of informing the dealer that there is a strong hand against him.

Redoubling.—When a declaration has been doubled, the declarer knows the minimum that he will find against him; he must be prepared to find occasionally strength against him considerably exceeding this minimum. Except in the case of a spade declaration, cases in which redoubling is justifiable are very rare.

The Play of the Hand.—In a no-trump declaration the main object is to bring in a long suit. In selecting the suit to establish, the following are favourable conditions:—One hand should hold at least five cards of the suit. The two hands, unless with a sequence of high cards, should hold between them eight cards of the suit, so as to render it probable that the suit will be established in three rounds. The hand which contains the strong suit should be sufficiently strong in cards of re-entry. The suit should not be so full of possible tenaces as to make it disadvantageous to open it. As regards the play of the cards in a suit, it is not the object to make tricks early, but to make all possible tricks. Deep finesses should be made when there is no other way of stealing a trick. Tricks may be given away, if by so doing a favourable opening can be made for a finesse. When, however, it is doubtful with which hand the finesse should be made, it is better to leave it as late as possible, since the card to be finessed against may fall, or an adversary may fail, thus disclosing the suit. It is in general unsound to finesse against a card that must be unguarded. From a hand short in cards of re-entry, winning cards should not be led out so as to exhaust the suit from the partner's hand. Even a trick should sometimes be given away. For instance, if one hand holds seven cards headed by ace, king, and the other hand hold's only two of the suit, although there is a fair chance of making seven tricks in the suit, it would often be right to give the first trick to the adversaries. When one of the adversaries has shown a long suit, it is frequently possible to prevent its being brought in by a device, such as holding up a winning card, until the suit is exhausted from his partner's hand, or playing in other suits so as to give the player the lead whilst his partner his a card of his suit to return, and to give the latter the lead when he has no card to return. The dealer should give as little information as possible as to what he holds in his own hand, playing frequent false cards. Usually he should play the higher or highest of a sequence; still, there are positions in which playing the higher gives more information than the lower; a strict adherence to a rule in itself assists the adversaries.

With a suit declaration, if there is no chance of letting the weak hand make a trump by ruffing, it will generally be the dealer's aim to discard the losing cards in the declaring hand either to high cards or to the cards of an established suit in the other hand, sometimes after the adverse trumps have been taken out, but often before, there being no time for drawing trumps. With no card of any value in a suit in one hand, the lead should come from that hand, but it is better, if possible, to let the adversaries open the suit. It is generally useless to lead a moderately high card from the weaker hand in order to finesse it, when holding no cards in sequence with it in either hand. Sometimes (especially in no-trumps) it is the better play to make the weak hand third player. For instance, with king, 8, 7, 5, 2 in one hand, knave, 4 in the other, the best way of opening is from the hand that holds five cards.

In a no-trump declaration the opponents of the dealer should endeavour to find the longest suit in the two hands, or the one most easily established. With this object the leader should open his best suit. If his partner next obtains the lead he ought to return the suit, unless he himself has a suit which he considers better, having due regard to the fact that the first suit is already partially established. The opponents should employ the same tactics as the dealer to prevent the latter from bringing in a long suit; they can use them with special effect when the long suit is in the exposed hand.

Against no-trumps the leader should not play his winning cards unless he has a good chance of clearing the suit without help from his partner; in most cases it is advisable to give away the first trick, especially if he has no card of re-entry, in order that his partner on gaining the lead may have a card of the suit to return; but holding ace, king and queen, or ace, king with seven in the suit, or ace, king, knave, ten with six, the player may lead out his best. With three honours any two of which are in sequence (not to the ace) the player should lead the higher of the sequence. He should lead his highest card from queen, knave, ten; from queen, knave, nine; from knave, ten, nine; knave, ten, eight, and ten, nine, eight. In other cases the player should lead a small card; according to the usual convention, the fourth best. His partner, and also the dealer, can credit him with three cards higher than the card led, and can often place the cards of the suit: for instance, the seven is led, dummy holds queen and eight, playing the queen, the third player holds the nine and smaller cards; the unseen cards higher than the seven are ace, king, knave and ten of which the leader must hold three; he cannot hold both knave and ten or he would have led the knave; he must therefore hold the ace, king and either knave or ten. The "eleven" rule is as follows: the number of pips in the card led subtracted from eleven (11-7=4 in the case stated) gives the number of cards higher than the one led not in the leader's hand; the three cards seen (queen, nine and eight) leave one for the dealer to hold. The mental process is no shorter than assigning three out of the unseen cards to the leader, and by not noting the unseen cards much valuable information may be missed, as in the illustrative case given.

With a suit declared the best opening lead is a singleton, failing which a lead from a strong sequence. A lead from a tenace or a guarded king or queen is to be avoided. Two small cards may be led from, though the lead is objected to by some. A suit of three small cards of no great strength should not be opened. In cases of doubt preference should be given to hearts and to a less extent to diamonds.

To lead up to dummy's weak suits is a valuable rule. The converse, to lead through strength, must be used with caution, and does not apply to no-trump declarations. It is not advisable to adopt any of the recent whist methods of giving information. It is clear that, if the adversaries signal, the dealer's hand alone is a secret, and he, in addition to his natural advantage, has the further advantage of better information than either of the adversaries. The following signals are however, used, and are of great trick-making value: playing an unnecessarily high card, whether to one's partner's suit or in discarding in a no-trump declaration, indicates strength in the suit; in a suit declaration a similar method of play indicates two only of the suit and a desire to ruff,—it is best used in the case of a king led by one's partner.

The highest of a sequence led through dummy will frequently tell the third player that he has a good finesse. The lowest of a sequence led through the dealer will sometimes explain the position to the third player, at the same time keeping the dealer in the dark.

When on dummy's left it is futile to finesse against a card not in dummy's hand. But with ace and knave, if dummy has either king or queen, the knave should usually be played, partly because the other high card may be in the leader's hand, partly because, if the finesse fails, the player may still hold a tenace over dummy. When a player is with any chance of success trying to establish his long suit, he should keep every card of it if possible, whether it is a suit already opened or a suit which he wishes his partner to lead; when, however, the main object of the hand is to establish one's partner's suit, it is not necessary for a player to keep his own long suit, and he should pay attention to guarding the other suits. In some circles a discard from a suit is always understood to indicate strength in the suit; this convention, while it makes the game easier for inferior players, frequently causes the player to throw away one of his most valuable cards.

Playing to the Score.—At the beginning of the hand the chances are so great against any particular result, that at the score of love-all the advantage of getting to any particular score has no appreciable effect in determining the choice of suit. In the play of the hand, the advantage of getting to certain points should be borne in mind. The principal points to be aimed at are 6, 18, and, in a less degree, 22. The reason is that the scores 24, 12 and 8, which will just take the dealer out from the respective points, can each be made in a variety of ways, and are the most common for the dealer to make. The 2 points that take the score from 4 to 6 are worth 4, or perhaps 5, average points; and the 2 points that take the score from 6 to 8 are worth 1 point. When approaching game it is an advantage to make a declaration that may just take the player out, and, in a smaller degree, one that will not exactly take the adversaries out. When the score is 24 to 22 against the dealer, hearts and clubs are half a trick better relatively to diamonds than at the score of love-all. In the first and second games of the rubber the value of each point scored for honours is probably about a half of a point scored for tricks—in a close game rather less, in a one-sided game rather more. In the deciding game of the rubber, on account of the importance of winning the game, the value of each point scored for honours sinks to one-third of a point scored for tricks.

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Other Forms of Bridge.—The following varieties of the game are also played:—

Three-handed Bridge.—The three players cut; the one that cuts the lowest card deals, and takes dummy for one deal: each takes dummy in turn. Dummy's cards are dealt face downwards, and the dealer declares without seeing them. If the dealer declares trumps, both adversaries may look at their hands; doubling and redoubling proceeds as at ordinary bridge, but dummy's hand is not exposed till the first card has been led. If the dealer passes the declaration to dummy, his right-hand adversary, who must not have looked at his own hand, examines dummy's, and declares trumps, not, however, exposing the hand. The declaration is forced: with three or four aces *sans atout* (no trumps) must be declared: in other cases the longest suit: if suits are equal in length, the strongest, *i.e.* the suit containing most pips, ace counting eleven, king, queen and knave counting ten each. If suits are equal in both length and strength, the one in which the trick has the higher value must be trumps. On the dummy's declaration the third player can only double before seeing his own cards. When the first card has been led, dummy's hand is exposed, never before the lead. The game is 30: the player wins the rubber who is the first to win two games. Fifty points are scored for each game won, and fifty more for the rubber. Sometimes three games are played without reference to a rubber, fifty points being scored for a game won. No tricks score towards game except those which a player wins in his own deal; the value of tricks won in other deals is scored above the line with honours, slam and chicane. At the end of the rubber the totals are added up, and the points won or lost are adjusted thus. Suppose A is credited with 212, B with 290, and C with 312, then A owes 78 to B and 100 to C; B owes 22 to C.

Dummy Bridge.—The player who cuts the lowest card takes dummy. Dummy deals the first hand of all. The player who takes dummy always looks at his own hand first, when he deals for himself or for dummy; he can either declare trumps or "leave it" to dummy. Dummy's declaration is compulsory, as in three-handed bridge. When the dealer deals for dummy, the player on the dealer's *left* must not look at his cards till either the dealer has declared trumps or, the declaration having been left to dummy, his own partner has led a card. The latter can double, but his partner can only double without seeing his hand. The dealer can only redouble on his own hand. When the player of dummy deals for himself, the player on his *right* hand looks at dummy's hand if the declaration is passed, the positions and restrictions of his partner and himself being reversed. If the player of dummy declares from his own hand, the game proceeds as in ordinary bridge, except that dummy's hand is not looked at till permission to play has been given. When the player on dummy's right deals, dummy's partner may look at dummy's hand to decide if he will double, but he may not look at his own till a card has been led by dummy. In another form of

dummy bridge two hands are exposed whenever dummy's adversaries deal, but the game is unsuited for many players, as in every other hand the game is one of double-dummy.

Misery Bridge.—This is a form of bridge adapted for two players. The non-dealer has the dummy, whilst the dealer is allowed to strengthen his hand by discarding four or fewer cards and taking an equal number from the fourth packet dealt; the rest of the cards in that packet are unused and remain unseen. A novel and interesting addition to the game is that the three of clubs (called "Cato") does not rank as a club but can be played to any trick and win it. The dealer, in addition to his other calls, may declare "misery" when he has to make less than two tricks.

Draw- or Two-handed Bridge.—This is the best form of bridge for two players. Each player has a dummy, which is placed opposite to him; but the cards are so arranged that they cannot be seen by his opponent, a special stand being required for the purpose. The dealer makes the declaration or passes it to his dummy to make by the same rules as in three-handed or dummy bridge. The objection to this is that, since the opponent does not see the dealer's dummy, he has no chance of checking an erroneous declaration. This could be avoided by not allowing the dealer the option of passing.

Auction Bridge.—This variety of the game for four players, which adds an element characteristic of poker, appears to have been suggested about 1904, but was really introduced at the Bath Club, London, in 1907, and then was gradually taken up by a wider circle. The laws were settled in August 1908 by a joint committee of the Bath and Portland clubs. The scoring (except as below), value of suits, and play are as at ordinary bridge, but the variety consists in the method of declaration, the declaration not being confined in auction bridge to the dealer or his partner, and the deal being a disadvantage rather than otherwise. The dealer, having examined his hand, *must* declare to win at least one "odd" trick, and then each player in turn, beginning with the one on the dealer's left, has the right to pass the previous declaration, or double, or redouble, or overcall by making a declaration of higher value any number of times till all are satisfied, the actual play of the combined hands (or what in ordinary bridge would be dealer and dummy) resting eventually with the partners making the final declaration; the partner who made the first call (however small) in the suit finally constituting the trump (or no-trump) plays the hands, the other being dummy. A declaration of a greater number of tricks in a suit of lower value, which equals a previous call in value of points (*e.g.* two in spades as against one in clubs) is "of higher value"; but doubling and redoubling only affect the score and not the declaration, so that a call of two diamonds overcalls one no-trump even though this has been doubled. The scoring in auction bridge has the additional element that when the eventual player of the two hands wins what was ultimately declared or more, his side score the full value below the line (as tricks), but if he fails the opponents score 50 points above the line (as honours) for each under-trick (*i.e.* trick short of the declaration), or 100 or 200 if doubled or redoubled, nothing being scored by either side below the line; the loss on a declaration of one spade is limited, however, to a maximum of 100 points. A player whose declaration has been doubled and who fulfils his contract, scores a bonus of 50 points above the line and a further 50 points for each additional trick beyond his declaration; if there was a redouble and he wins, he scores double the bonus. The penalty for a revoke (unaffected by a double) is (1) in the case of the declarer, that his adversaries add 150 above the line; (2) in the case of one of his adversaries, that the declarer may either add 150 points above the line or may take three tricks from his opponents and add them to his own; in the latter case such tricks may assist him to fulfil his contract, but shall not entitle him to any bonus for a double or redouble. A revoking side may score nothing either above or below the line except for honours or chicane. As regards the essential feature of auction bridge, the competitive declaration, it is impossible here to discuss the intricacies involved. It entails, clearly, much reliance on a good partner, since the various rounds of bidding enable good players to draw inferences as to where the cards lie. The game opens the door to much larger scores than ordinary bridge, and since the end only comes from scores made below the line, there are obvious ways of prolonging it at the cost of scores above the line which involve much more of the gambling element. It by no means follows that the winner of the rubber is the winner by points, and many players prefer to go for points (*i.e.* above the line) extorted from their opponents rather than for fulfilling a declaration made by themselves.

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(W. H. W.*)

BRIDGEBUILDING BROTHERHOOD, a confraternity (*Fratres Pontifices*) that arose in the south of France during the latter part of the 12th century, and maintained hospices at the chief fords of the principal rivers, besides building bridges and looking after ferries. The brotherhood was recognized by Pope Clement III. in 1189.

BRIDGE-HEAD (Fr. *tête-du-pont*), in fortification, a work designed to cover the passage of a river by means of fortifications on one or both banks. As the process of moving an army over bridges is slow and complicated, it is usually necessary to secure it from hostile interruption, and the works constituting the bridge-head must therefore be sufficiently far advanced to keep the enemy's artillery out of range of the bridges. In addition, room is required for the troops to form up on the farther bank. In former days, with short-range weapons, a bridge-head was often little more than a screen for the bridge itself, but modern conditions have rendered necessary far

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greater extension of bridge defences.

BRIDGEND, a market town in the southern parliamentary division of Glamorganshire, Wales, on both sides of the river Ogwr (whence its Welsh name Penybont-ar-Ogwr). Pop. of urban district (1901) 6062. It has a station 165 m. from London on the South Wales trunk line of the Great Western railway, and is the junction of the Barry Company's railway to Barry via Llantwit Major. Bridgend has a good market for agricultural produce, and is an important centre owing to its being the natural outlet for the mining valleys of the Llynvi, Garw and the two Ogwr rivers, which converge about 3 m. north of the town and are connected with it by branch lines of the Great Western railway. Though without large manufacturing industries, the town has joinery works, a brass and iron foundry, a tannery and brewery. There are brick-works and stone quarries, and much lime is burnt in the neighbourhood. Just outside the town at Angelton and Parc Gwyllt are the Glamorgan county lunatic asylums.

There was no civil parish of Bridgend previous to 1905, when one was formed out of portions of the parishes of Newcastle and Coity. Of the castle of Newcastle, built on the edge of a cliff above the church of that parish, there remain a courtyard with flanking towers and a fine Norman gateway. At Coity, about 2 m. distant, there are more extensive ruins of its castle, originally the seat of the Turbervilles, lords of Coity, but now belonging to the earls of Dunraven. Coity church, dating from the 14th century, is a fine cruciform building with central embattled tower in Early Decorated style.

BRIDGE OF ALLAN, a police burgh of Stirlingshire, Scotland. Pop. (1901) 3240. It lies on the Allan, a left-hand tributary of the Forth, 3 m. N. of Stirling by the Caledonian railway and by tramway. Built largely on the well-wooded slopes of Westerton and Airthrey Hill, sheltered by the Ochils from the north and east winds, and environed by charming scenery, it has a great reputation as a health resort and watering-place, especially in winter and spring. There is a pump-room. The chief buildings are the hydropathic and the Macfarlane museum of fine art and natural history. The industries include bleaching, dyeing and paper-making. The Strathallan Gathering, usually held in the neighbourhood, is the most popular athletic meeting in mid-Scotland. Airthrey Castle, standing in a fine park with a lake, adjoins the town on the south-east, and just beyond it are the old church and burying-ground of Logie, beautifully situated at the foot of a granite spur of the Ochil range.

BRIDGEPORT, a city, a port of entry, and one of the county-seats of Fairfield county, Connecticut, U.S.A., co-extensive with the town of Bridgeport, in the S.W. part of the state, on Long Island Sound, at the mouth of the Pequonnock river; about 18 m. S.W. of New Haven. Pop. (1880) 27,643; (1890) 48,866; (1900) 70,996, of whom 22,281 were foreign-born, including 5974 from Ireland, 3172 from Hungary, 2854 from Germany, 2755 from England, and 1436 from Italy; (1910) 102,054. Bridgeport is served by the New York, New Haven & Hartford railway, by lines of coast steamers, and by steamers to New York City and to Port Jefferson, directly across Long Island Sound. The harbour, formed by the estuary of the river and Yellow Mill Pond, an inlet, is excellent. Between the estuary and the pond is a peninsula, East Bridgeport, in which are some of the largest manufacturing establishments, and west of the harbour and the river is the main portion of the city, the wholesale section extending along the bank, the retail section farther back, and numerous factories along the line of the railway far to the westward. There are two large parks, Beardsley, in the extreme north part of the city, and Seaside, west of the harbour entrance and along the Sound; in the latter are statues of Elias Howe, who built a large sewing-machine factory here in 1863, and of P.T. Barnum, the showman, who lived in Bridgeport after 1846 and did much for the city, especially for East Bridgeport. In Seaside Park there is also a soldiers' and sailors' monument, and in the vicinity are many fine residences. The principal buildings are the St Vincent's and Bridgeport hospitals, the Protestant orphan asylum, the Barnum Institute, occupied by the Bridgeport Scientific and Historical Society and the Bridgeport Medical Society; and the United States government building, which contains the post-office and the customs house.

In 1905 Bridgeport was the principal manufacturing centre in Connecticut, the capital invested in manufacturing being $49,381,348, and the products being valued at $44,586,519. The largest industries were the manufacture of corsets—the product of Bridgeport was 19.9% of the total for the United States in 1905, Bridgeport being the leading city in this industry—sewing machines (one of the factories of the Singer Manufacturing Co. is here), steam-fitting and heating apparatus, cartridges (the factory of the Union Metallic Cartridge Co. is here), automobiles, brass goods, phonographs and gramophones, and typewriters. There are also large foundry and machine shops. Here, too, are the winter headquarters of "Barnum and Bailey's circus" and of "Buffalo Bill's Wild West Show." Bridgeport is a port of entry; its imports in 1908 were valued at $656,271. Bridgeport was originally a part of the township of Stratford. The first settlement here was made in 1659. It was called Pequonnock until 1695, when its name was changed to Stratfield. During the War of Independence it was a centre of privateering. In 1800 the borough of Bridgeport was chartered, and in 1821 the township was incorporated. The city was not chartered until 1836.

See S. Orcutt's *History of the Township of Stratford and the City of Bridgeport* (New Haven, 1886).

BRIDGES, ROBERT (1844-), English poet, born on the 23rd of October 1844, was educated at Eton and at Corpus Christi College, Oxford, and studied medicine in London at St Bartholomew's hospital. He was afterwards assistant physician at the Children's hospital, Great Ormond Street,

and physician at the Great Northern hospital, retiring in 1882. Two years later he married Mary, daughter of Alfred Waterhouse, R.A. As a poet Robert Bridges stands rather apart from the current of modern English verse, but his work has had great influence in a select circle, by its restraint, purity, precision, and delicacy yet strength of expression; and it embodies a distinct theory of prosody. His chief critical works are *Milton's Prosody* (1893), a volume made up of two earlier essays (1887 and 1889), and *John Keats, a Critical Essay* (1895). He maintained that English prosody depended on the number of "stresses" in a line, not on the number of syllables, and that poetry should follow the rules of natural speech. His poetry was privately printed in the first instance, and was slow in making its way beyond a comparatively small circle of his admirers. His best work is to be found in his *Shorter Poems* (1890), and a complete edition of his *Poetical Works* (6 vols.) was published in 1898-1905. His chief volumes are *Prometheus* (Oxford, 1883, privately printed), a "mask in the Greek Manner"; *Eros and Psyche* (1885), a version of Apuleius; *The Growth of Love*, a series of sixty-nine sonnets printed for private circulation in 1876 and 1889; *Shorter Poems* (1890); *Nero* (1885), a historical tragedy, the second part of which appeared in 1894; *Achilles in Scyros* (1890), a drama; *Palicio* (1890), a romantic drama in the Elizabethan manner; *The Return of Ulysses* (1890), a drama in five acts; *The Christian Captives* (1890), a tragedy on the same subject as Calderon's *El Principe Constante*; *The Humours of the Court* (1893), a comedy founded on the same dramatist's *El secreto á voces* and on Lope de Vega's *El Perro del hortelano*; *The Feast of Bacchus* (1889), partly translated from the *Heauton-Timoroumenos* of Terence; *Hymns from the Yattendon Hymnal* (Oxford, 1899); and *Demeter, a Mask* (Oxford, 1905).

[v.04 p.0533] **BRIDGES.** 1. *Definitions and General Considerations.*—Bridges (old forms, *brig*, *brygge*, *brudge*; Dutch, *brug*; German, *Brücke*; a common Teutonic word) are structures carrying roadways, waterways or railways across streams, valleys or other roads or railways, leaving a passage way below. Long bridges of several spans are often termed "viaducts," and bridges carrying canals are termed "aqueducts," though this term is sometimes used for waterways which have no bridge structure. A "culvert" is a bridge of small span giving passage to drainage. In railway work an "overbridge" is a bridge over the railway, and an "underbridge" is a bridge carrying the railway. In all countries there are legal regulations fixing the minimum span and height of such bridges and the width of roadway to be provided. Ordinarily bridges are fixed bridges, but there are also movable bridges with machinery for opening a clear and unobstructed passage way for navigation. Most commonly these are "swing" or "turning" bridges. "Floating" bridges are roadways carried on pontoons moored in a stream.

In classical and medieval times bridges were constructed of timber or masonry, and later of brick or concrete. Then late in the 18th century wrought iron began to be used, at first in combination with timber or cast iron. Cast iron was about the same time used for arches, and some of the early railway bridges were built with cast iron girders. Cast iron is now only used for arched bridges of moderate span. Wrought iron was used on a large scale in the suspension road bridges of the early part of the 19th century. The great girder bridges over the Menai Strait and at Saltash near Plymouth, erected in the middle of the 19th century, were entirely of wrought iron, and subsequently wrought iron girder bridges were extensively used on railways. Since the introduction of mild steel of greater tenacity and toughness than wrought iron (*i.e.* from 1880 onwards) it has wholly superseded the latter except for girders of less than 100 ft. span. The latest change in the material of bridges has been the introduction of ferro-concrete, armoured concrete, or concrete strengthened with steel bars for arched bridges. The present article relates chiefly to metallic bridges. It is only since metal has been used that the great spans of 500 to 1800 ft. now accomplished have been made possible.

2. In a bridge there may be distinguished the *superstructure* and the *substructure*. In the former the main supporting member or members may be an arch ring or arched ribs, suspension chains or ropes, or a pair of girders, beams or trusses. The bridge flooring rests on the supporting members, and is of very various types according to the purpose of the bridge. There is also in large bridges wind-bracing to stiffen the structure against horizontal forces. The *substructure* consists of (*a*) the piers and end piers or abutments, the former sustaining a vertical load, and the latter having to resist, in addition, the oblique thrust of an arch, the pull of a suspension chain, or the thrust of an embankment; and (*b*) the foundations below the ground level, which are often difficult and costly parts of the structure, because the position of a bridge may be fixed by considerations which preclude the selection of a site naturally adapted for carrying a heavy structure.

3. *Types of Bridges.*—Bridges may be classed as *arched bridges*, in which the principal members are in compression; *suspension bridges*, in which the principal members are in tension; and *girder bridges*, in which half the components of the principal members are in compression and half in tension. But there are cases of bridges of mixed type. The choice of the type to be adopted depends on many and complex considerations:—(1) The cost, having regard to the materials available. For moderate spans brick, masonry or concrete can be used without excessive cost, but for longer spans steel is more economical, and for very long spans its use is imperative. (2) The importance of securing permanence and small cost of maintenance and repairs has to be considered. Masonry and concrete are more durable than metal, and metal than timber. (3) Aesthetic considerations sometimes have great weight, especially in towns. Masonry bridges are preferable in appearance to any others, and metal arch bridges are less objectionable than most forms of girder.

Most commonly the engineer has to attach great importance to the question of cost, and to

design his structure to secure the greatest economy consistent with the provision of adequate strength. So long as bridge building was an empirical art, great waste of material was unavoidable. The development of the theory of structures has been largely directed to determining the arrangements of material which are most economical, especially in the superstructure. In the case of bridges of large span the cost and difficulty of erection are serious, and in such cases facility of erection becomes a governing consideration in the choice of the type to be adopted. In many cases the span is fixed by local conditions, such as the convenient sites for piers, or the requirements of waterway or navigation. But here also the question of economy must be taken into the reckoning. The cost of the superstructure increases very much as the span increases, but the greater the cost of the substructure, the larger the span which is economical. Broadly, the least costly arrangement is that in which the cost of the superstructure of a span is equal to that of a pier and foundation.

For masonry, brick or concrete the arch subjected throughout to compression is the most natural form. The arch ring can be treated as a blockwork structure composed of rigid voussoirs. The stability of such structures depends on the position of the line of pressure in relation to the extrados and intrados of the arch ring. Generally the line of pressure lies within the middle half of the depth of the arch ring. In finding the line of pressure some principle such as the principle of least action must be used in determining the reactions at the crown and springings, and some assumptions must be made of not certain validity. Hence to give a margin of safety to cover contingencies not calculable, an excess of material must be provided. By the introduction of hinges the position of the line of resistance can be fixed and the stress in the arch ring determined with less uncertainty. In some recent masonry arched bridges of spans up to 150 ft. built with hinges considerable economy has been obtained.

For an elastic arch of metal there is a more complete theory, but it is difficult of application, and there remains some uncertainty unless (as is now commonly done) hinges are introduced at the crown and springings.

In suspension bridges the principal members are in tension, and the introduction of iron link chains about the end of the 18th century, and later of wire ropes of still greater tenacity, permitted the construction of road bridges of this type with spans at that time impossible with any other system of construction. The suspension bridge dispenses with the compression member required in girders and with a good deal of the stiffening required in metal arches. On the other hand, suspension bridges require lofty towers and massive anchorages. The defect of the suspension bridge is its flexibility. It can be stiffened by girders and bracing and is then of mixed type, when it loses much of its advantage in economy. Nevertheless, the stiffened suspension bridge will probably be the type adopted in future for very great spans. A bridge on this system has been projected at New York of 3200 ft. span.

The immense extension of railways since 1830 has involved the construction of an enormous number of bridges, and most of these are girder bridges, in which about half the superstructure is in tension and half in compression. The use of wrought iron and later of mild steel has made the construction of such bridges very convenient and economical. So far as superstructure is concerned, more material must be used than for an arch or chain, for the girder is in a sense a combination of arch and chain. On the other hand, a girder imposes only a vertical load on its piers and abutments, and not a horizontal thrust, as in the case of an arch or suspension chain. It is also easier to erect.

A fundamental difference in girder bridges arises from the mode of support. In the simplest case the main girders are supported at the ends only, and if there are several spans they are *discontinuous* or *independent*. But a main girder may be supported at two or more points so as to be *continuous* over two or more spans. The continuity permits economy of weight. In a three-span bridge the theoretical advantage of continuity is about 49% for a dead load and 16% for a live load. The objection to continuity is that very small alterations of level of the supports due to settlement of the piers may very greatly alter the distribution of stress, and render the bridge unsafe. Hence many multiple-span bridges such as the Hawkesbury, Benares and Chittravatti bridges have been built with independent spans.

[v.04 p.0534]

Lastly, some bridges are composed of cantilevers and suspended girders. The main girder is then virtually a continuous girder hinged at the points of contrary flexure, so that no ambiguity can arise as to the stresses.

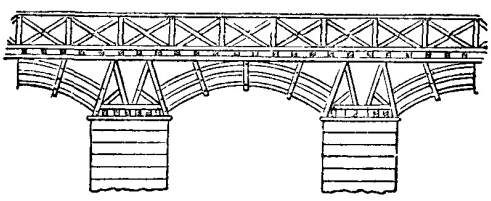


FIG. 1.—Trajan's Bridge.

Whatever type of bridge is adopted, the engineer has to ascertain the loads to be carried, and to proportion the parts so that the stresses due to the loads do not exceed limits found by experience to be safe. In many countries the limits of working stress in public and railway bridges are prescribed by law. The development of theory has advanced *pari passu* with the demand for bridges of greater strength and span and of more complex design, and there is now little uncertainty in calculating the stresses in any of the types of structure now adopted. In the modern metal bridge every member has a definite function and is subjected to a calculated straining action. Theory has been the guide in the development of bridge design, and its trustworthiness is completely recognized. The margin of uncertainty which must be met by empirical allowances on the side of safety has been steadily diminished.

The larger the bridge, the more important is economy of material, not only because the total expenditure is more serious, but because as the span increases the dead weight of the structure becomes a greater fraction of the whole load to be supported. In fact, as the span increases a point is reached at which the dead weight of the superstructure becomes so large that a limit is imposed to any further increase of span.

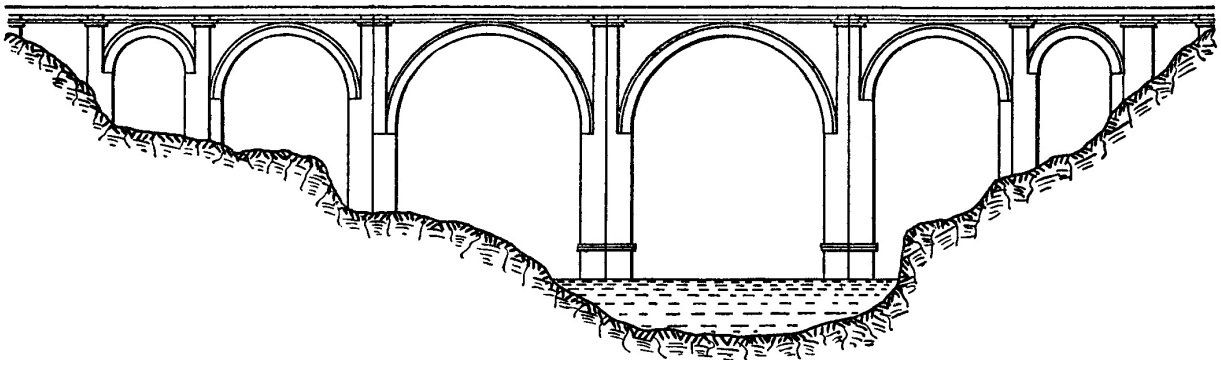


FIG. 2.—Bridge of Alcantara.

HISTORY OF BRIDGE BUILDING

4. *Roman Bridges.*—The first bridge known to have been constructed at Rome over the Tiber was the timber Pons Sublicius, the bridge defended by Horatius. The Pons Milvius, now Ponte Molle, was reconstructed in stone by M. Aemilius Scaurus in 109 B.C., and some portions of the old bridge are believed to exist in the present structure. The arches vary from 51 to 79 ft. span. The Pons Fabricius (mod. Ponte dei Quattro Capi), of about 62 B.C., is practically intact; and the Pons Cestius, built probably in 46 B.C., retains much of the original masonry. The Pons Aelius, built by Hadrian A.D. 134 and repaired by Pope Nicholas II. and Clement IX., is now the bridge of St Angelo. It had eight arches, the greatest span being 62 ft.[1] Dio Cassius mentions a bridge, possibly 3000 to 4000 ft. in length, built by Trajan over the Danube in A.D. 104. Some piers are said still to exist. A bas-relief on the Trajan column shows this bridge with masonry piers and timber arches, but the representation is probably conventional (fig. 1). Trajan also constructed the bridge of Alcantara in Spain (fig. 2), of a total length of 670 ft., at 210 ft. above the stream. This had six arches and was built of stone blocks without cement. The bridge of Narses, built in the 6th century (fig. 3), carried the Via Salaria over the Anio. It was destroyed in 1867, during the approach of Garibaldi to Rome. It had a fortification such as became usual in later bridges for defence or for the enforcement of tolls. The great lines of aqueducts built by Roman engineers, and dating from 300 B.C. onwards, where they are carried above ground, are arched bridge structures of remarkable magnitude (see AQUEDUCTS, § *Roman*). They are generally of brick and concrete.

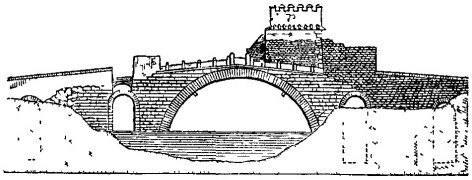


FIG. 3.—Ponte Salario.

5. *Medieval and other Early Bridges.*—Bridges with stone piers and timber superstructures were no doubt constructed from Roman times onward, but they have perished. Fig. 4 shows a timber bridge erected by the brothers Grubenmann at Schaffhausen about the middle of the 18th century. It had spans of 172 and 193 ft., and may be taken as a representative type of bridges of this kind. The Wittingen bridge by the same engineers had a span of 390 ft., probably the longest timber span ever constructed. Of stone bridges in Great Britain, the earliest were the cyclopean bridges still existing on Dartmoor, consisting of stone piers bridged by stone slabs. The bridge over the East Dart near Tavistock had three piers, with slabs 15 ft. by 6 ft. (Smiles, *Lives of the Engineers,* ii. 43). It is reputed to have lasted for 2000 years.

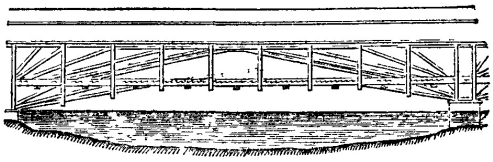


FIG. 4.—First Span of Schaffhausen Bridge.

[v.04 p.0535]

The curious bridge at Crowland near Peterborough (fig. 5) which now spans roadways, the streams which formerly flowed under it having been diverted, is one of the earliest known stone bridges in England. It is referred to in a charter of the year 943. It was probably built by the abbots. The first bridges over the Thames at London were no doubt of timber. William of Malmesbury mentions the existence of a bridge in 994. J. Stow (*Survey of the Cities of London and Westminster*) describes the building of the first stone bridge commonly called Old London Bridge: "About the year 1176, the stone bridge was begun to be founded by Peter of Colechurch, near unto the bridge of timber, but more towards the west." It carried timber houses (fig. 6) which were frequently burned down, yet the main structure existed till the beginning of the 19th century. The span of the arches ranged from 10 to 33 ft., and the total waterway was only 337 ft. The waterway of the present London Bridge is 690 ft., and the removal of the obstruction caused by the old bridge caused a lowering of the low-water level by 5 ft., and a considerable deepening of the river-bed. (See Smiles, *Lives of the Engineers*, "Rennie.")

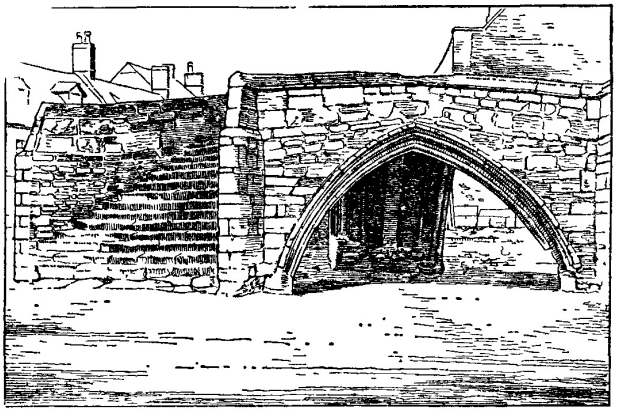


FIG. 5.—Crowland Bridge.

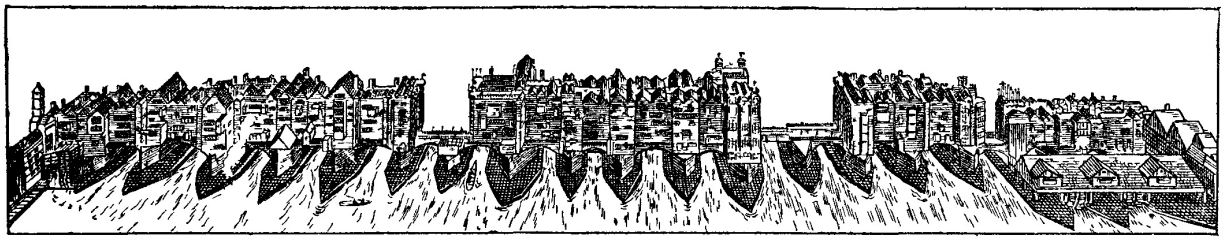


FIG. 6.—Old London Bridge, A.D. 1600. From a Drawing in the Pepysian Library Magdalene College, Cambridge. From J. R Green's *A Short History of the English People*, by permission of Macmillan & Co., Ltd.

The architects of the Renaissance showed great boldness in their designs. A granite arch built in 1377 over the Adda at Trezzo had a span at low water of 251 ft. This noble bridge was destroyed for military reasons by Carmagnola in 1416. The Rialto bridge at Venice, with a span of 91 ft., was built in 1588 by Antonio da Ponte. Fig. 7 shows the beautiful Ponte dellà Trinità erected at Florence in 1566 from the design of B. Ammanati.

6. *Modern Bridges.*—(*a*) *Timber.*—In England timber bridges of considerable span, either braced trusses or laminated arches (*i.e.* arches of planks bolted together), were built for some of the earlier railways, particularly the Great Western and the Manchester, Sheffield & Lincolnshire. They have mostly been replaced, decay having taken place at the joints. Timber bridges of large span were constructed in America between the end of the 18th and the middle of the 19th century. The Amoskeag bridge over the Merrimac at Manchester, N.H., U.S.A., built in 1792, had 6 spans of 92 ft. The Bellows Falls bridge over the Connecticut (built 1785-1792) had 2 spans of 184 ft. The singular Colossus bridge, built in 1812 over the Schuylkill, a kind of flat arched truss, had a span of 340 ft. Some of these timber bridges are said to have lasted ninety years with ordinary repairs, but they were road bridges not heavily loaded. From 1840, trusses, chiefly of timber but with wrought-iron tension-rods and cast-iron shoes, were adopted in America. The Howe truss of 1830 and the Pratt truss of 1844 are examples. The Howe truss had timber chords and a lattice of timber struts, with vertical iron ties. In the Pratt truss the struts were vertical and the ties inclined. Down to 1850 such bridges were generally limited to 150 ft. span. The timber was white pine. As railway loads increased and greater spans were demanded, the Howe truss was stiffened by timber arches on each side of each girder. Such a composite structure is, however, fundamentally defective, the distribution of loading to the two independent systems being indeterminate. Remarkably high timber piers were built. The Genesee viaduct, 800 ft. in length, built in 1851-1852 in 10 spans, had timber trestle piers 190 ft. in height. (See Mosse, "American Timber Bridges," *Proc. Inst. C.E.* xxii. p. 305, and for more modern examples, cxlii. p. 409; and clv. p. 382; Cooper, "American Railroad Bridges," *Trans. Am. Soc. C.E.* vol. xxi pp. 1-28.) These timber framed structures served as models for the earlier metal trusses which began to be used soon after 1850, and which, except in a few localities where iron is costly, have quite superseded them.

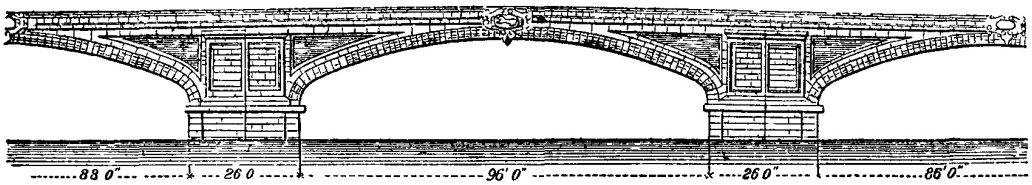


FIG. 7.—Ponte della Trinità, Florence.

7. (*b*) *Masonry.*—The present London Bridge, begun in 1824 and completed in 1831, is as fine an example of a masonry arch structure as can be found (figs. 8 and 9). The design was made by John Rennie the elder, and the acting engineer was his son, Sir John Rennie. The semi-elliptical shape of the arches the variation of span, the slight curvature of the roadway, and the simple yet bold architectural details, combine to make it a singularly beautiful bridge. The centre arch has a span of 152 ft., and rises 29 ft. 6 in above Trinity high-water mark; the arches on each side of the centre have a span of 140 ft. and the abutment arches 130 ft. The total length of the bridge is

1005 ft., its width from outside to outside 56 ft., and height above low water 60 ft. The two centre piers are 24 ft. thick, the exterior stones are granite, the interior, half Bramley Fall and half from Painshaw, Derbyshire. The voussoirs of the centre arch (all of granite) are 4 ft. 9 in. deep at the crown, and increase to not less than 9 ft. at the springing. The general depth at which the foundations are laid is about 29 ft. 6 in. below low water. The total cost was £1,458,311, but the contractor's tender for the bridge alone was £425,081.

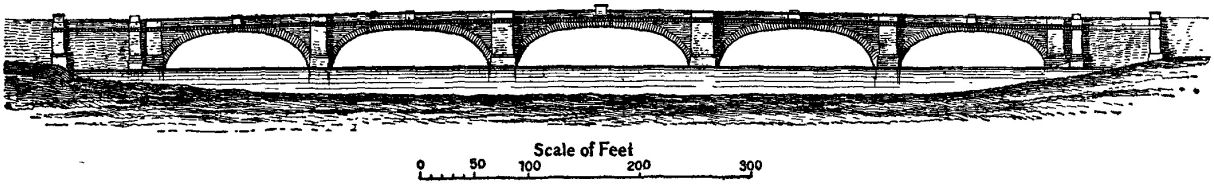


FIG. 8.—London New Bridge.

Since 1867 it had been recognized that London Bridge was inadequate to carry the traffic passing over it, and a scheme for widening it was adopted in 1900. This was carried out in 1902-1904, the footways being carried on granite corbels, on which are mounted cornices and open parapets. The width between parapets is now 65 ft., giving a roadway of 35 ft. and two footways of 15 ft. each. The architect was Andrew Murray and the engineer, G. E. W. Cruttwell. (Cole, *Proc. Inst. C.E.* clxi. p. 290.)

The largest masonry arch is the Adolphe bridge in Luxemburg, erected in 1900-1903. This has a span of 278 ft., 138 ft. rise above the river, and 102 ft. from foundation to crown. The thickness of the arch is 4 ft. 8 in. at the crown and 7 ft. 2 in. where it joins the spandrel masonry. The roadway is 52 ft. 6 in. wide. The bridge is not continuous in width, there are arch rings on each face, each 16.4 ft. wide with a space between of 19.7 ft. This space is filled with a flooring of reinforced concrete, resting on the two arches, and carrying the central roadway. By the method adopted the total masonry has been reduced one-third. One centering was used for the two arch rings, supported on dwarf walls which formed a slipway, along which it was moved after the first was built.

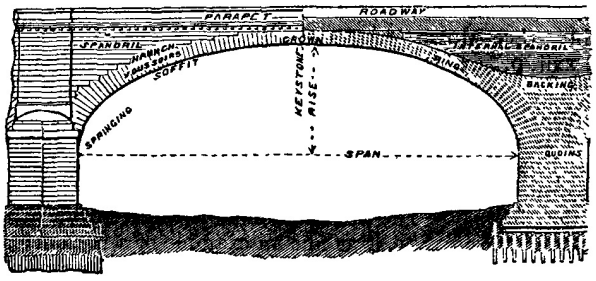


FIG. 9.—Half Elevation and Half Section of Arch of London Bridge.

Till near the end of the 19th century bridges of masonry or brickwork were so constructed that they had to be treated as rigid blockwork structures. The stability of such structures depends on the position of the line of pressure relatively to the intrados and extrados of the arch ring. Generally, so far as could be ascertained, the line of pressure lies within the middle half of the depth of the voussoirs. In finding the abutment reactions some principle such as the principle of least action must be used, and some assumptions of doubtful validity made. But if hinges are introduced at crown and springings, the calculation of the stresses in the arch ring becomes simple, as the line of pressures must pass through the hinges. Such hinges have been used not only for metal arches, but in a modified form for masonry and concrete arches. Three cases therefore arise: (*a*) The arch is rigid at crown and springings; (*b*) the arch is two-hinged (hinges at springings); (*c*) the arch is three-hinged (hinges at crown and springings). For an elementary account of the theory of arches, hinged or not, reference may be made to a paper by H. M. Martin (*Proc. Inst. C. E.* vol. xciii. p. 462); and for that of the elastic arch, to a paper by A.E.Young (*Proc. Inst. C.E.* vol. cxxxi. p. 323).

In Germany and America two- and three-hinged arches of masonry and concrete have been built, up to 150 ft. span, with much economy, and the calculations being simple, an engineer can venture to work closely to the dimensions required by theory. For hinges, Leibbrand, of Stuttgart, uses sheets of lead about 1 in. thick extending over the middle third of the depth of the voussoir joints, the rest of the joints being left open. As the lead is plastic this construction is virtually an articulation. If the pressure on the lead is uniformly varying, the centre of pressure must be within the middle third of the width of the lead; that is, it cannot deviate from the centre of the voussoir joint by more than one-eighteenth of its depth. In any case the position of the line of pressures is confined at the lead articulations within very narrow limits, and ambiguity as to the stresses is greatly diminished. The restricted area on which the pressure acts at the lead joints involves greater intensity of stress than has been usual in arched bridges. In the Württemberg hinged arches a limit of stress of 110 tons per sq. ft. was allowed, while in the unhinged arches at Cologne and Coblentz the limit was 50 to 60 tons per sq. ft. (*Annales des Fonts et Chaussées*, 1891). At Rechtenstein a bridge of two concrete arches has been constructed, span 75½ ft., with lead articulations: width of arch 11 ft.; depth of arch at crown and springing 2.1 and 2.96 ft. respectively. The stresses were calculated to be 15, 17 and 12 tons per sq. ft. at crown, joint of rupture, and springing respectively. At Cincinnati a concrete arch of 70 ft. span has been built, with a rise of 10 ft. The concrete is reinforced by eleven 9-in. steel-rolled joists, spaced 3 ft. apart and supported by a cross-channel joist at each springing. The arch is 15 in. thick at the crown and 4 ft. at the abutments. The concrete consisted of 1 cement, 2 sand and 3 to 4 broken stone. An important series of experiments on the strength of masonry, brick and concrete structures

will be found in the *Zeitschr. des österreichen Ing. und Arch. Vereines* (1895).

The thermal coefficient of expansion of steel and concrete is nearly the same, otherwise changes of temperature would cause shearing stress at the junction of the two materials. If the two materials are disposed symmetrically, the amount of load carried by each would be in direct proportion to the coefficient of elasticity and inversely as the moment of inertia of the cross section. But it is usual in many cases to provide a sufficient section of steel to carry all the tension. For concrete the coefficient of elasticity E varies with the amount of stress and diminishes as the ratio of sand and stone to cement increases. Its value is generally taken at 1,500,000 to 3,000,000 lb per sq. in. For steel E = 28,000,000 to 30,000,000, or on the average about twelve times its value for concrete. The maximum compressive working stress on the concrete may be 500 lb per sq. in., the tensile working stress 50 lb per sq. in., and the working shearing stress 75 lb per sq. in. The tensile stress on the steel may be 16,000 lb per sq. in. The amount of steel in the structure may vary from 0.75 to 1.5%. The concrete not only affords much of the strength to resist compression, but effectively protects the steel from corrosion.

8. (*c*) *Suspension Bridges.*—A suspension bridge consists of two or more chains, constructed of links connected by pins, or of twisted wire strands, or of wires laid parallel. The chains pass over lofty piers on which they usually rest on saddles carried by rollers, and are led down on either side to anchorages in rock chambers. A level platform is hung from the chains by suspension rods. In the suspension bridge iron or steel can be used in its strongest form, namely hard-drawn wire. Iron suspension bridges began to be used at the end of the 18th century for road bridges with spans unattainable at that time in any other system. In 1819 T. Telford began the construction of the Menai bridge (fig. 10), the span being 570 ft. and the dip 43 ft. This bridge suffered some injury in a storm, but it is still in good condition and one of the most graceful of bridges. Other bridges built soon after were the Fribourg bridge of 870 ft. span, the Hammersmith bridge of 422 ft. span, and the Pest bridge of 666 ft. span. The merit of the simple
[v.04 p.0537]
suspension bridge is its cheapness, and its defect is its flexibility. This last becomes less serious as the dead weight of the structure becomes large in proportion to the live or temporary load. It is, therefore, a type specially suited for great spans. Some suspension bridges have broken down in consequence of the oscillations produced by bodies of men marching in step. In 1850 a suspension bridge at Angers gave way when 487 soldiers were marching over it, and 226 were killed.

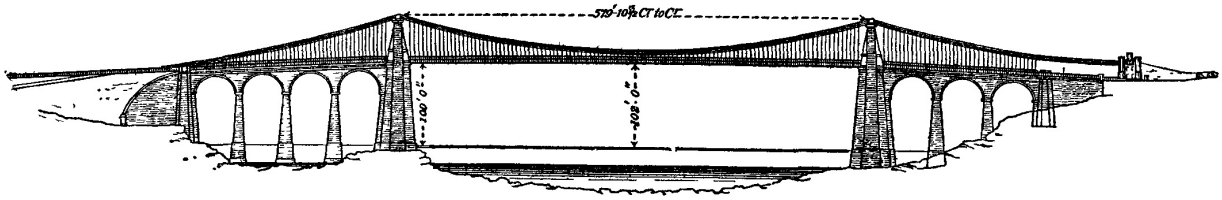


Fig. 10.—Menai Suspension Bridge.

To obtain greater stiffness various plans have been adopted. In the Ordish system a certain number of intermediate points in the span are supported by oblique chains, on which girders rest. The Ordish bridge built at Prague in 1868 had oblique chains supporting the stiffening girders at intermediate points of the span. A curved chain supported the oblique chains and kept them straight. In 1860 a bridge was erected over the Danube canal at Vienna, of 264 ft. span which had two parallel chains one above the other and 4 ft. apart on each side of the bridge. The chains of each pair were connected by bracing so that they formed a stiff inverted arch resisting deformation under unequal loading. The bridge carried a railway, but it proved weak owing to errors of calculation, and it was taken down in 1884. The principle was sound and has been proposed at various times. About 1850 it was perceived that a bridge stiff enough to carry railway trains could be constructed by combining supporting chains with stiffening girders suspended from them. W. J. M. Rankine proved (*Applied Mechanics*, p. 370) that the necessary strength of a stiffening girder would be only one-seventh part of that of an independent girder of the same span as the bridge, suited to carry the same moving load (not including the dead weight of the girder which is supported by the chain). (See "Suspension Bridge with Stiffened Roadway," by Sir G. Airy, and the discussion, *Proc. Inst, C.E.*, 1867, xxvi. p. 258; also "Suspension Bridges with Stiffening Girders," by Max am Ende, *Proc. Inst. C.E.* cxxxvii. p. 306.)

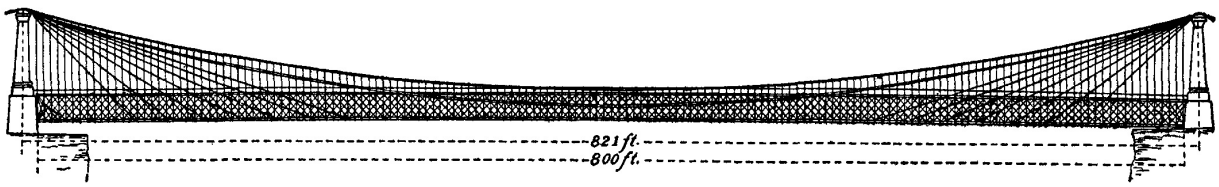


Fig. 11.—Niagara Suspension Bridge.

The most remarkable bridge constructed on this system was the Niagara bridge built by J. A. Roebling in 1852-1855 (fig. 11). The span was 821 ft., much the largest of any railway bridge at that time, and the height above the river 245 ft. There were four suspension cables, each 10 in. in diameter; each was composed of seven strands, containing 520 parallel wires, or 3640 wires in each cable. Each cable was carried on a separate saddle on rollers on each pier. The stiffening

girder, constructed chiefly of timber, was a box-shaped braced girder 18 ft. deep and 25 ft. wide, carrying the railway on top and a roadway within. After various repairs and strengthenings, including the replacement of the timber girder by an iron one in 1880, this bridge in 1896-1897 was taken down and a steel arch built in its place. It was not strong enough to deal with the increasing weight of railway traffic. In 1836 I. K. Brunei constructed the towers and abutments for a suspension bridge of 702 ft. span at Clifton over the Avon, but the project was not then carried further; in 1860, however, the link chains of the Hungerford suspension bridge which was being taken down were available at small cost, and these were used to complete the bridge. There are three chains on each side, of one and two links alternately, and these support wrought iron stiffening girders. There are wrought iron saddles and steel rollers on the piers. At 196 ft. on either side from the towers the chains are carried over similar saddles without rollers, and thence at 45° with the horizontal down to the anchorages. Each chain has an anchor plate 5 ft. by 6 ft. The links are 24 ft. long at the centre of the bridge, and longer as they are more inclined, so that their horizontal projection is 24 ft. The chains are so arranged that there is a suspending rod at each 8 ft., attached at the joint of one of the three chains. For erection a suspended platform was constructed on eight wire ropes, on which the chains were laid out and connected. Another wire rope with a travelling carriage took out the links. The sectional area of the chains is 481 sq. in. at the piers and 440 sq. in. at the centre. The two stiffening girders are plate girders 3 ft. deep with flanges of 11 sq. in. area. In addition, the hand railing on each side forms a girder 4 ft. 9 in. deep, with flanges 4½ sq. in. area.

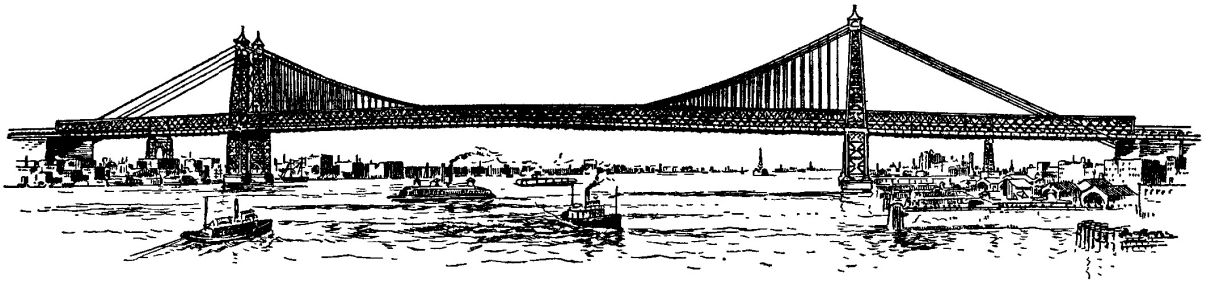


Fig. 12.—Williamsburg Suspension Bridge.

Of later bridges of great span, perhaps the bridges over the East river at New York are the most remarkable. The Brooklyn bridge, begun in 1872, has a centre span of 1595½ and side spans of 930 ft. The Brooklyn approach being 971 ft., and the New York approach 1562½ ft., the total length of the bridge is 5989 ft. There are four cables which carry a promenade, a roadway and an electric railway. The stiffening girders of the main span are 40 ft. deep and 67 ft. apart. The saddles for the chains are 329 ft. above high water. The cables are 15¾ in. in diameter. Each cable has 19 strands of 278 parallel steel wires, 7 B.W.G. Each wire is taken separately across the river and its length adjusted. Roebling preferred parallel wires as 10 % stronger than twisted wires. Each strand when made up and clamped was lowered to its position. The Williamsburg bridge (fig. 12), begun in 1897 and opened for traffic in 1903, has a span of 1600 ft., a versed sine of 176 ft., and a width of 118 ft. It has two decks, and carries two elevated railway tracks, four electric tramcar lines, two carriageways, two footways and two bicycle paths. There are four cables, one on each side of the two main trusses or stiffening girders. These girders are supported by the cables over the centre span but not in the side spans. Intermediate piers support the trusses in the side spans. The cables are 18¾ in. in diameter; each weighs about 1116 tons, and has a nominal breaking strength of 22,320 tons, the actual breaking strength being probably greater. The saddles are 332 ft. above the water. The four cables support a dead load of 7140 tons and a live load of 4017 tons. Each cable is composed of 37 strands of 208 wires, or 7696 parallel steel wires, No. 8 B.W.G., or about 3/16 in. in diameter. The wire was required to have a tensile strength of 89 tons per sq. in., and 2½% elongation in 5 ft. and 5% in 8 in. Cast steel clamps hold the cable together, and to these the suspending rods are attached. The cables are wrapped in cotton duck soaked in oxidized oil and varnish, and are sheathed in sheet iron. A later bridge, the Manhattan, is designed to carry four railway tracks and four tramway lines, with a wide roadway and footpaths, supported by cables 21¼ in. in diameter, each composed of 9472 galvanized steel wires 3/16 in. in diameter.

[v.04 p.0538]

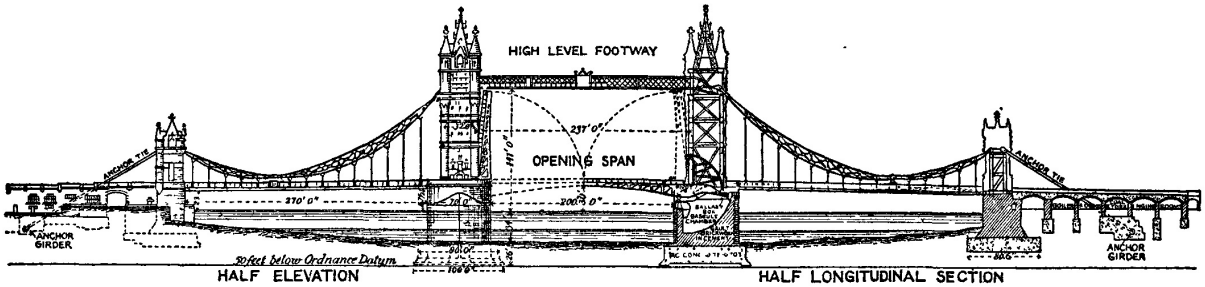


Fig. 13.—Tower Bridge, London.

The Tower Bridge, London (fig. 13), is a suspension bridge with a secondary bascule bridge in the centre span to permit the passage of ships. Two main towers in the river and two towers on the shore abutments carry the suspension chains. The opening bridge between the river towers

consists of two leaves or bascules, pivoted near the faces of the piers and rotating in a vertical plane. When raised, the width of 200 ft. between the main river piers is unobstructed up to the high-level foot-bridge, which is 141 ft. above Trinity H.W. The clear width of the two shore spans is 270 ft. The total length of the bridge is 940 ft., and that of the approaches 1260 ft. on the north and 780 ft. on the south. The width of the bridge between parapets is 60 ft., except across the centre span, where it is 49 ft. The main towers consist of a skeleton of steel, enclosed in a facing of granite and Portland stone, backed with brickwork. There are two high-level footways for use when the bascules are raised, the main girders of which are of the cantilever and suspended girder type. The cantilevers are fixed to the shore side of the towers. The middle girders are 120 ft. in length and attached to the cantilevers by links. The main suspension chains are carried across the centre span in the form of horizontal ties resting on the high-level footway girders. These ties are jointed to the hanging chains by pins 20 in. in diameter with a ring in halves surrounding it 5 in. thick. One half ring is rigidly attached to the tie and one to the hanging chain, so that the wear due to any movement is distributed over the length of the pin. A rocker bearing under these pins transmits the load at the joint to the steel columns of the towers. The abutment towers are similar to the river towers. On the abutment towers the chains are connected by horizontal links, carried on rockers, to anchor ties. The suspension chains are constructed in the form of braced girders, so that they are stiff against unsymmetrical loading. Each chain over a shore span consists of two segments, the longer attached to the tie at the top of the river tower, the shorter to the link at the top of the abutment tower, and the two jointed together at the lowest point. Transverse girders are hung from the chains at distances of 18 ft. There are fifteen main transverse girders to each shore span, with nine longitudinal girders between each pair. The trough flooring, ⅜ in. thick and 6 in. deep, is riveted to the longitudinals. The anchor ties are connected to girders embedded in large concrete blocks in the foundations of the approach viaducts.

The two bascules are each constructed with four main girders. Over the river these are lattice girders, with transverse girders 12 ft. apart, and longitudinal and subsidiary transverse girders dividing the floor into rectangles 3 ft. by 3½ ft. covered with buckled plates. The roadway is of pine blocks dowelled. The bascules rotate through an angle of 82°, and their rear ends in the bascule chambers of the piers carry 365 tons of counterweight, the total weight of each being 1070 tons. They rotate on steel shafts 21 in. in diameter and 48 ft. long, and the bascules can be lifted or lowered in one minute, but usually the time taken is one and a half minutes. They are worked by hydraulic machinery.

9. (*d*) *Iron and Steel Girder Bridges.*—The main supporting members are two or more horizontal beams, girders or trusses. The girders carry a floor or platform either on top (*deck* bridges) or near the bottom (*through* bridges). The platform is variously constructed. For railway bridges it commonly consists of cross girders, attached to or resting on the main girders, and longitudinal rail girders or stringers carried by the cross girders and directly supporting the sleepers and rails. For spans over 75 ft., expansion due to change of temperature is provided for by carrying one end of each chain girder on rollers placed between the bearing-plate on the girder and the bed-plate on the pier or abutment.

Fig. 14 shows the roller bed of a girder of the Kuilenburg bridge of 490 ft. span. It will be seen that the girder directly rests on a cylindrical pin or rocker so placed as to distribute the load uniformly to all the rollers. The pressure on the rollers is limited to about $p = 600\ d$ in lb per in. length of roller, where d is the diameter of the roller in inches.

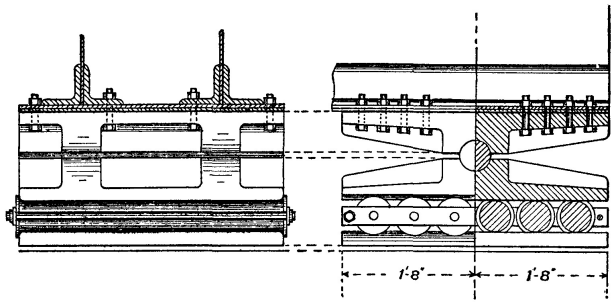


Fig. 14.—Roller Bed of a Girder.

In the girders of bridges the horizontal girder is almost exclusively subjected to vertical loading forces. Investigation of the internal stresses, which balance the external forces, shows that most of the material should be arranged in a top flange, boom or chord, subjected to compression, and a bottom flange or chord, subjected to tension. (See Strength of Materials.) Connecting the flanges is a vertical web which may be a solid plate or a system of bracing bars. In any case, though the exact form of cross section of girders varies very much, it is virtually an I section (fig. 15). The function of the flanges is to resist a horizontal tension and compression distributed practically uniformly on their cross sections. The web resists forces equivalent to a shear on vertical and horizontal planes. The inclined tensions and compressions in the bars of a braced web are equivalent to this shear. The horizontal stresses in the flanges are greatest at the centre of a span. The stresses in the web are greatest at the ends of the span. In the most numerous cases the flanges or chords are parallel. But girders may have curved chords and then the stresses in the web are diminished.

[v.04 p.0539]

At first girders had solid or plate webs, but for spans over 100 ft. the web always now consists of bracing bars. In some girder bridges the members are connected entirely by riveting, in others the principal members are connected by pin joints. The pin system of connexion used in the Chepstow, Saltash, Newark Dyke and other early English bridges is now rarely used in Europe. But it is so commonly used in America as to be regarded as a distinctive American feature. With pin connexions some weight is saved in the girders, and erection is a little easier. In early pin

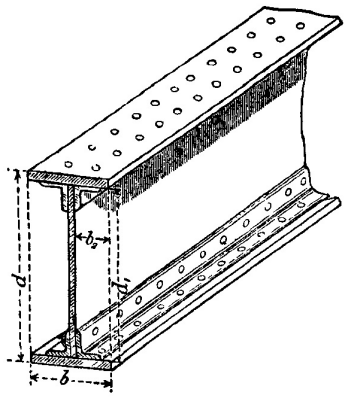


FIG. 15.—Flanged Girder.

bridges insufficient bearing area was allowed between the pins and parts connected, and they worked loose. In some cases riveted covers had to be substituted for the pins. The proportions are now better understood. Nevertheless the tendency is to use riveted connexions in preference to pins, and in any case to use pins for tension members only.

On the first English railways cast iron girder bridges for spans of 20 to 66 ft. were used, and in some cases these were trussed with wrought iron. When in 1845 the plans for carrying the Chester and Holyhead railway over the Menai Straits were considered, the conditions imposed by the admiralty in the interests of navigation involved the adoption of a new type of bridge. There was an idea of using suspension chains combined with a girder, and in fact the tower piers were built so as to accommodate chains. But the theory of such a combined structure could not be formulated at that time, and it was proved, partly by experiment, that a simple tubular girder of wrought iron was strong enough to carry the railway. The Britannia bridge (fig. 16) has two spans of 460 and two of 230 ft. at 104 ft. above high water. It consists of a pair of tubular girders with solid or plate sides stiffened by angle irons, one line of rails passing through each tube. Each girder is 1511 ft. long and weighs 4680 tons. In cross section (fig. 17), it is 15 ft. wide and varies in depth from 23 ft. at the ends to 30 ft. at the centre. Partly to counteract any tendency to buckling under compression and partly for convenience in assembling a great mass of plates, the top and bottom were made cellular, the cells being just large enough to permit passage for painting. The total area of the cellular top flange of the large-span girders is 648 sq. in., and of the bottom 585 sq. in. As no scaffolding could be used for the centre spans, the girders were built on shore, floated out and raised by hydraulic presses. The credit for the success of the Conway and Britannia bridges must be divided between the engineers. Robert Stephenson and William Fairbairn, and Eaton Hodgkinson, who assisted in the experimental tests and in formulating the imperfect theory then available. The Conway bridge was first completed, and the first train passed through the Britannia bridge in 1850. Though each girder has been made continuous over the four spans it has not quite the proportions over the piers which a continuous girder should have, and must be regarded as an imperfectly continuous girder. The spans were in fact designed as independent girders, the advantage of continuity being at that time imperfectly known. The vertical sides of the girders are stiffened so that they amount to 40% of the whole weight. This was partly necessary to meet the uncertain conditions in floating when the distribution of supporting forces was unknown and there were chances of distortion.

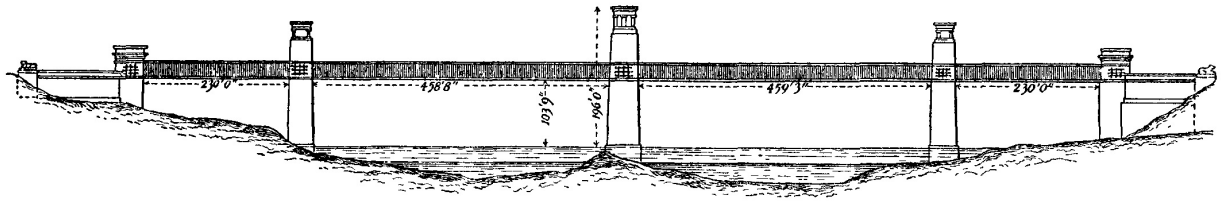


FIG. 16.—Britannia Bridge.

Wrought iron and, later, steel plate web girders were largely used for railway bridges in England after the construction of the Conway and Menai bridges, and it was in the discussions arising during their design that the proper function of the vertical web between the top and bottom flanges of a girder first came to be understood. The proportion of depth to span in the Britannia bridge was 1/16. But so far as the flanges are concerned the stress to be resisted varies inversely as the depth of the girder. It would be economical, therefore, to make the girder very deep. This, however, involves a much heavier web, and therefore for any type of girder there must be a ratio of depth to span which is most economical. In the case of the plate web there must be a considerable excess of material, partly to stiffen it against buckling and partly because an excess of thickness must be provided to reduce the effect of corrosion. It was soon found that with plate webs the ratio of depth to span could not be economically increased beyond 1/15 to 1/12. On the other hand a framed or braced web afforded opportunity for much better arrangement of material, and it very soon became apparent that open web or lattice or braced girders were more economical of material than solid web girders, except for small spans. In America such girders were used from the first and naturally followed the general design of the earlier timber bridges. Now plate web girders are only used for spans of less than 100 ft.

[v.04 p.0540]

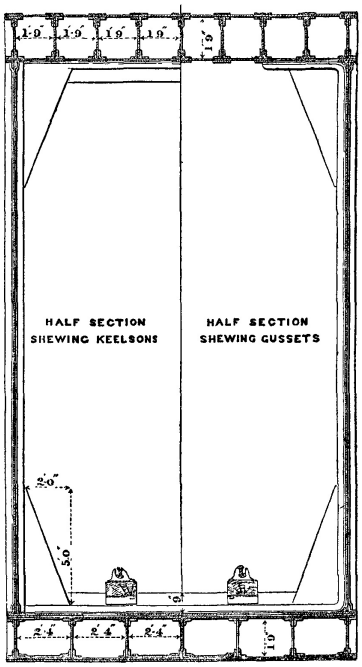


FIG. 17.—Britannia Bridge (Cross Section of Tubular Girder).

Three types of bracing for the web very early developed—the Warren type in which the bracing bars form equilateral triangles, the Whipple Murphy in which the struts are vertical and the ties inclined, and the lattice in which both struts and ties are

inclined at equal angles, usually 45° with the horizontal. The earliest published theoretical investigations of the stresses in bracing bars were perhaps those in the paper by W.T. Doyne and W.B. Blood (*Proc. Inst. C.E.*, 1851, xi. p. 1), and the paper by J. Barton, "On the economic distribution of material in the sides of wrought iron beams" (*Proc. Inst. C.E.*, 1855, xiv. p. 443).

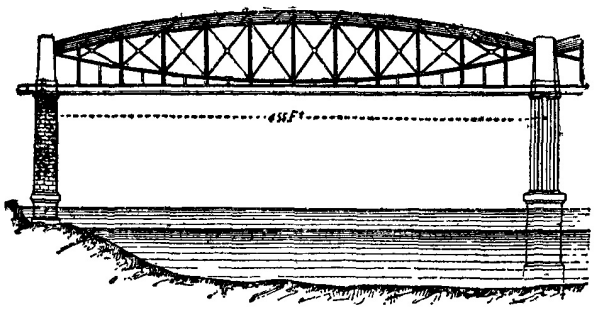


FIG. 18.—Span of Saltash Bridge.

The Boyne bridge, constructed by Barton in Ireland, in 1854-1855, was a remarkable example of the confidence with which engineers began to apply theory in design. It was a bridge for two lines of railway with lattice girders continuous over three spans. The centre span was 264 ft., and the side spans 138 ft. 8 in.; depth 22 ft. 6 in. Not only were the bracing bars designed to calculated stresses, and the continuity of the girders taken into account, but the validity of the calculations was tested by a verification on the actual bridge of the position of the points of contrary flexure of the centre span. At the calculated position of one of the points of contrary flexure all the rivets of the top boom were cut out, and by lowering the end of the girder over the side span one inch, the joint was opened 1/32 in. Then the rivets were cut out similarly at the other point of contrary flexure and the joint opened. The girder held its position with both joints severed, proving that, as should be the case, there was no stress in the boom where the bending moment changes sign.

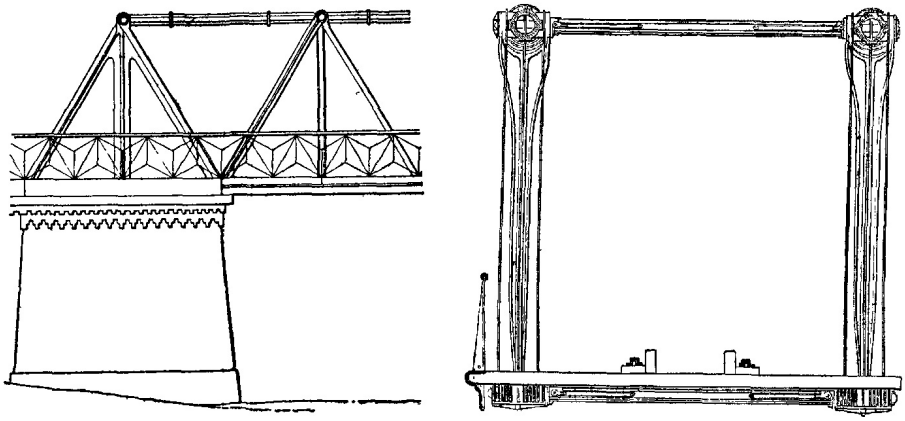


FIG. 19.—Newark Dyke Bridge and Section of Newark Dyke Bridge.

By curving the top boom of a girder to form an arch and the bottom boom to form a suspension chain, the need of web except for non-uniform loading is obviated. I.K. Brunel adopted this principle for the Saltash bridge near Plymouth, built soon after the Britannia bridge. It has two spans of 455 ft. and seventeen smaller spans, the roadway being 100 ft. above high water. The top boom of each girder is an elliptical wrought iron tube 17 ft. wide by 12 ft. deep. The lower boom is a pair of chains, of wrought-iron links, 14 in each chain, of 7 in. by 1 in. section, the links being connected by pins. The suspending rods and cross bracing are very light. The depth of the girder at the centre is about one-eighth of the span.

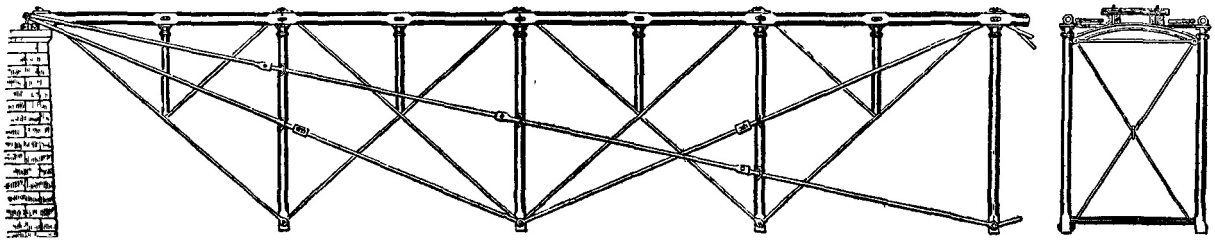


FIG. 20.—Fink Truss.

In both England and America in early braced bridges cast iron, generally in the form of tubes circular or octagonal in section, was used for compression members, and wrought iron for the tension members. Fig. 19 shows the Newark Dyke bridge on the Great Northern railway over the Trent. It was a pin-jointed Warren girder bridge erected from designs by C.M. Wild in 1851-1853. The span between supports was 259 ft., the clear span 240½ ft.; depth between joint pins 16 ft. There were four girders, two to each line of way. The top flange consisted of cast iron hollow castings butted end to end, and the struts were of cast iron. The lower flange and ties were flat wrought iron links. This bridge has now been replaced by a stronger bridge to carry the greater loads imposed by modern traffic. Fig. 20 shows a Fink truss, a characteristic early American type, with cast iron compression and wrought iron tension members. The bridge is a deck bridge, the railway being carried on top. The transfer of the loads to the ends of the bridge by long ties is uneconomical, and this type has disappeared. The Warren type, either with two sets of bracing bars or with intermediate verticals, affords convenient means of supporting the floor girders. In

1869 a bridge of 390 ft. span was built on this system at Louisville.

Amongst remarkable American girder bridges may be mentioned the Ohio bridge on the Cincinnati & Covington railway, which is probably the largest girder span constructed. The centre span is 550 ft. and the side spans 490 ft.—centre to centre of piers. The girders are independent polygonal girders. The centre girder has a length of 545 ft. and a depth of 84 ft. between pin centres. It is 67 ft. between parapets, and carries two lines of railway, two carriageways, and two footways. The cross girders, stringers and wind-bracing are wrought iron, the rest of mild steel. The bridge was constructed in 1888 by the Phoenix Bridge Company, and was erected on staging. The total weight of iron and steel in three spans was about 5000 tons.

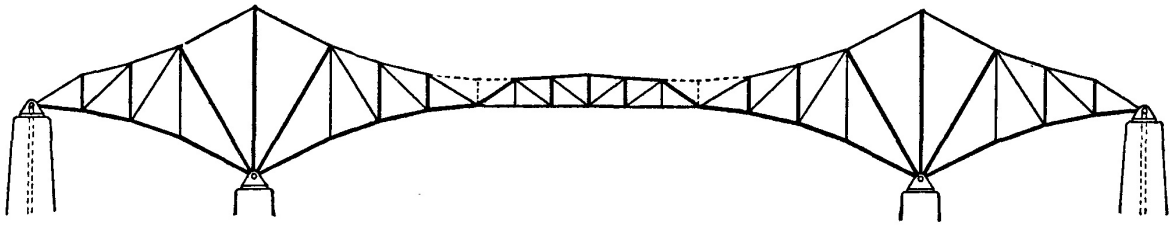


FIG. 21.—Typical Cantilever Bridge.

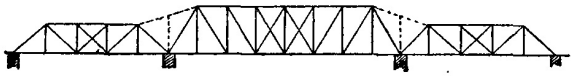


FIG. 22.

10. (*e*) *Cantilever Bridges.*—It has been stated that if in a girder bridge of three or more spans, the girders were made continuous there would be an important economy of material, but that the danger of settlement of the supports, which would seriously alter the points of contrary flexure or points where the bending moment changes sign, and therefore the magnitude and distribution of the stresses, generally prevents the adoption of continuity. If, however, hinges or joints are introduced at the points of contrary flexure, they become necessarily points where the bending moment is zero and ambiguity as to the stresses vanishes. The exceptional local conditions at the site of the Forth bridge led to the adoption there of the cantilever system, till then little considered. Now it is well understood that in many positions this system is the simplest and most economical method of bridging. It is available for spans greater than those practicable with independent girders; in fact, on this system the spans are virtually reduced to smaller spans so far as the stresses are concerned. There is another advantage which in many cases is of the highest importance. The cantilevers can be built out from the piers, member by member, without any temporary scaffolding below, so that navigation is not interrupted, the cost of scaffolding is saved, and the difficulty of building in deep water is obviated. The centre girder may be built on the cantilevers and rolled into place or lifted from the water-level. Fig. 21 shows a typical cantilever bridge of American design. In this case the shore ends of the cantilevers are anchored to the abutments. J.A.L. Waddell has shown that, in some cases, it is convenient to erect simple independent spans, by building them out as cantilevers and converting them into independent girders after erection. Fig. 22 shows girders erected in this way, the dotted lines being temporary members during erection, which are removed afterwards. The side spans are erected first on staging and anchored to the piers. From these, by the aid of the temporary members, the centre span is built out from both sides. The most important cantilever bridges so far erected or projected are as follows:—

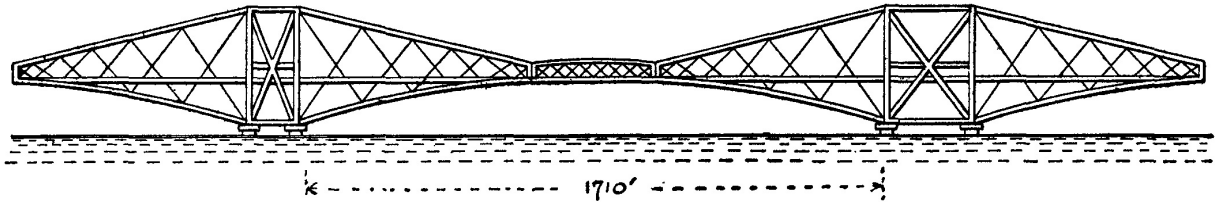


FIG. 23.—Forth Bridge.

(1) The Forth bridge (fig. 23). The original design was for a stiffened suspension bridge, but after the fall of the Tay bridge in 1879 this was abandoned. The bridge, which was begun in 1882 and completed in 1889, is at the only narrowing of the Forth in a distance of 50 m., at a point where the channel, about a mile in width, is divided by the island of Inchgarvie. The length of the cantilever bridge is 5330 ft., made up thus: central tower on Inchgarvie 260 ft.; Fife and Queensferry piers each 145 ft.; two central girders between cantilevers each 350 ft.; and six cantilevers each 680 ft. The two main spans are each 1710 ft. The clear headway is 157 ft., and the extreme height of the towers above high water 361 ft. The outer ends of the shore cantilevers are loaded to balance half the weight of the central girder, the rolling load, and 200 tons in addition. An internal viaduct of lattice girders carries a double line of rails. Provision is made for longitudinal expansion due to change of temperature, for distortion due to the sun acting on one side of the structure, and for the wind acting on one side of the bridge. The amount of steel used was 38,000 tons exclusive of approach viaducts. (See *The Forth Bridge*, by W. Westhofen; *Reports of the British Association* (1884 and 1885); *Die Forth Brücke*, von G. Barkhausen (Berlin, 1889); *The Forth Bridge*, by Philip Phillips (1890); Vernon Harcourt, *Proc. Inst. C.E.* cxxi. p. 309.)

(2) The Niagara bridge of a total length of 910 ft., for two lines of railway. Clear span between towers 495 ft. Completed in 1883, and more recently strengthened (*Proc. Inst. C.E.* cvii. p. 18, and cxliv. p. 331).

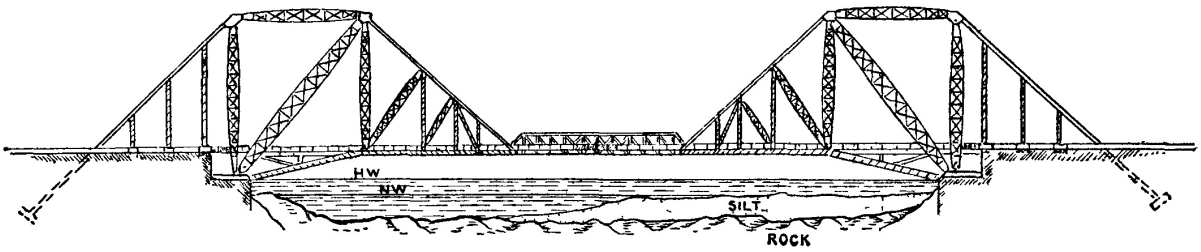


FIG. 24.—Lansdowne Bridge.

(3) The Lansdowne bridge (completed 1889) at Sukkur, over the Indus. The clear span is 790 ft., and the suspended girder 200 ft. in length. The span to the centres of the end uprights is 820 ft.; width between centres of main uprights at bed-plate 100 ft., and between centres of main members at end of cantilevers 20 ft. The bridge is for a single line of railway of 5 ft. 6 in. gauge. The back guys are the most heavily strained part of the structure, the stress provided for being 1200 tons. This is due to the half weight of centre girder, the weight of the cantilever itself, the rolling load on half the bridge, and the wind pressure. The anchors are built up of steel plates and angle, bars, and are buried in a large mass of concrete. The area of each anchor plate, normal to the line of stress, is 32 ft. by 12 ft. The bridge was designed by Sir A. Rendel, the consulting engineer to the Indian government (*Proc. Inst. C.E.* ciii. p. 123).

(4) The Red Rock cantilever bridge over the Colorado river, with a centre span of 660 ft.

(5) The Poughkeepsie bridge over the Hudson, built 1886-1887. There are five river and two shore spans. The girders over the second and fourth spans are extended as cantilevers over the adjoining spans. The shore piers carry cantilevers projecting one way over the river openings and the other way over a shore span where it is secured to an anchorage. The girder spans are 525 ft., the cantilever spans 547 ft., and the shore spans 201 ft.

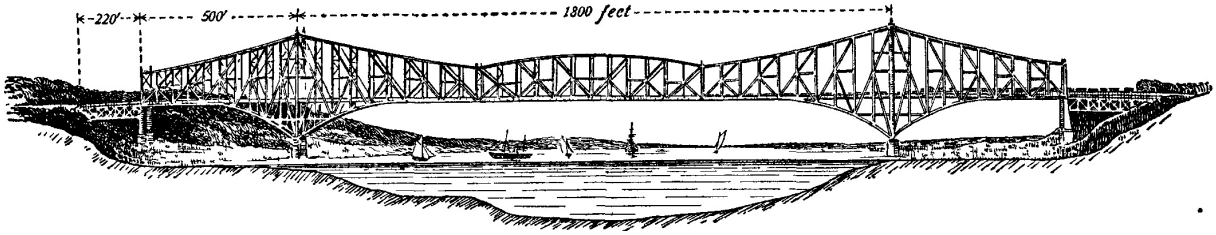


FIG. 25.—Quebec Bridge (original design)

(6) The Quebec bridge (fig. 25) over the St Lawrence, which collapsed while in course of construction in 1907. This bridge, connecting very important railway systems, was designed to carry two lines of rails, a highway and electric railway on each side, all between the main trusses.
[v.04 p.0542] Length between abutments 3240 ft.; channel span 1800 ft.; suspended span 675 ft.; shore spans 562½ ft. Total weight of metal about 32,000 tons.

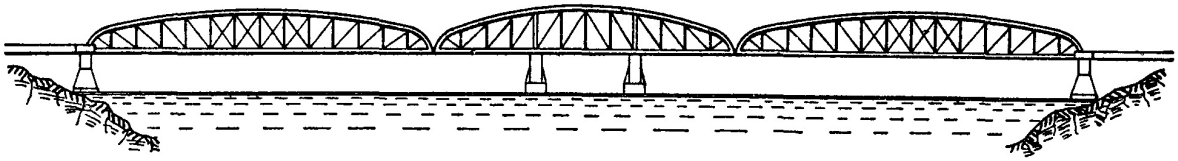
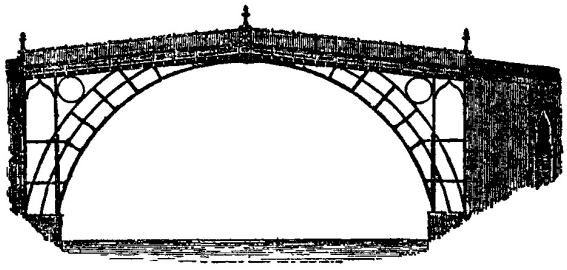


FIG. 26.—Jubilee Bridge over the Hugli.

(7) The Jubilee bridge over the Hugli, designed by Sir Bradford Leslie, is a cantilever bridge of another type (fig. 26). The girders are of the Whipple Murphy type, but with curved top booms. The bridge carries a double line of railway, between the main girders. The central double cantilever is 360 ft. long. The two side span girders are 420 ft long. The cantilever rests on two river piers 120 ft. apart, centre to centre. The side girders rest on the cantilevers on 15 in. pins, in pendulum links suspended from similar pins in saddles 9 ft. high.



11. (*f*) *Metal Arch Bridges.*—The first iron bridge erected was constructed by John Wilkinson (1728-1808) and Abraham Darby (1750-1791) in 1773-1779 at Coalbrookdale over the Severn (fig. 27). It had five cast iron arched ribs with a centre span of 100 ft. This curious bridge is still in use. Sir B. Baker stated that it had required patching for ninety years, because the arch and the high side arches would not work together. Expansion and contraction broke

Fig. 27.—Coalbrookdale Bridge.

the high arch and the connexions between the arches. When it broke they fished it. Then the bolts sheared or the ironwork broke in a new place. He advised that there was nothing unsafe; it was perfectly strong and the stress in vital parts moderate. All that needed to be done was to fish the fractured ribs of the high arches, put oval holes in the fishes, and not screw up the bolts too tight.

Cast iron arches of considerable span were constructed late in the 18th and early in the 19th century. The difficulty of casting heavy arch ribs led to the construction of cast iron arches of cast voussoirs, somewhat like the voussoirs of masonry bridges. Such a bridge was the Wearmouth bridge, designed by Rowland Burdon and erected in 1793-1796, with a span of 235 ft. Southwark bridge over the Thames, designed by John Rennie with cast iron ribs and erected in 1814-1819, has a centre span of 240 ft. and a rise of 24 ft. In Paris the Austerlitz (1800-1806) and Carrousel (1834-1836) bridges had cast iron arches. In 1858 an aqueduct bridge was erected at Washington by M.C. Meigs (1816-1892). This had two arched ribs formed by the cast iron pipes through which the water passed. The pipes were 4 ft. in diameter inside, 1½ in. thick, and were lined with staves of pine 3 in. thick to prevent freezing. The span was 200 ft.

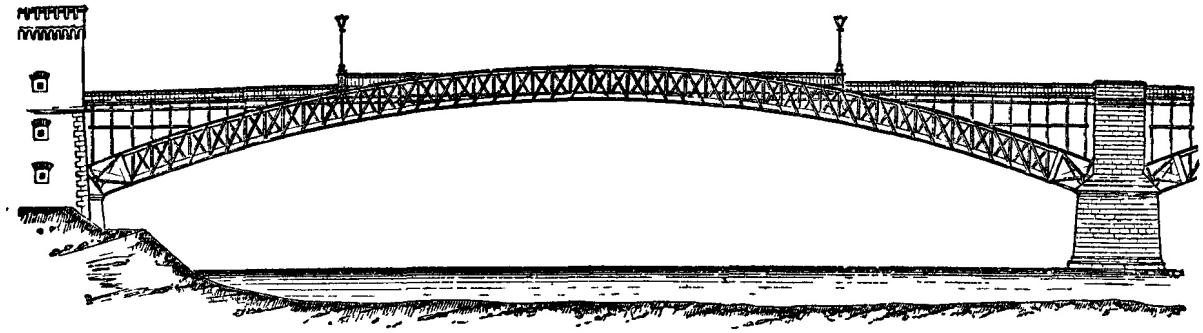


Fig. 28.—Arch of Bridge at Coblenz

Fig. 28 shows one of the wrought iron arches of a bridge over the Rhine at Coblenz. The bridge consists of three spans of about 315 ft. each.

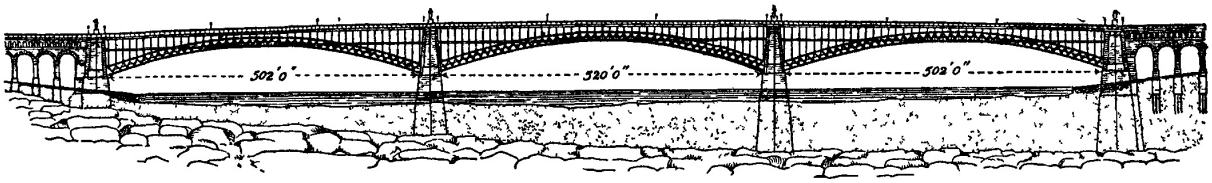


Fig. 29.—St Louis Bridge.

Of large-span bridges with steel arches, one of the most important is the St Louis bridge over the Mississippi, completed in 1874 (fig. 29). The river at St Louis is confined to a single channel, 1600 ft. wide, and in a freshet in 1870 the scour reached a depth of 51 ft. Captain J.B. Eads, the engineer, determined to establish the piers and abutments on rock at a depth for the east pier and east abutment of 136 ft. below high water. This was effected by caissons with air chambers and air locks, a feat unprecedented in the annals of engineering. The bridge has three spans, each formed of arches of cast steel. The centre span is 520 ft. and the side spans 502 ft. in the clear. The rise of the centre arch is 47½ ft., and that of the side arches 46 ft. Each span has four steel double ribs of steel tubes butted and clasped by wrought iron couplings. The vertical bracing between the upper and lower members of each rib, which are 12 ft. apart, centre to centre, consolidates them into a single arch. The arches carry a double railway track and above this a roadway 54 ft. wide.

The St Louis bridge is not hinged, but later bridges have been constructed with hinges at the springings and sometimes with hinges at the crown also.

The Alexander III. bridge over the Seine has fifteen steel ribs hinged at crown and springings with a span of 353 ft. between centres of hinges and 358 ft. between abutments. The rise from side to centre hinges is 20 ft. 7 in. The roadway is 65½ ft. wide and footways 33 ft. (*Proc. Inst. C.E.* cxxx. p. 335).

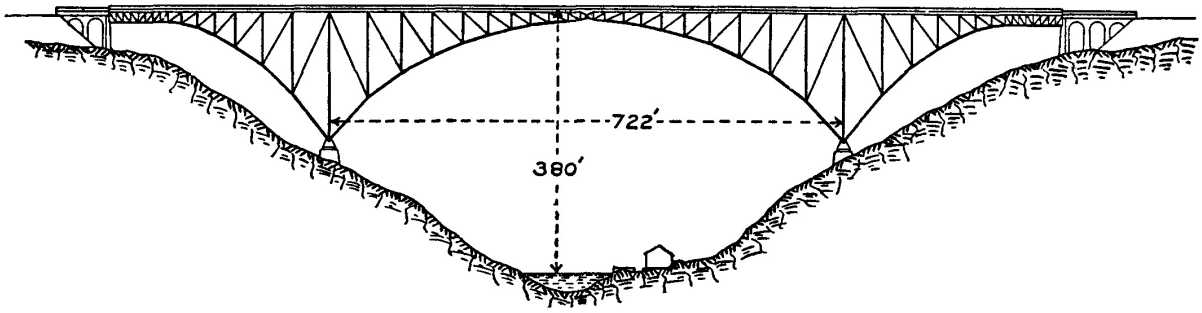


Fig. 30.—Viaur Viaduct.

The largest three-hinged-arch bridge constructed is the Viaur viaduct in the south of France (fig. 30). The central span is 721 ft. 9 in. and the height of the rails above the valley 380 ft. It has a very fine appearance, especially when seen in perspective and not merely in elevation.

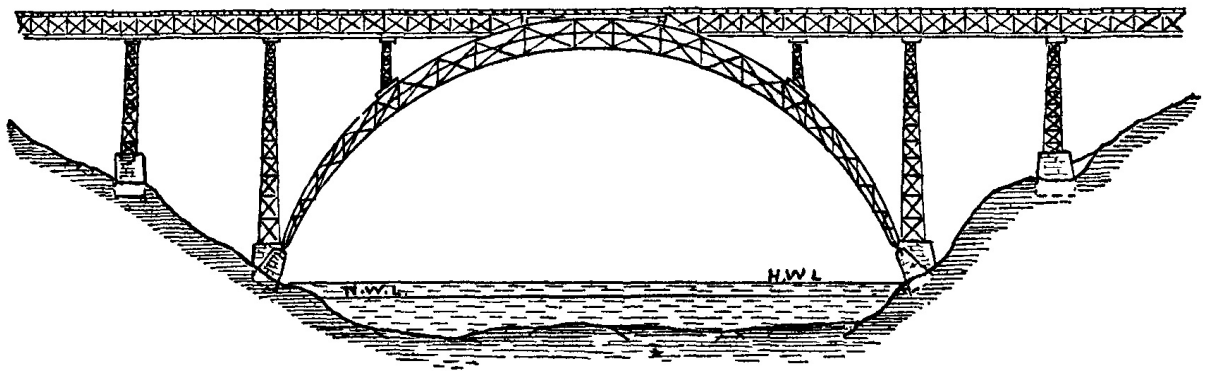


Fig. 31.—Douro Viaduct.

Fig. 31 shows the Douro viaduct of a total length of 1158 ft. carrying a railway 200 ft. above the water. The span of the central opening is 525 ft. The principal rib is crescent-shaped 32.8 ft. deep at the crown. Rolling load taken at 1.2 ton per ft. Weight of centre span 727 tons. The Luiz I. bridge is another arched bridge over the Douro, also designed by T. Seyrig. This has a span of 566 ft. There are an upper and lower roadway, 164 ft. apart vertically. The arch rests on rollers and is narrowest at the crown. The reason given for this change of form was that it more conveniently allowed the lower road to pass between the springings and ensured the transmission of the wind stresses to the abutments without interrupting the cross-bracing. Wire cables were used in the erection, by which the members were lifted from barges and assembled, the operations being conducted from the side piers.

[v.04 p.0543]

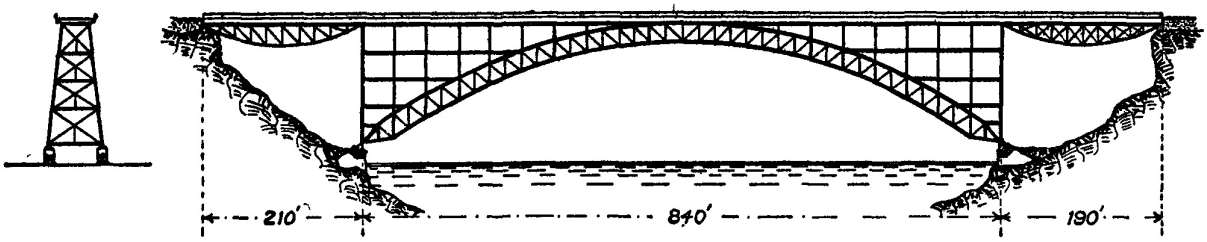


Fig. 32.—Niagara Falls and Clifton Bridge.

The Niagara Falls and Clifton steel arch (fig. 32) replaces the older Roebling suspension bridge. The centre span is a two-hinged parabolic braced rib arch, and there are side spans of 190 and 210 ft. The bridge carries two electric-car tracks, two roadways and two footways. The main span weighed 1629 tons, the side spans 154 and 166 tons (Buck, *Proc. Inst. C.E.* cxliv. p. 70). Prof. Claxton Fidler, speaking of the arrangement adopted for putting initial stress on the top chord, stated that this bridge marked the furthest advance yet made in this type of construction. When such a rib is erected on centering without initial stress, the subsequent compression of the arch under its weight inflicts a bending stress and excess of compression in the upper member at the crown. But the bold expedients adopted by the engineer annulled the bending action.

The Garabit viaduct carries the railway near St Flour, in the Cantal department, France, at 420 ft. above low water. The deepest part of the valley is crossed by an arch of 541 ft. span, and 213 ft. rise. The bridge is similar to that at Oporto, also designed by Seyrig. It is formed by a crescent-shaped arch, continued on one side by four, on the other side by two lattice girder spans, on iron piers. The arch is formed by two lattice ribs hinged at the abutments. Its depth at the crown is 33 ft., and its centre line follows nearly the parabolic line of pressures. The two arch ribs are 65½ ft. apart at the springings and 20½ ft. at the crown. The roadway girders are lattice, 17 ft. deep, supported from the arch ribs at four points. The total length of the viaduct is 1715 ft. The lattice girders of the side spans were first rolled into place, so as to project some distance

beyond the piers, and then the arch ribs were built out, being partly supported by wire-rope cables from the lattice girders above. The total weight of ironwork was 3200 tons and the cost £124,000 (*Annales des travaux publiques*, 1884).

The Victoria Falls bridge over the Zambezi, designed by Sir Douglas Fox, and completed in 1905, is a combination of girder and arch having a total length of 650 ft. The centre arch is 500 ft. span, the rise of the crown 90 ft., and depth at crown 15 ft. The width between centres of ribs of main arch is 27½ ft. at crown and 53 ft. 9 in at springings. The curve of the main arch is a parabola. The bridge has a roadway of 30 ft. for two lines of rails. Each half arch was supported by cables till joined at the centre. An electric cableway of 900 ft. span capable of carrying 10 tons was used in erection.

12. (g) *Movable Bridges* can be closed to carry a road or railway or in some cases an aqueduct, but can be opened to give free passage to navigation. They are of several types:—

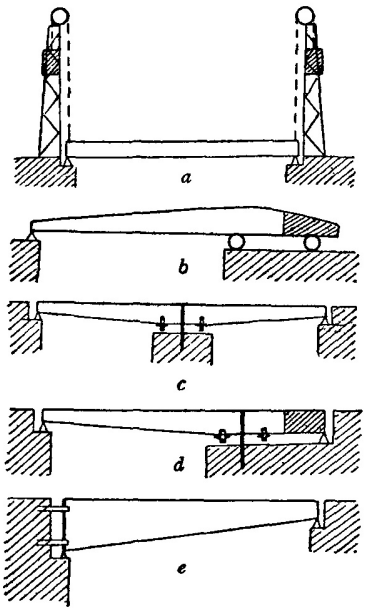


FIG. 33.

(1) *Lifting Bridges.*—The bridge with its platform is suspended from girders above by chains and counterweights at the four corners (fig. 33 a). It is lifted vertically to the required height when opened. Bridges of this type are not very numerous or important.

(2) *Rolling Bridges.*—The girders are longer than the span and the part overhanging the abutment is counter-weighted so that the centre of gravity is over the abutment when the bridge is rolled forward (fig. 33 b). To fill the gap in the approaches when the bridge is rolled forward a frame carrying that part of the road is moved into place sideways. At Sunderland, the bridge is first lifted by a hydraulic press so as to clear the roadway behind, and is then rolled back.

(3) *Draw or Bascule Bridges.*—The fortress draw-bridge is the original type, in which a single leaf, or bascule, turns round a horizontal hinge at one abutment. The bridge when closed is supported on abutments at each end. It is raised by chains and counterweights. A more common type is a bridge with two leaves or bascules, one hinged at each abutment. When closed the bascules are locked at the centre (see fig. 13). In these bridges each bascule is prolonged backwards beyond the hinge so as to balance at the hinge, the prolongation sinking into the piers when the bridge is opened.

[v.04 p.0544]

(4) *Swing or Turning Bridges.*—The largest movable bridges revolve about a vertical axis. The bridge is carried on a circular base plate with a central pivot and a circular track for a live ring and conical rollers. A circular revolving platform rests on the pivot and rollers. A toothed arc fixed to the revolving platform or to the live ring serves to give motion to the bridge. The main girders rest on the revolving platform, and the ends of the bridge are circular arcs fitting the fixed roadway. Three arrangements are found: (a) the axis of rotation is on a pier at the centre of the river and the bridge is equal armed (fig. 33 c), so that two navigation passages are opened simultaneously. (b) The axis of rotation is on one abutment, and the bridge is then usually unequal armed (fig. 33 d), the shorter arm being over the land. (c) In some small bridges the shorter arm is vertical and the bridge turns on a kind of vertical crane post at the abutment (fig. 33 e).

(5) *Floating Bridges*, the roadway being carried on pontoons moored in the stream.

The movable bridge in its closed position must be proportioned like a fixed bridge, but it has also other conditions to fulfil. If it revolves about a vertical axis its centre of gravity must always lie in that axis; if it rolls the centre of gravity must always lie over the abutment. It must have strength to support safely its own overhanging weight when moving.

At Konigsberg there is a road bridge of two fixed spans of 39 ft., and a central span of 60 ft. between bearings, or 41 ft. clear, with balanced bascules over the centre span. Each bascule consists of two main girders with cross girders and stringers. The main girders are hung at each side on a horizontal shaft 8⅝ in. in diameter, and are 6 ft. deep at the hinge, diminishing to 1 ft. 7 in. at the centre of the span. The counterweight is a depressed cantilever arm 12 ft. long, overlapped by the fixed platform which sinks into a recess in the masonry when the bridge opens. In closed position the main girders rest on a bed plate on the face of the pier 4 ft. 3 in. beyond the shaft bearings. The bridge is worked by hydraulic power, an accumulator with a load of 34 tons supplying pressure water at 630 lb per sq. in. The bridge opens in 15 seconds and closes in 25 seconds.

At the opening span of the Tower bridge (fig. 13) there are four main girders in each bascule. They project 100 ft. beyond and 62 ft. 6 in. within the face of the piers. Transverse girders and bracings are inserted between the main girders at 12 ft. intervals. The floor is of buckled plates paved with wood blocks. The arc of rotation is 82°, and the axis of rotation is 13 ft. 3 in. inside the face of the piers, and 5 ft. 7 in. below the roadway. The weight of ballast in the short arms of the bascules is 365 tons. The weight of each leaf including ballast is about 1070 tons. The axis is of forged steel 21 in. in diameter and 48 ft. long. The axis has eight bearings, consisting of rings

of live rollers 4-7/16 in. in diameter and 22 in. long. The bascules are rotated by pinions driven by hydraulic engines working in steel sectors 42 ft. radius (*Proc. Inst. C.E.* cxxvii. p. 35).

As an example of a swing bridge, that between Duluth and Superior at the head of Lake Superior over the St Louis river may be described. The centre opening is 500 ft., spanned by a turning bridge, 58 ft. wide. The girders weighing 2000 tons carry a double track for trains between the girders and on each side on cantilevers a trolley track, roadway and footway. The bridge can be opened in 2 minutes, and is operated by two large electric motors. These have a speed reduction from armature shaft to bridge column of 1500 to 1, through four intermediate spur gears and a worm gear. The end lifts which transfer the weight of the bridge to the piers when the span is closed consist of massive eccentrics having a throw of 4 in. The clearance is 2 in., so that the ends are lifted 2 in. This gives a load of 50 tons per eccentric. One motor is placed at each end of the span to operate the eccentrics and also to release the latches and raise the rails of the steam track.

At Riga there is a floating pontoon bridge over the Duna. It consists of fourteen rafts, 105 ft. in length, each supported by two pontoons placed 64 ft. apart. The pairs of rafts are joined by three baulks 15 ft. long laid in parallel grooves in the framing. Two spans are arranged for opening easily. The total length is 1720 ft. and the width 46 ft. The pontoons are of iron, 85½ ft. in length, and their section is elliptical, 10½ ft. horizontal and 12 ft. vertical. The displacement of each pontoon is 180 tons and its weight 22 tons. The mooring chains, weighing 22 lb per ft., are taken from the upstream end of each pontoon to a downstream screw pile mooring and from the downstream end to an upstream screw pile.

13. *Transporter Bridges.*—This new type of bridge consists of a high level bridge from which is suspended a car at a low level. The car receives the traffic and conveys it across the river, being caused to travel by electric machinery on the high level bridge. Bridges of this type have been erected at Portugalete, Bizerta, Rouen, Rochefort and more recently across the Mersey between the towns of Widnes and Runcorn.

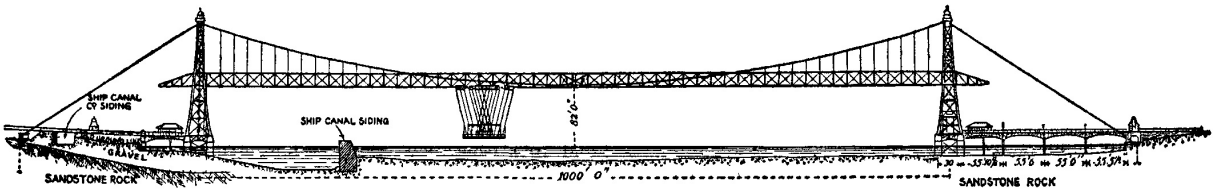


FIG. 34.—Widnes and Runcorn Transporter Bridge.

The Runcorn bridge crosses the Manchester Ship Canal and the Mersey in one span of 1000 ft., and four approach spans of 55½ ft. on one side and one span on the other. The low-level approach roadways are 35 ft. wide with footpaths 6 ft. wide on each side. The supporting structure is a cable suspension bridge with stiffening girders. A car is suspended from the bridge, carried by a trolley running on the underside of the stiffening girders, the car being propelled electrically from one side to the other. The underside of the stiffening girder is 82 ft. above the river. The car is 55 ft. long by 24½ ft. wide. The electric motors are under the control of the driver in a cabin on the car. The trolley is an articulated frame 77 ft. long in five sections coupled together with pins. To this are fixed the bearings of the running wheels, fourteen on each side. There are two steel-clad series-wound motors of 36 B.H.P. For a test load of 120 tons the tractive force is 70 lb per ton, which is sufficient for acceleration, and maintaining speed against wind pressure. The brakes are magnetic, with auxiliary handbrakes. Electricity is obtained by two gas engines (one spare) each of 75 B.H.P.

[v.04 p.0545]

On the opening day passengers were taken across at the rate of more than 2000 per hour in addition to a number of vehicles. The time of crossing is 3 or 4 minutes. The total cost of the structure was £133,000.

14. In the United States few railway companies design or build their own bridges. General specifications as to span, loading, &c., are furnished to bridge-building companies, which make the design under the direction of engineers who are experts in this kind of work. The design, with strain sheets and detail drawings, is submitted to the railway engineer with estimates. The result is that American bridges are generally of well-settled types and their members of uniform design, carefully considered with reference to convenient and accurate manufacture. Standard patterns of details are largely adopted, and more system is introduced in the workshop than is possible where the designs are more varied. Riveted plate girders are used up to 50 ft. span, riveted braced girders for spans of 50 ft. to 75 ft., and pin-connected girders for longer spans. Since the erection of the Forth bridge, cantilever bridges have been extensively used, and some remarkable steel arch and suspension bridges have also been constructed. Overhead railways are virtually continuous bridge constructions, and much attention has been given to a study of the special conditions appertaining to that case.

Substructure.

15. The substructure of a bridge comprises the piers, abutments and foundations. These portions usually consist of masonry in some form, including under that general head stone masonry, brickwork and concrete. Occasionally metal work or woodwork is used for intermediate piers.

When girders form the superstructure, the resultant pressure on the piers or abutments is vertical, and the dimensions of these are simply regulated by the sufficiency to bear this vertical load.

When arches form the superstructure, the abutment must be so designed as to transmit the resultant thrust to the foundation in a safe direction, and so distributed that no part may be unduly compressed. The intermediate piers should also have considerable stability, so as to counterbalance the thrust arising when one arch is loaded while the other is free from load.

For suspension bridges the abutment forming the anchorage must be so designed as to be thoroughly stable under the greatest pull which the chains can exert. The piers require to be carried above the platform, and their design must be modified according to the type of suspension bridge adopted. When the resultant pressure is not vertical on the piers these must be constructed to meet the inclined pressure. In any stiffened suspension bridge the action of the pier will be analogous to that of a pier between two arches.

Concrete in a shell is a name which might be applied to all the methods of founding a pier which depend on the very valuable property which strong hydraulic concrete possesses of setting into a solid mass under water. The required space is enclosed by a wooden or iron shell; the soil inside the shell is removed by dredging, or some form of mechanical excavator, until the formation is reached which is to support the pier; the concrete is then shot into the enclosed space from a height of about 10 ft., and rammed down in layers about 1 ft. thick; it soon consolidates into a permanent artificial stone.

Piles are used as foundations in compressible or loose soil. The heads of the piles are sawn off, and a platform of timber or concrete rests on them. Cast iron and concrete reinforced piles are now used. *Screw piles* are cast iron piles which are screwed into the soil instead of being driven in. At their end is fixed a blade of cast iron from two to eight times the diameter of the shaft of the pile; the pitch of the screw varies from one-half to one-fourth of the external diameter of the blade.

Disk piles have been used in sand. These piles have a flat flange at the bottom, and water is pumped in at the top of the pile, which is weighted to prevent it from rising. Sand is thus blown or pumped from below the piles, which are thus easily lowered in ground which baffles all attempts to drive in piles by blows. In ground which is of the nature of quicksand, piles will often slowly rise to their original position after each blow.

Wells.—In some soils foundations may be obtained by the device of building a masonry casing like that of a well and excavating the soil inside; the casing gradually sinks and the masonry is continued at the surface. This method is applicable in running sands. The interior of the well is generally filled up with concrete or brick when the required depth has been reached.

Piers and Abutments.—Piers and abutments are of masonry, brickwork, or cast or wrought iron. In the last case they consist of any number of hollow cylindrical pillars, vertical or raking, turned and planed at the ends and united by a projection or socket and by flanges and bolts. The pillars are strengthened against lateral yielding by horizontal and diagonal bracing. In some cases the piers are cast iron cylinders 10 ft. or more in diameter filled with concrete.

Cylinder Foundations.—Formerly when bridge piers had to be placed where a firm bearing stratum could only be reached at a considerable depth, a timber cofferdam was used in which piles were driven down to the firm stratum. On the piles the masonry piers were built. Many bridges so constructed have stood for centuries. A great change of method arose when iron cylinders and in some cases brick cylinders or wells were adopted for foundations. These can be sunk to almost any depth or brought up to any height, and are filled with Portland cement concrete. They are sometimes excavated by grabs. Sometimes they are closed in and kept free of water by compressed air so that excavation work can be carried on inside them (fig. 35). Sometimes in silty river beds they are sunk 100 ft. or more, for security against deep scouring of the river-bed in floods. In the case of the Empress bridge over the Sutlej each pier consisted of three brick wells, 19 ft. in diameter, sunk 110 ft. The piers of the Benares bridge were single iron caissons, 65 ft. by 28 ft., sunk about 100 ft., lined with brick and filled with concrete. At the Forth bridge iron caissons 70 ft. in diameter were sunk about 40 ft. into the bed of the Forth. In this case the compressed air process was used.

[v.04 p.0546]

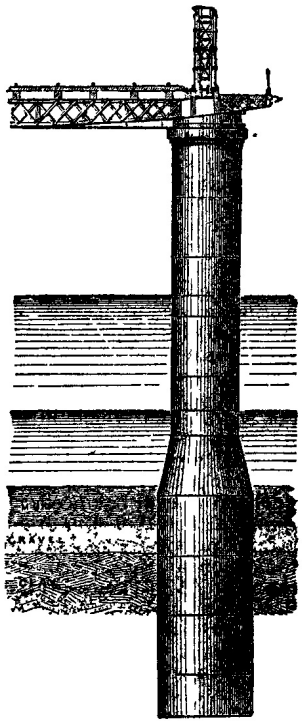


Fig. 35.—Cylinder, Charing Cross Bridge.

16. *Erection.*—Consideration of the local conditions affecting the erection of bridges is always important, and sometimes becomes a controlling factor in the determination of the design. The methods of erection may be classed as—(1) erection on staging or falsework; (2) floating to the site and raising; (3) rolling out from one abutment; (4) building out member by member, the completed part forming the stage from which additions are handled.

(1) In erection on staging, the materials available determine the character of the staging; stacks of timber, earth banks, or built-up

staging of piles and trestles have all been employed, also iron staging, which can be rapidly erected and moved from site to site. The most ordinary type of staging consists of timber piles at nearly equal distances of 20 ft. to 30 ft., carrying a timber platform, on which the bridge is erected. Sometimes a wide space is left for navigation, and the platform at this part is carried by a timber and iron truss. When the headway is great or the river deep, timber-braced piers or clusters of piles at distances of 50 ft. to 100 ft. may be used. These carry temporary trusses of timber or steel. The Kuilenburg bridge in Holland, which has a span of 492 ft., was erected on a timber staging of this kind, containing 81,000 cub. ft. of timber and 5 tons of bolts. The bridge superstructure weighed 2150 tons, so that 38 cub. ft. of timber were used per ton of superstructure.

(2) The Britannia and Conway bridges were built on staging on shore, lifted by pontoons, floated out to their position between the piers, and lastly lifted into place by hydraulic presses. The Moerdyk bridge in Holland, with 14 spans of 328 ft., was erected in a similar way. The convenience of erecting girders on shore is very great, but there is some risk in the floating operations and a good deal of hauling plant is required.

(3) If a bridge consists of girders continuous over two or more spans, it may be put together on the embankment at one end and rolled over the piers. In some cases hauling tackle is used, in others power is applied by levers and ratchets to the rollers on which the girders travel. In such rolling operations the girder is subjected to straining actions different from those which it is intended to resist, and parts intended for tension may be in compression; hence it may need to be stiffened by timber during rolling. The bending action on the bottom boom in passing over the rollers is also severe. Modifications of the system have been adopted for bridges with discontinuous spans. In narrow ravines a bridge of one span may be rolled out, if the projecting end is supported on a temporary suspension cable anchored on each side. The free end is slung to a block running on the cable. If the bridge is erected when the river is nearly dry a travelling stage may be constructed to carry the projecting end of the girder while it is hauled across, the other end resting on one abutment. Sometimes a girder is rolled out about one-third of its length, and then supported on a floating pontoon.

(4) Some types of bridge can be built out from the abutments, the completed part forming an erecting stage on which lifting appliances are fixed. Generally, in addition, wire cables are stretched across the span, from which lifting tackle is suspended. In bridges so erected the straining action during erection must be studied, and material must be added to resist erecting stresses. In the case of the St Louis bridge, half arches were built out on either side of each pier, so that the load balanced. Skeleton towers on the piers supported chains attached to the arched ribs at suitable points. In spite of careful provision, much difficulty was experienced in making the connexion at the crown, from the expansion due to temperature changes. The Douro bridge was similarly erected. The girders of the side spans were rolled out so as to overhang the great span by 105 ft., and formed a platform from which parts of the arch could be suspended. Dwarf towers, built on the arch ring at the fifth panel from either side, helped to support the girder above, in erecting the centre part of the arch (Seyrig, *Proc. Inst. C.E.* lxiii. p. 177). The great cantilever bridges have been erected in the same way, and they are specially adapted for erection by building out.

Straining Actions and Working Stresses.

17. In metal bridges wrought iron has been replaced by mild steel—a stronger, tougher and better material. Ingot metal or mild steel was sometimes treacherous when first introduced, and accidents occurred, the causes of which were obscure. In fact, small differences of composition or variations in thermal treatment during manufacture involve relatively large differences of quality. Now it is understood that care must be taken in specifying the exact quality and in testing the material supplied. Structural wrought iron has a tenacity of 20 to 22½ tons per sq. in. in the direction of rolling, and an ultimate elongation of 8 or 10% in 8 in. Across the direction of rolling the tenacity is about 18 tons per sq. in., and the elongation 3% in 8 in. Steel has only a small difference of quality in different directions. There is still controversy as to what degree of hardness, or (which is nearly the same thing) what percentage of carbon, can be permitted with safety in steel for structures.

The qualities of steel used may be classified as follows:—(*a*) Soft steel, having a tenacity of 22½ to 26 tons per sq. in., and an elongation of 32 to 24% in 8 in. (*b*) Medium steel, having a tenacity of 26 to 34 tons per sq. in., and 28 to 25% elongation. (*c*) Moderately hard steel, having a tenacity of 34 to 37 tons per sq. in., and 17% elongation, (*d*) Hard steel, having a tenacity of 37 to 40 tons per sq. in., and 10% elongation. Soft steel is used for rivets always, and sometimes for the whole superstructure of a bridge, but medium steel more generally for the plates, angle bars, &c., the weight of the bridge being then reduced by about 7% for a given factor of safety. Moderately hard steel has been used for the larger members of long-span bridges. Hard steel, if used at all, is used only for compression members, in which there is less risk of flaws extending than in tension members. With medium or moderately hard steel all rivet holes should be drilled, or punched ⅛ in. less in diameter than the rivet and reamed out, so as to remove the ring of material strained by the punch.

In the specification for bridge material, drawn up by the British Engineering Standards Committee, it is provided that the steel shall be acid or basic open-hearth steel, containing not more than 0.06% of sulphur or phosphorus. Plates, angles and bars, other than rivet bars, must

have a tensile strength of 28 to 32 tons per sq. in., with an elevation of 20% in 8 in. Rivet bars tested on a gauge length eight times the diameter must have a tensile strength of 26 to 30 tons per sq. in. and an elongation of 25%.

18. *Straining Actions.*—The external forces acting on a bridge may be classified as follows:—

(1) The *live* or *temporary load*, for road bridges the weight of a dense crowd uniformly distributed, or the weight of a heavy wagon or traction engine; for railway bridges the weight of the heaviest train likely to come on the bridge. (2) An allowance is sometimes made for *impact*, that is the dynamical action of the live load due to want of vertical balance in the moving parts of locomotives, to irregularities of the permanent way, or to yielding of the structure. (3) The *dead load* comprises the weight of the main girders, flooring and wind bracing, or the total weight of the superstructure exclusive of any part directly carried by the piers. This is usually treated as uniformly distributed over the span. (4) The *horizontal pressure* due to a wind blowing transversely to the span, which becomes of importance in long and high bridges. (5) The *longitudinal drag* due to the friction of a train when braked, about one-seventh of the weight of the train. (6) On a curved bridge the *centrifugal load* due to the radical acceleration of the train. If w is the weight of a locomotive in tons, r the radius of curvature of the track, v the velocity in feet per sec.; then the horizontal force exerted on the bridge is wv^2/gr tons. (7) In some cases, especially in arch and suspension bridges, changes of temperature set up stresses equivalent to those produced by an external load. In Europe a variation of temperature of 70° C. or 126° F. is commonly assumed. For this the expansion is about 1 in. in 100 ft. Generally a structure should be anchored at one point and free to move if possible in other directions. Roughly, if expansion is prevented, a stress of one ton per sq. in. is set up in steel structures for each 12° change of temperature.

i. *Live Load on Road Bridges.*—A dense crowd of people may be taken as a uniform load of 80 to 120 lb per sq. ft. But in recent times the weight of traction engines and wagons which pass over bridges has increased, and this kind of load generally produces greater straining action than a crowd of people. In manufacturing districts and near large towns loads of 30 tons may come on road bridges, and county and borough authorities insist on provision being made for such loads. In Switzerland roads are divided into three classes according to their importance, and the following loads are prescribed, the designer having to provide sufficient strength either for a uniformly distributed crowd, or for a heavy wagon anywhere on the roadway:— [v.04 p.0547]

	Crowd, lb per sq. ft.	Wagon, tons per axle.
Main Roads	92	10 with 13 ft. wheel base
Secondary Roads	72	6 with 10 ft. wheel base
Other Roads	51	3 with 8 ft. wheel base

In England still larger loads are now provided for. J.C. Inglis (*Proc. Inst. C.E.* cxli. p. 35) has considered two cases—(*a*) a traction engine and boiler trolley, and (*b*) a traction engine and trucks loaded with granite. He has calculated the equivalent load per foot of span which would produce the same maximum bending moments. The following are some of the results:—

Span Ft.	10.	20.	30.	40.	50.
Equivalent load in tons per ft. run, Case *a*	1.75	0.95	0.70	0.73	0.72
Do. Case *b*	3.25	1.7	1.3	1.2	1.15

Large as these loads are on short spans, they are not more than must often be provided for.

Live Load on Railway Bridges.—The live load is the weight of the heaviest train which can come on the bridge. In the earlier girder bridges the live load was taken to be equivalent to a uniform load of 1 ton per foot run for each line of way. At that time locomotives on railways of 4 ft. 8½ in. gauge weighed at most 35 to 45 tons, and their length between buffers was such that the average load did not exceed 1 ton per foot run. Trains of wagons did not weigh more than three-quarters of a ton per foot run when most heavily loaded. The weights of engines and wagons are now greater, and in addition it is recognized that the concentration of the loading at the axles gives rise to greater straining action, especially in short bridges, than the same load uniformly distributed along the span. Hence many of the earlier bridges have had to be strengthened to carry modern traffic. The following examples of some of the heaviest locomotives on English railways is given by W.B. Farr (*Proc. Inst. C.E.* cxli. p. 12):—

Passenger Engines.

Total weights, tons	84.35	98.90	91.90	85.48
Tons per ft. over all	1.58	1.71	1.62	1.61
Tons per ft. of wheel base	1.92	2.04	1.97	1.95
Maximum axle load, tons	19.00	16.00	18.70	18.50

Goods Engines.

Total weight, tons	77.90	78.80	76.46	75.65
Tons per ft. over all	1.54	1.50	1.54	1.51
Tons per ft. of wheel base	2.02	2.02	2.03	2.00
Maximum axle load, tons	15.90	16.00	13.65	15.50

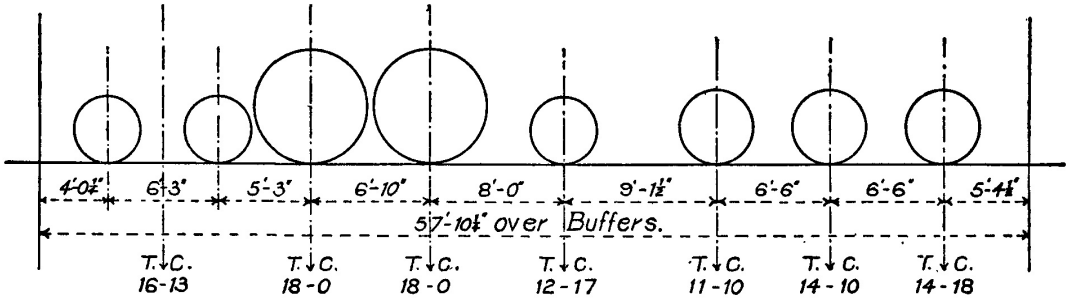
Tank Engines.

Total weight, tons	53.80	58.61	60.80	47.00
Tons per ft. over all	1.60	1.68	1.70	1.55
Tons per ft. of wheel base	2.45	2.52	2.23	3.03
Maximum axle load, tons	17.54	15.29	17.10	15.77

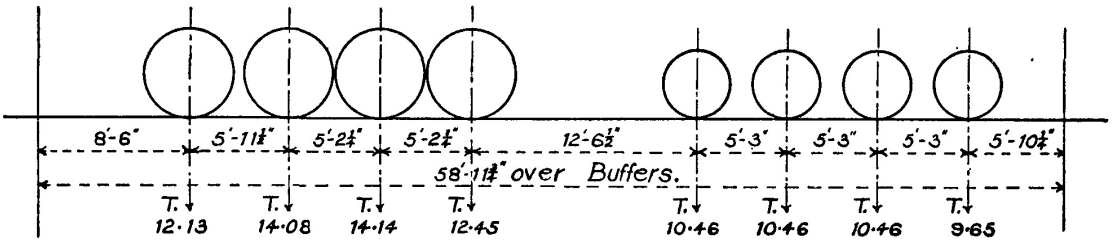
Farr has drawn diagrams of bending moment for forty different very heavy locomotives on different spans, and has determined for each case a uniform load which at every point would produce as great a bending moment as the actual wheel loads. The following short abstract gives the equivalent uniform load which produces bending moments as great as those of any of the engines calculated:—

Span in Ft.	Load per ft. run equivalent to actual Wheel Loads in Tons, for each Track.
5.0	7.6
10.0	4.85
20.0	3.20
30.0	2.63
50.0	2.24
100.0	1.97

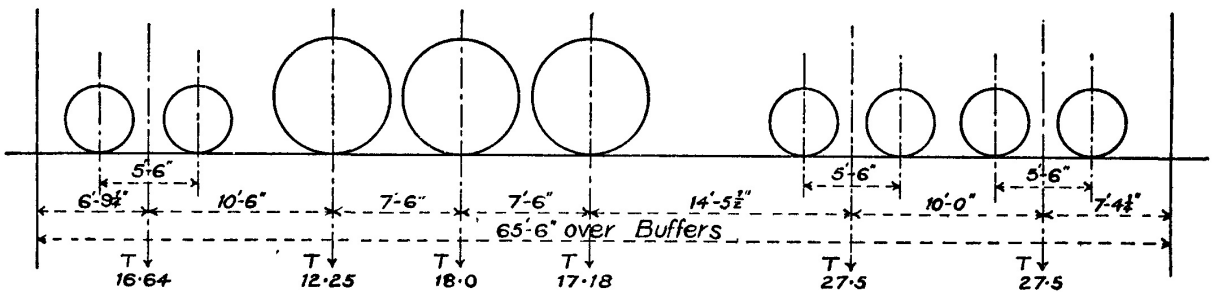
Fig. 36 gives the loads per axle and the distribution of loads in some exceptionally heavy modern British locomotives.



Express Passenger Engine, G.N. Ry.



Goods Engine, L. & Y. Ry.



Passenger Engine, Cal. Ry.

FIG. 36.

[v.04 p.0548] In Austria the official regulations require that railway bridges shall be designed for at least the following live loads per foot run and per track:—

Span.	

		Live Load in Tons.	
Metres.	Ft.	Per metre run.	Per ft. run.
1	3.3	20	6.1
2	6.6	15	4.6
5	16.4	10	3.1
20	65.6	5	1.5
30	98.4	4	1.2

It would be simpler and more convenient in designing short bridges if, instead of assuming an equivalent uniform rolling load, agreement could be come to as to a typical heavy locomotive which would produce stresses as great as any existing locomotive on each class of railway. Bridges would then be designed for these selected loads, and the process would be safer in dealing with flooring girders and shearing forces than the assumption of a uniform load.

Some American locomotives are very heavy. Thus a consolidation engine may weigh 126 tons with a length over buffers of 57 ft., corresponding to an average load of 2.55 tons per ft. run. Also long ore wagons are used which weigh loaded two tons per ft. run. J.A.L. Waddell (*De Pontibus*, New York, 1898) proposes to arrange railways in seven classes, according to the live loads which may be expected from the character of their traffic, and to construct bridges in accordance with this classification. For the lightest class, he takes a locomotive and tender of 93.5 tons, 52 ft. between buffers (average load 1.8 tons per ft. run), and for the heaviest a locomotive and tender weighing 144.5 tons, 52 ft. between buffers (average load 2.77 tons per ft. run). Wagons he assumes to weigh for the lightest class 1.3 tons per ft. run and for the heaviest 1.9 tons. He takes as the live load for a bridge two such engines, followed by a train of wagons covering the span. Waddell's tons are short tons of 2000 lb.

ii. *Impact.*—If a vertical load is imposed suddenly, but without velocity, work is done during deflection, and the deformation and stress are momentarily double those due to the same load at rest on the structure. No load of exactly this kind is ever applied to a bridge. But if a load is so applied that the deflection increases with speed, the stress is greater than that due to a very gradually applied load, and vibrations about a mean position are set up. The rails not being absolutely straight and smooth, centrifugal and lurching actions occur which alter the distribution of the loading. Again, rapidly changing forces, due to the moving parts of the engine which are unbalanced vertically, act on the bridge; and, lastly, inequalities of level at the rail ends give rise to shocks. For all these reasons the stresses due to the live load are greater than those due to the same load resting quietly on the bridge. This increment is larger on the flooring girders than on the main ones, and on short main girders than on long ones. The impact stresses depend so much on local conditions that it is difficult to fix what allowance should be made. E.H. Stone (*Trans. Am. Soc. of C.E.* xli. p. 467) collated some measurements of deflection taken during official trials of Indian bridges, and found the increment of deflection due to impact to depend on the ratio of dead to live load. By plotting and averaging he obtained the following results:—

Excess of Deflection and straining Action of a moving Load over that due to a resting Load.

Dead load in per cent of total load	10	20	30	40	50	70	90
Live load in per cent of total load	90	80	70	60	50	30	10
Ratio of live to dead load	9	4	2.3	1.5	1.0	0.43	0.10
Excess of deflection and stress due to moving load per cent	23	13	8	5.5	4.0	1.6	0.3

These results are for the centre deflections of main girders, but Stone infers that the augmentation of stress for any member, due to causes included in impact allowance, will be the same percentage for the same ratios of live to dead load stresses. Valuable measurements of the deformations of girders and tension members due to moving trains have been made by S.W. Robinson (*Trans. Am. Soc. C.E.* xvi.) and by F.E. Turneaure (*Trans. Am. Soc. C.E.* xli.). The latter used a recording deflectometer and two recording extensometers. The observations are difficult, and the inertia of the instrument is liable to cause error, but much care was taken. The most striking conclusions from the results are that the locomotive balance weights have a large effect in causing vibration, and next, that in certain cases the vibrations are cumulative, reaching a value greater than that due to any single impact action. Generally: (1) At speeds less than 25 m. an hour there is not much vibration. (2) The increase of deflection due to impact at 40 or 50 m. an hour is likely to reach 40 to 50% for girder spans of less than 50 ft. (3) This percentage decreases rapidly for longer spans, becoming about 25% for 75-ft. spans. (4) The increase per cent of boom stresses due to impact is about the same as that of deflection; that in web bracing bars is rather greater. (5) Speed of train produces no effect on the mean deflection, but only on the magnitude of the vibrations.

A purely empirical allowance for impact stresses has been proposed, amounting to 20% of the live load stresses for floor stringers; 15% for floor cross girders; and for main girders, 10% for 40-ft. spans, and 5% for 100-ft. spans. These percentages are added to the live load stresses.

iii. *Dead Load.*—The dead load consists of the weight of main girders, flooring and wind-bracing. It is generally reckoned to be uniformly distributed, but in large spans the distribution of weight in the main girders should be calculated and taken into account. The weight of the bridge

flooring depends on the type adopted. Road bridges vary so much in the character of the flooring that no general rule can be given. In railway bridges the weight of sleepers, rails, &c., is 0.2 to 0.25 tons per ft. run for each line of way, while the rail girders, cross girders, &c., weigh 0.15 to 0.2 tons. If a footway is added about 0.4 ton per ft. run may be allowed for this. The weight of main girders increases with the span, and there is for any type of bridge a limiting span beyond which the dead load stresses exceed the assigned limit of working stress.

Let W_l be the total live load, W_f the total flooring load on a bridge of span l, both being considered for the present purpose to be uniform per ft. run. Let $k(W_l+W_f)$ be the weight of main girders designed to carry W_l+W_f, but not their own weight in addition. Then

$$W_g = (W_l+W_f)(k+k^2+k^3 \ldots)$$

will be the weight of main girders to carry W_l+W_f and their own weight (Buck, *Proc. Inst. C.E.* lxvii. p. 331). Hence,

$$W_g = (W_l+W_f)k/(1-k).$$

Since in designing a bridge W_l+W_f is known, $k(W_l+W_f)$ can be found from a provisional design in which the weight W_g is neglected. The actual bridge must have the section of all members greater than those in the provisional design in the ratio $k/(1-k)$.

Waddell (*De Pontibus*) gives the following convenient empirical relations. Let w_1, w_2 be the weights of main girders per ft. run for a live load p per ft. run and spans l_1, l_2. Then

$$w_2/w_1 = \tfrac{1}{2}\,[l_2/l_1+(l_2/l_1)^2].$$

Now let w_1', w_2' be the girder weights per ft. run for spans l_1, l_2, and live loads p' per ft. run. Then

$$w_2'/w_2 = 1/5(1+4p'/p)$$

$$w_2'/w_1 = 1/10[l_2/l_1+(l_2/l_1)^2](1+4p'/p)$$

A partially rational approximate formula for the weight of main girders is the following (Unwin, *Wrought Iron Bridges and Roofs*, 1869, p. 40):—

Let w = total live load per ft. run of girder; w_2 the weight of platform per ft. run; w_3 the weight of main girders per ft. run, all in tons; l = span in ft.; s = average stress in tons per sq. in. on gross section of metal; d = depth of girder at centre in ft.; r = ratio of span to depth of girder so that $r = l/d$. Then

$$w_3 = (w_1+w_2)l^2/(\mathrm{C}ds-l_2) = (w_1+w_2)lr/(\mathrm{C}s-lr),$$

where C is a constant for any type of girder. It is not easy to fix the average stress s per sq. in. of gross section. Hence the formula is more useful in the form

$$w = (w_1+w_2)l^2/(\mathrm{K}d-l^2) = (w_1+w_2)lr/(\mathrm{K}-lr)$$

where $\mathrm{K} = (w_1+w_2+w_3)lr/w_3$ is to be deduced from the data of some bridge previously designed with the same working stresses. From some known examples, C varies from 1500 to 1800 for iron braced parallel or bowstring girders, and from 1200 to 1500 for similar girders of steel. K = 6000 to 7200 for iron and = 7200 to 9000 for steel bridges.

iv. *Wind Pressure.*—Much attention has been given to wind action since the disaster to the Tay bridge in 1879. As to the maximum wind pressure on small plates normal to the wind, there is not much doubt. Anemometer observations show that pressures of 30 lb per sq. ft. occur in storms annually in many localities, and that occasionally higher pressures are recorded in exposed positions. Thus at Bidstone, Liverpool, where the gauge has an exceptional exposure, a pressure of 80 lb per sq. ft. has been observed. In tornadoes, such as that at St Louis in 1896, it has been calculated, from the stability of structures overturned, that pressures of 45 to 90 lb per sq. ft. must have been reached. As to anemometer pressures, it should be observed that the recorded pressure is made up of a positive front and negative (vacuum) back pressure, but in structures the latter must be absent or only partially developed. Great difference of opinion exists as to whether on large surfaces the average pressure per sq. ft. is as great as on small surfaces, such as anemometer plates. The experiments of Sir B. Baker at the Forth bridge showed that on a surface 30 ft. × 15 ft. the intensity of pressure was less than on a similarly exposed anemometer plate. In the case of bridges there is the further difficulty that some surfaces partially shield other surfaces; one girder, for instance, shields the girder behind it (see *Brit. Assoc. Report*, 1884). In 1881 a committee of the Board of Trade decided that the maximum wind pressure on a vertical surface in Great Britain should be assumed in designing structures to be 56 lb per sq. ft. For a plate girder bridge of less height than the train, the wind is to be taken to act on a surface equal to the projected area of one girder and the exposed part of a train covering the bridge. In

the case of braced girder bridges, the wind pressure is taken as acting on a continuous surface extending from the rails to the top of the carriages, plus the vertical projected area of so much of one girder as is exposed above the train or below the rails. In addition, an allowance is made for pressure on the leeward girder according to a scale. The committee recommended that a factor of safety of 4 should be taken for wind stresses. For safety against overturning they considered a factor of 2 sufficient. In the case of bridges not subject to Board of Trade inspection, the allowance for wind pressure varies in different cases. C. Shaler Smith allows 300 lb per ft. run for the pressure on the side of a train, and in addition 30 lb per sq. ft. on twice the vertical projected area of one girder, treating the pressure on the train as a travelling load. In the case of bridges of less than 50 ft. span he also provides strength to resist a pressure of 50 lb per sq. ft. on twice the vertical projection of one truss, no train being supposed to be on the bridge.

19. *Stresses Permitted.*—For a long time engineers held the convenient opinion that, if the total dead and live load stress on any section of a structure (of iron) did not exceed 5 tons per sq. in., ample safety was secured. It is no longer possible to design by so simple a rule. In an interesting address to the British Association in 1885, Sir B. Baker described the condition of opinion as to the safe limits of stress as chaotic. "The old foundations," he said, "are shaken, and engineers have not come to an agreement respecting the rebuilding of the structure. The variance in the strength of existing bridges is such as to be apparent to the educated eye without any calculation. In the present day engineers are in accord as to the principles of estimating the magnitude of the stresses on the members of a structure, but not so in proportioning the members to resist those stresses. The practical result is that a bridge which would be passed by the English Board of Trade would require to be strengthened 5% in some parts and 60% in others, before it would be accepted by the German government, or by any of the leading railway companies in America." Sir B. Baker then described the results of experiments on repetition of stress, and added that "hundreds of existing bridges which carry twenty trains a day with perfect safety would break down quickly under twenty trains an hour. This fact was forced on my attention nearly twenty-five years ago by the fracture of a number of girders of ordinary strength under a five-minutes' train service."

Practical experience taught engineers that though 5 tons per sq. in. for iron, or 6½ tons per sq. in. for steel, was safe or more than safe for long bridges with large ratio of dead to live load, it was not safe for short ones in which the stresses are mainly due to live load, the weight of the bridge being small. The experiments of A. Wöhler, repeated by Johann Bauschinger, Sir B. Baker and others, show that the breaking stress of a bar is not a fixed quantity, but depends on the range of variation of stress to which it is subjected, if that variation is repeated a very large number of times. Let K be the breaking strength of a bar per unit of section, when it is loaded once gradually to breaking. This may be termed the statical breaking strength. Let $k_{max.}$ be the breaking strength of the same bar when subjected to stresses varying from $k_{max.}$ to $k_{min.}$ alternately and repeated an indefinitely great number of times; $k_{min.}$ is to be reckoned + if of the same kind as $k_{max.}$ and - if of the opposite kind (tension or thrust). The range of stress is therefore $k_{max.}-k_{min.}$, if the stresses are both of the same kind, and $k_{max.}+k_{min.}$, if they are of opposite kinds. Let $\Delta = k_{max.} \pm k_{min.}$ = the range of stress, where Δ is always positive. Then Wöhler's results agree closely with the rule,

$$k_{max.} = \tfrac{1}{2}\Delta+\sqrt{(K^2-n\Delta K)},$$

where n is a constant which varies from 1.3 to 2 in various qualities of iron and steel. For ductile iron or mild steel it may be taken as 1.5. For a statical load, range of stress nil, $\Delta = 0$, $k_{max.} = K$, the statical breaking stress. For a bar so placed that it is alternately loaded and the load removed, $\Delta = k_{max.}$ and $k_{max.} = 0.6$ K. For a bar subjected to alternate tension and compression of equal amount, $\Delta = 2\ f_{max.}$ and $k_{max.} = 0.33$ K. The safe working stress in these different cases is $k_{max.}$ divided by the factor of safety. It is sometimes said that a bar is "fatigued" by repeated straining. The real nature of the action is not well understood, but the word fatigue may be used, if it is not considered to imply more than that the breaking stress under repetition of loading diminishes as the range of variation increases.

It was pointed out as early as 1869 (Unwin, *Wrought Iron Bridges and Roofs*) that a rational method of fixing the working stress, so far as knowledge went at that time, would be to make it depend on the ratio of live to dead load, and in such a way that the factor of safety for the live load stresses was double that for the dead load stresses. Let A be the dead load and B the live load, producing stress in a bar; $\rho = B/A$ the ratio of live to dead load; f_1 the safe working limit of stress for a bar subjected to a dead load only and f the safe working stress in any other case. Then

$$f_1\ (A+B)/(A+2B) = f_1(1+\rho)/(1+2\rho).$$

The following table gives values of f so computed on the assumption that $f_1 = 7\frac{1}{2}$ tons per sq. in. for iron and 9 tons per sq. in. for steel.

Working Stress for combined Dead and Live Load. Factor of Safety twice as great for Live Load as for Dead Load.

			Values of *f*,

	Ratio ρ	$\frac{1+\rho}{1+2\rho}$	tons per sq. in.	
			Iron.	Mild Steel.
All dead load	0	1.00	7.5	9.0
	.25	0.83	6.2	7.5
	.50	0.75	5.6	6.8
	.66	0.71	5.3	6.4
Live load = Dead load	1.00	0.66	4.9	5.9
	2.00	0.60	4.5	5.4
	4.00	0.56	4.2	5.0
All live load	∞	0.50	3.7	4.5

Bridge sections designed by this rule differ little from those designed by formulae based directly on Wöhler's experiments. This rule has been revived in America, and appears to be increasingly relied on in bridge-designing. (See *Trans. Am. Soc. C.E.* xli. p. 156.)

The method of J.J. Weyrauch and W. Launhardt, based on an empirical expression for Wöhler's law, has been much used in bridge designing (see *Proc. Inst. C.E.* lxiii. p. 275). Let t be the *statical breaking strength* of a bar, loaded once gradually up to fracture (t = breaking load divided by original area of section); u the breaking strength of a bar loaded and unloaded an indefinitely great number of times, the stress varying from u to 0 alternately (this is termed the *primitive strength*); and, lastly, let s be the breaking strength of a bar subjected to an indefinitely great number of repetitions of stresses equal and opposite in sign (tension and thrust), so that the stress ranges alternately from s to $-s$. This is termed the *vibration strength*. Wöhler's and Bauschinger's experiments give values of t, u, and s, for some materials. If a bar is subjected to alternations of stress having the range $\Delta = f_{max.} - f_{min.}$, then, by Wöhler's law, the bar will ultimately break, if

$$f_{max.} = F\Delta, \quad . \quad . \quad . \quad (1)$$

where F is some unknown function. Launhardt found that, for stresses always of the same kind, $F = (t-u)/(t-f_{max.})$ approximately agreed with experiment. For stresses of different kinds Weyrauch found $F = (u-s)/(2u-s-f_{max.})$ to be similarly approximate. Now let $f_{max.}/f_{min.} = \varphi$, where φ is + or - according as the stresses are of the same or opposite signs. Putting the values of F in (1) and solving for $f_{max.}$, we get for the breaking stress of a bar subjected to repetition of varying stress,

$$f_{max.} = u(1+(t-u)\varphi/u) \text{ [Stresses of same sign.]}$$
$$f_{max.} = u(1+(u-s)\varphi/u) \text{ [Stresses of opposite sign.]}$$

The working stress in any case is $f_{max.}$ divided by a factor of safety. Let that factor be 3. Then Wöhler's results for iron and Bauschinger's for steel give the following equations for tension or thrust:—

Iron, working stress, $f = 4.4\ (1+\frac{1}{2}\varphi)$
Steel, working stress, $f = 5.87\ (1+\frac{1}{2}\varphi)$.

In these equations φ is to have its + or - value according to the case considered. For shearing stresses the working stress may have 0.8 of its value for tension. The following table gives values of the working stress calculated by these equations:—

Working Stress for Tension or Thrust by Launhardt and Weyrauch Formula.

	φ	1+φ/2	Working Stress *f*, tons per sq. in.	
			Iron.	Steel.
All dead load	1.0	1.5	6.60	8.80
	0.75	1.375	6.05	8.07
	0.50	1.25	5.50	7.34
	0.25	1.125	4.95	6.60
All live load	0.00	1.00	4.40	5.87
	-0.25	0.875	3.85	5.14
	-0.50	0.75	3.30	4.40
	-0.75	0.625	2.75	3.67
Equal stresses + and -	-1.00	0.500	2.20	2.93

[v.04 p.0550] To compare this with the previous table, $\varphi = (A+B)/A = 1+\rho$. Except when the limiting stresses are of opposite sign, the two tables agree very well. In bridge work this occurs only in some of the bracing bars.

It is a matter of discussion whether, if fatigue is allowed for by the Weyrauch method, an additional allowance should be made for impact. There was no impact in Wöhler's experiments, and therefore it would seem rational to add the impact allowance to that for fatigue; but in that case the bridge sections become larger than experience shows to be necessary. Some engineers

escape this difficulty by asserting that Wöhler's results are not applicable to bridge work. They reject the allowance for fatigue (that is, the effect of repetition) and design bridge members for the total dead and live load, plus a large allowance for impact varied according to some purely empirical rule. (See Waddell, *De Pontibus*, p.7.) Now in applying Wöhler's law, $f_{max.}$ for any bridge member is found for the maximum possible live load, a live load which though it may sometimes come on the bridge and must therefore be provided for, is not the usual live load to which the bridge is subjected. Hence the range of stress, $f_{max.}$-$f_{min.}$, from which the working stress is deduced, is not the ordinary range of stress which is repeated a practically infinite number of times, but is a range of stress to which the bridge is subjected only at comparatively long intervals. Hence practically it appears probable that the allowance for fatigue made in either of the tables above is sufficient to cover the ordinary effects of impact also.

English bridge-builders are somewhat hampered in adopting rational limits of working stress by the rules of the Board of Trade. Nor do they all accept the guidance of Wöhler's law. The following are some examples of limits adopted. For the Dufferin bridge (steel) the working stress was taken at 6.5 tons per sq. in. in bottom booms and diagonals, 6.0 tons in top booms, 5.0 tons in verticals and long compression members. For the Stanley bridge at Brisbane the limits were 6.5 tons per sq. in. in compression boom, 7.0 tons in tension boom, 5.0 tons in vertical struts, 6.5 tons in diagonal ties, 8.0 tons in wind bracing, and 6.5 tons in cross and rail girders. In the new Tay bridge the limit of stress is generally 5 tons per sq. in., but in members in which the stress changes sign 4 tons per sq. in. In the Forth bridge for members in which the stress varied from 0 to a maximum frequently, the limit was 5.0 tons per sq. in., or if the stress varied rarely 5.6 tons per sq. in.; for members subjected to alternations of tension and thrust frequently 3.3 tons per sq. in. or 5 tons per sq. in. if the alternations were infrequent. The shearing area of rivets in tension members was made 1½ times the useful section of plate in tension. For compression members the shearing area of rivets in butt-joints was made half the useful section of plate in compression.

20. *Determination of Stresses in the Members of Bridges.*—It is convenient to consider beam girder or truss bridges, and it is the stresses in the main girders which primarily require to be determined. A main girder consists of an upper and lower flange, boom or chord and a vertical web. The loading forces to be considered are vertical, the horizontal forces due to wind pressure are treated separately and provided for by a horizontal system of bracing. For practical purposes it is accurate enough to consider the booms or chords as carrying exclusively the horizontal tension and compression and the web as resisting the whole of the vertical and, in a plate web, the equal horizontal shearing forces. Let fig. 37 represent a beam with any system of loads W_1, W_2, ... W_n.

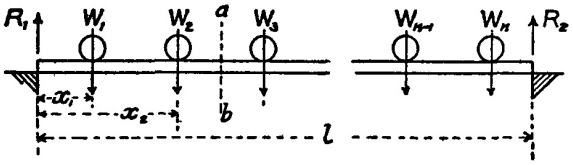


FIG. 37.

The reaction at the right abutment is

$$R_2 = W_1x_1/l+W_2x_2/l+...$$

That at the left abutment is

$$R_1 = W_1+W_2+...-R_2.$$

Consider any section *a b*. The total shear at *a b* is

$$S = R-\sum(W_1+W_2 ...)$$

where the summation extends to all the loads to the left of the section. Let p_1, p_2 ... be the distances of the loads from *a b*, and p the distance of R_1 from *a b*; then the bending moment at *a b* is

$$M = R_1p-\sum(W_1p_1+W_2p_2 ...)$$

where the summation extends to all the loads to the left of *a b*. If the loads on the right of the section are considered the expressions are similar and give the same results.

If A_t A_c are the cross sections of the tension and compression flanges or chords, and h the distance between their mass centres, then on the assumption that they resist all the direct horizontal forces the total stress on each flange is

$$H_t = H_c = M/h$$

and the intensity of stress of tension or compression is

$$f_t = M/A_th,$$
$$f_c = M/A_ch.$$

If A is the area of the plate web in a vertical section, the intensity of shearing stress is

f_x = S/A

and the intensity on horizontal sections is the same. If the web is a braced web, then the vertical component of the stress in the web bars cut by the section must be equal to S.

21. *Method of Sections. A. Ritter's Method.*—In the case of braced structures the following method is convenient: When a section of a girder can be taken cutting only three bars, the stresses in the bars can be found by taking moments. In fig. 38 *m n* cuts three bars, and the forces in the three bars cut by the section are C, S and T. There are to the left of the section the external forces, R, W_1, W_2. Let *s* be the perpendicular from O, the join of C and T on the direction of S; *t* the perpendicular from A, the join of C and S on the direction of T; and *c* the perpendicular from B, the join of S and T on the direction of C. Taking moments about O,

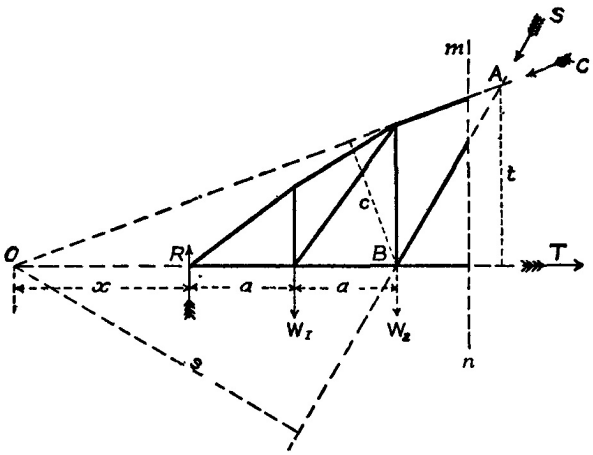


FIG. 38.

$$R_x\text{-}W_1(x+a)\text{-}W_2(x+2a) = Ss;$$

taking moments about A,

$$R3a\text{-}W_1 2a\text{-}W_2 a = Tt;$$

and taking moments about B,

$$R2a\text{-}W_1 a = Cc$$

Or generally, if M_1 M_2 M_3 are the moments of the external forces to the left of O, A, and B respectively, and *s*, *t* and *c* the perpendiculars from O, A and B on the directions of the forces cut by the section, then

$$Ss = M_1;\ Tt = M_2 \text{ and } Cc = M_3.$$

Still more generally if H is the stress on any bar, *h* the perpendicular distance from the join of the other two bars cut by the section, and M is the moment of the forces on one side of that join,

$$Hh = M.$$

22. *Distribution of Bending Moment and Shearing Force.*—Let a girder of span *l*, fig. 39, supported at the ends, carry a fixed load W at m from the right abutment. The reactions at the abutments are $R_1 = Wm/l$ and $R_2 = W(l\text{-}m)/l$. The shears on vertical sections to the left and right of the load are R_1 and $-R_2$, and the distribution of shearing force is given by two rectangles. Bending moment increases uniformly from either abutment to the load, at which the bending moment is $M = R_2 m = R_1(l\text{-}m)$. The distribution of bending moment is given by the ordinates of a triangle. Next let the girder carry a uniform load *w* per ft. run

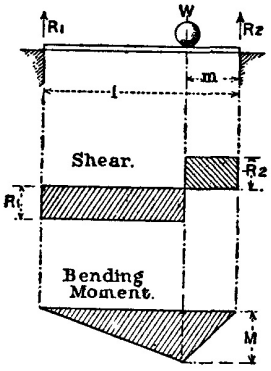


FIG. 39.

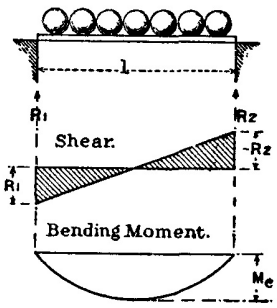


FIG. 40.

[v.04 p.0551] (fig. 40). The total load is *wl*; the reactions at abutments, $R_1 = R_2 = \frac{1}{2}wl$. The distribution of shear on vertical sections is given by the ordinates of a sloping line. The greatest bending moment is at the centre and $= M_c = \frac{1}{8}wl^2$. At any point *x* from the abutment, the bending moment is $M = \frac{1}{2}wx(l\text{-}x)$, an equation to a parabola.

23. *Shear due to Travelling Loads.*—Let a uniform train weighing *w* per ft. run advance over a girder of span 2*c*, from the left abutment. When it covers the girder to a distance *x* from the centre (fig. 41) the total load is $w(c+x)$; the reaction at B is

$$R_2 = w(c+x)\times\frac{c+x}{4c} = \frac{w}{4c}(c+x)^2,$$

which is also the shearing force at C for that position of the load. As the load travels, the shear at the head of the train will be given by the ordinates of a parabola having its vertex at A, and a maximum $F_{max.} = -\frac{1}{2}wl$ at B. If the load travels the reverse way, the shearing force at the head of the train is given by the ordinates of the dotted parabola. The greatest shear at C for any position

of the load occurs when the head of the train is at C. For any load p between C and B will increase the reaction at B and therefore the shear at C by part of p, but at the same time will diminish the shear at C by the whole of p. The web of a girder must resist the maximum shear, and, with a travelling load like a railway train, this is greater for partial than for complete loading. Generally a girder supports both a dead and a live load. The distribution of total shear, due to a dead load w_l per ft. run and a travelling load w_l per ft. run, is shown in fig. 42, arranged so that the dead load shear is added to the maximum travelling load shear of the same sign.

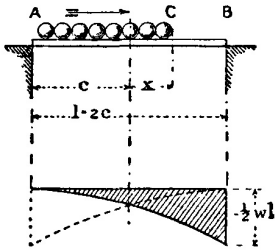


FIG. 41.

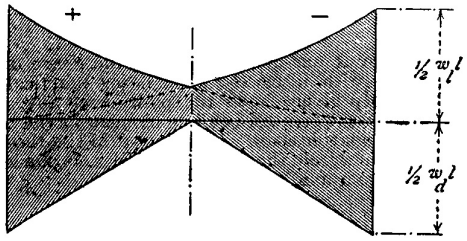


FIG. 42.

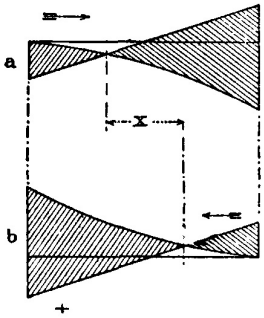


FIG. 43.

24. *Counterbracing.*—In the case of girders with braced webs, the tension bars of which are not adapted to resist a thrust, another circumstance due to the position of the live load must be considered. For a train advancing from the left, the travelling load shear in the left half of the span is of a different sign from that due to the dead load. Fig. 43 shows the maximum shear at vertical sections due to a dead and travelling load, the latter advancing (fig. 43, *a*) from the left and (fig. 43, *b*) from the right abutment. Comparing the figures it will be seen that over a distance x near the middle of the girder the shear changes sign, according as the load advances from the left or the right. The bracing bars, therefore, for this part of the girder must be adapted to resist either tension or thrust. Further, the range of stress to which they are subjected is the sum of the stresses due to the load advancing from the left or the right.

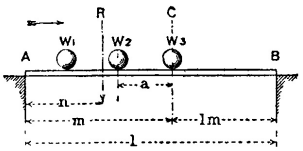


FIG. 44.

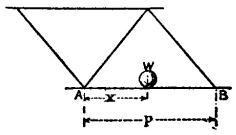


FIG. 45.

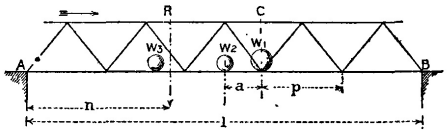


FIG. 46.

25. *Greatest Shear when concentrated Loads travel over the Bridge.*—To find the greatest shear with a set of concentrated loads at fixed distances, let the loads advance from the left abutment, and let C be the section at which the shear is required (fig. 44). The greatest shear at C may occur with W_1 at C. If W_1 passes beyond C, the shear at C will probably be greatest when W_2 is at C. Let R be the resultant of the loads on the bridge when W_1 is at C. Then the reaction at B and shear at C is Rn/l. Next let the loads advance a distance a so that W_2 comes to C. Then the shear at C is $R(n+a)/l - W_1$, plus any reaction d at B, due to any additional load which has come on the girder during the movement. The shear will therefore be increased by bringing W_2 to C, if $Ra/l + d > W_1$ and d is generally small and negligible. This result is modified if the action of the load near the section is distributed to the bracing intersections by rail and cross girders. In fig. 45 the action of W is distributed to A and B by the flooring. Then the loads at A and B are $W(p-x)/p$ and Wx/p. Now let C (fig. 46) be the section at which the greatest shear is required, and let the loads advance from the left till W_1 is at C. If R is the resultant of the loads then on the girder, the reaction at B and shear at C is Rn/l. But the shear may be greater when W_2 is at C. In that case the shear at C becomes $R(n+a)/l + d - W_1$, if $a > p$, and $R(n+a)/l + d - W_1 a/p$, if $a < p$. If we neglect d, then the shear increases by moving W_2 to C, if $Ra/l > W_1$ in the first case, and if $Ra/l > W_1 a/p$ in the second case.

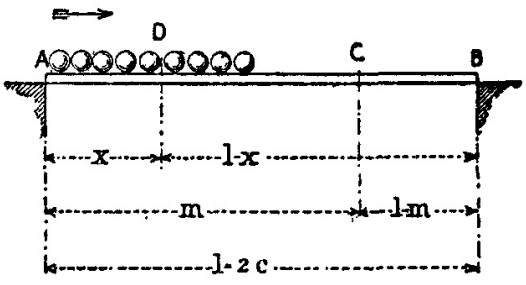


FIG. 47.

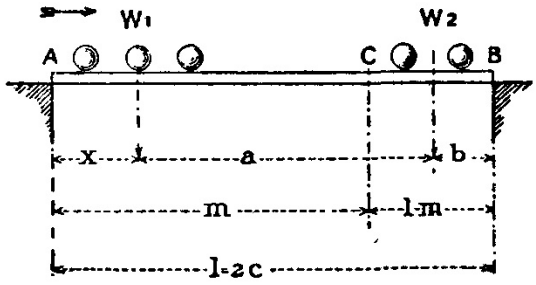


FIG. 48.

26. *Greatest Bending Moment due to travelling concentrated Loads.*—For the greatest bending moment due to a travelling live load, let a load of w per ft. run advance from the left abutment (fig. 47), and let its centre be at x from the left abutment. The reaction at B is $2wx^2/l$ and the bending moment at any section C, at m from the left abutment, is $2wx^2/(l\text{-}m)/l$, which increases as x increases till the span is covered. Hence, for uniform travelling loads, the bending moments are greatest when the loading is complete. In that case the loads on either side of C are proportional to m and $l\text{-}m$. In the case of a series of travelling loads at fixed distances apart passing over the girder from the left, let W_1, W_2 (fig. 48), at distances x and $x+a$ from the left abutment, be their resultants on either side of C. Then the reaction at B is $W_1x/l+W_2(x+a)/l$. The bending moment at C is

$$M = W_1x(l\text{-}m)/l+W_2m\{1\text{-}(x+a)/l\}.$$

If the loads are moved a distance Δx to the right, the bending moment becomes

$$M+\Delta M = W_1(x+\Delta x)(l\text{-}m)/l+W_2m\{1\text{-}(x+\Delta x+a)/l\}$$
$$\Delta m = W_1\Delta x(l\text{-}m)/l\text{-}W_2\Delta xm/l,$$

and this is positive or the bending moment increases, if $W_1(l\text{-}m) > W_2m$, or if $W_1/m > W_2/(l\text{-}m)$. But these are the average loads per ft. run to the left and right of C. Hence, if the average load to the left of a section is greater than that to the right, the bending moment at the section will be increased by moving the loads to the right, and vice versa. Hence the maximum bending moment at C for a series of travelling loads will occur when the average load is the same on either side of C. If one of the loads is at C, spread over a very small distance in the neighbourhood of C, then a very small displacement of the loads will permit the fulfilment of the condition. Hence the criterion for the position of the loads which makes the moment at C greatest is this: one load must be at C, and the other loads must be distributed, so that the average loads per ft. on either side of C (the load at C being neglected) are nearly equal. If the loads are very unequal in magnitude or distance this condition may be satisfied for more than one position of the loads, but it is not difficult to ascertain which position gives the maximum moment. Generally one of the largest of the loads must be at C with as many others to right and left as is consistent with that condition.

This criterion may be stated in another way. The greatest bending moment will occur with one of the greatest loads at the section, and when this further condition is satisfied. Let fig. 49 represent a beam with the series of loads travelling from the right. Let a b be the section considered, and let W_x be the load at a b when the bending moment there is greatest, and W_n the last load to the right then on the bridge. Then the position of the loads must be that which satisfies the condition

[v.04 p.0552]

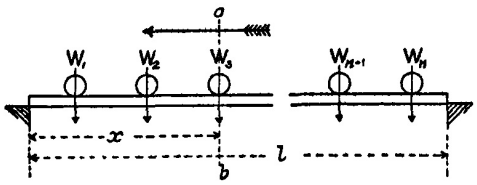


Fig. 49.

$$\frac{x}{l} \text{ greater than } \frac{W_1+W_2+\ldots W_{x\text{-}1}}{W_1+W_2+\ldots W_n}$$

$$\frac{x}{l} \text{ less than } \frac{W_1+W_2+\ldots W_x}{W_1+W_2+\ldots W_n}$$

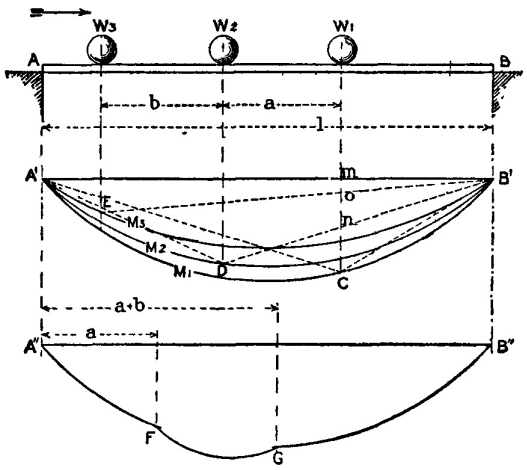


Fig. 50.

Fig. 50 shows the curve of bending moment under one of a series of travelling loads at fixed distances. Let W_1, W_2, W_3 traverse the girder from the left at fixed distances a, b. For the position shown the distribution of bending moment due to W_1 is given by ordinates of the triangle A′CB′; that due to W_2 by ordinates of A′DB′; and that due to W_3 by ordinates A′EB′. The total moment at W_1, due to three loads, is the sum $mC+mn+mo$ of the intercepts which the triangle sides cut off from the vertical under W_1. As the loads move over the girder, the points C, D, E describe the parabolas M_1, M_2, M_3, the middle ordinates of which are $\frac{1}{4}W_1l$, $\frac{1}{4}W_2l$, and $\frac{1}{4}W_3l$. If these are first drawn it is easy, for any position of the loads, to draw the lines B′C, B′D, B′E, and to find the sum of the intercepts which is the total bending moment under a load. The lower portion of the figure is the curve of bending moments under the leading load. Till W_1 has advanced a distance a only one load is on the girder, and the curve A″F gives bending moments due to W_1 only; as W_1 advances to a distance $a+b$, two loads

are on the girder, and the curve FG gives moments due to W_1 and W_2. GB″ is the curve of moments for all three loads $W_1+W_2+W_3$.

Fig. 51 shows maximum bending moment curves for an extreme case of a short bridge with very unequal loads. The three lightly dotted parabolas are the curves of maximum moment for each of the loads taken separately. The three heavily dotted curves are curves of maximum moment under each of the loads, for the three loads passing over the bridge, at the given distances, from left to right. As might be expected, the moments are greatest in this case at the sections under the 15-ton load. The heavy continuous line gives the last-mentioned curve for the reverse direction of passage of the loads.

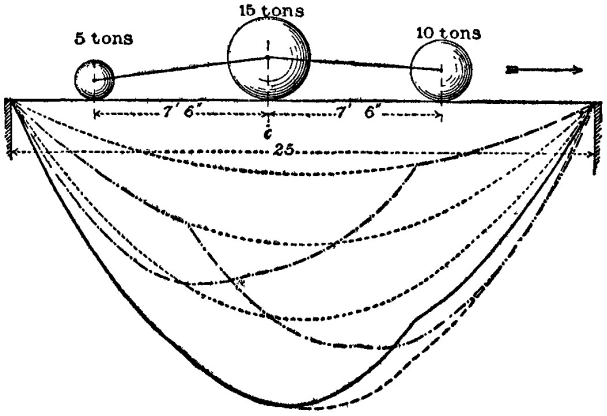


Fig. 51.

With short bridges it is best to draw the curve of maximum bending moments for some assumed typical set of loads in the way just described, and to design the girder accordingly. For longer bridges the funicular polygon affords a method of determining maximum bending moments which is perhaps more convenient. But very great accuracy in drawing this curve is unnecessary, because the rolling stock of railways varies so much that the precise magnitude and distribution of the loads which will pass over a bridge cannot be known. All that can be done is to assume a set of loads likely to produce somewhat severer straining than any probable actual rolling loads. Now, except for very short bridges and very unequal loads, a parabola can be found which includes the curve of maximum moments. This parabola is the curve of maximum moments for a travelling load uniform per ft. run. Let w_e be the load per ft. run which would produce the maximum moments represented by this parabola. Then w_e may be termed the uniform load per ft. equivalent to any assumed set of concentrated loads. Waddell has calculated tables of such equivalent uniform loads. But it is not difficult to find w_e, approximately enough for practical purposes, very simply. Experience shows that (*a*) a parabola having the same ordinate at the centre of the span, or (*b*) a parabola having the same ordinate at one-quarter span as the curve of maximum moments, agrees with it closely enough for practical designing. A criterion already given shows the position of any set of loads which will produce the greatest bending moment at the centre of the bridge, or at one-quarter span. Let M_c and M_a be those moments. At a section distant x from the centre of a girder of span $2c$, the bending moment due to a uniform load w_e per ft run is

$$M = \tfrac{1}{2} w_e(c-x)(c+x).$$

Putting x = 0, for the centre section

$$M_c = \tfrac{1}{2} w_e c^2;$$

and putting x = ½c, for section at quarter span

$$M_a = \tfrac{3}{8} w_e c^2.$$

From these equations a value of w_e can be obtained. Then the bridge is designed, so far as the direct stresses are concerned, for bending moments due to a uniform dead load and the uniform equivalent load w_e.

27. *Influence Lines.*—In dealing with the action of travelling loads much assistance may be obtained by using a line termed an *influence line*. Such a line has for abscissa the distance of a load from one end of a girder, and for ordinate the bending moment or shear at any given section, or on any member, due to that load. Generally the influence line is drawn for unit load. In fig. 52 let A′B′ be a girder supported at the ends and let it be required to investigate the bending moment at C′ due to unit load in any position on the girder. When the load is at F′, the reaction at B′ is m/l and the moment at C′ is $m(l-x)/l$, which will be reckoned positive, when it resists a tendency of the right-hand part of the girder to turn counter-clockwise. Projecting A′F′C′B′ on to the horizontal AB, take $Ff = m(l-x)/l$, the moment at C of unit load at F. If this process is repeated for all positions of the load, we get the influence line AGB for the bending moment at C. The area AGB is termed the influence area. The greatest moment CG at C is $x(l-x)/l$. To use this line to investigate the maximum moment at C due to a series of travelling loads at fixed distances, let P_1, P_2, P_3, ... be the loads which at the

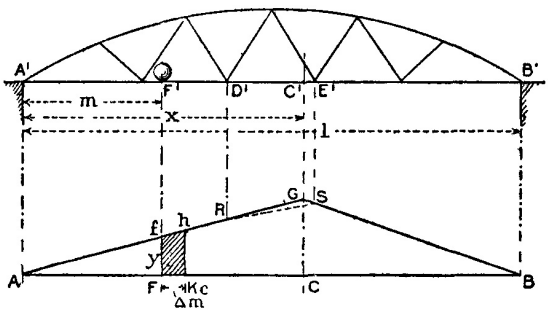


Fig. 52.

moment considered are at distances m_1, m_2, ... from the left abutment. Set off these distances along AB and let y_1, y_2, ... be the corresponding ordinates of the influence curve (y = Ff) on the verticals under the loads. Then the moment at C due to all the loads is

$$M = P_1y_1+P_2y_2+...$$

[v.04 p.0553] The position of the loads which gives the greatest moment at C may be settled by the criterion given above. For a uniform travelling load w per ft. of span, consider a small interval Fk = Δm on which the load is $w\Delta$m. The moment due to this, at C, is $wm(l\text{-}x)\Delta m/l$. But $m(l\text{-}x)\Delta m/l$ is the area of the strip Ffhk, that is $y\Delta m$. Hence the moment of the load on Δm at C is $wy\Delta m$, and the moment of a uniform load over any portion of the girder is w × the area of the influence curve under that portion. If the scales are so chosen that a inch represents 1 in. ton of moment, and b inch represents 1 ft. of span, and w is in tons per ft. run, then ab is the unit of area in measuring the influence curve.

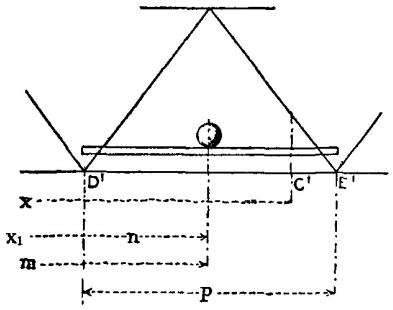


FIG. 53.

If the load is carried by a rail girder (stringer) with cross girders at the intersections of bracing and boom, its effect is distributed to the bracing intersections D′E′ (fig. 53), and the part of the influence line for that bay (panel) is altered. With unit load in the position shown, the load at D′ is $(p\text{-}n)/p$, and that at E′ is n/p. The moment of the load at C is $m(l\text{-}x)/l\text{-}n(p\text{-}n)/p$. This is the equation to the dotted line RS (fig. 52).

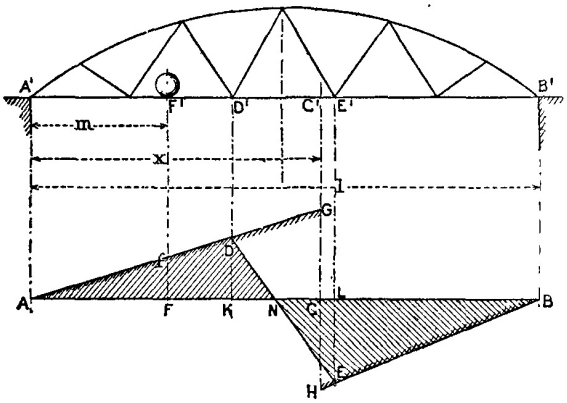


FIG. 54.

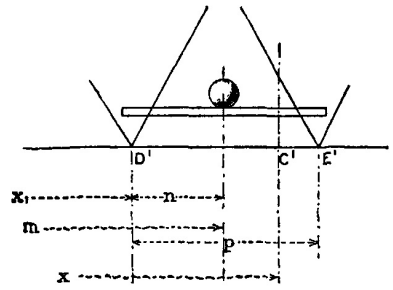


FIG. 55

If the unit load is at F′, the reaction at B′ and the shear at C′ is m/l, positive if the shearing stress resists a tendency of the part of the girder on the right to move upwards; set up Ff = m/l (fig. 54) on the vertical under the load. Repeating the process for other positions, we get the influence line AGHB, for the shear at C due to unit load anywhere on the girder. GC = x/l and CH = $-(l\text{-}x)/l$. The lines AG, HB are parallel. If the load is in the bay D′E′ and is carried by a rail girder which distributes it to cross girders at D′E′, the part of the influence line under this bay is altered. Let n (Fig. 55) be the distance of the load from D′, x_1 the distance of D′ from the left abutment, and p the length of a bay. The loads at D′, E, due to unit weight on the rail girder are $(p\text{-}n)/p$ and n/p. The reaction at B′ is $\{(p\text{-}n)x_1+n(x_1+p)\}/pl$. The shear at C′ is the reaction at B′ less the load at E′, that is, $\{p(x_1+n)\text{-}nl\}/pl$, which is the equation to the line DH (fig. 54). Clearly, the distribution of the load by the rail girder considerably alters the distribution of shear due to a load in the bay in which the section considered lies. The total shear due to a series of loads P_1, P_2, ... at distances m_1, m_2, ... from the left abutment, y_1, y_2, ... being the ordinates of the influence curve under the loads, is $S = P_1y_1+P_2y_2+....$ Generally, the greatest shear S at C will occur when the longer of the segments into which C divides the girder is fully loaded and the other is unloaded, the leading load being at C. If the loads are very unequal or unequally spaced, a trial or two will determine which position gives the greatest value of S. The greatest shear at C′ of the opposite sign to that due to the loading of the longer segment occurs with the shorter segment loaded. For a uniformly distributed load w per ft. run the shear at C is w × the area of the influence curve under the segment covered by the load, attention being paid to the sign of the area of the curve. If the load rests directly on the main girder, the greatest + and - shears at C will be w × AGC and $-w$ × CHB. But if the load is distributed to the bracing intersections by rail and cross girders, then the shear at C′ will be greatest when the load extends to N, and will have the values w × ADN and $-w$ × NEB. An interesting paper by F.C. Lea, dealing with the determination of stress due to concentrated loads, by the method of influence lines will be found in *Proc. Inst. C.E.* clxi. p.261.

Influence lines were described by Fränkel, *Der Civilingenieur*, 1876. See also *Handbuch der Ingenieur-wissenschaften*, vol. ii. ch. x. (1882), and Levy, *La Statique graphique* (1886). There is a useful paper by Prof. G.F. Swain (*Trans. Am. Soc. C.E.* xvii., 1887), and another by L.M. Hoskins (*Proc. Am. Soc. C.E.* xxv., 1899).

28. *Eddy's Method.*—Another method of investigating the maximum shear at a section due to any

distribution of a travelling load has been given by Prof. H.T. Eddy (*Trans. Am. Soc. C.E.* xxii., 1890). Let *hk* (fig. 56) represent in magnitude and position a load W, at *x* from the left abutment, on a girder AB of span *l*. Lay off *kf*, *hg*, horizontal and equal to *l*. Join *f* and *g* to *h* and *k*. Draw verticals at A, B, and join *no*. Obviously *no* is horizontal and equal to *l*. Also *mn*/*mf* = *hk*/*kf* or *mn*-W(*l*-*x*)/*l*, which is the reaction at A due to the load at C, and is the shear at any point of AC. Similarly, *po* is the reaction at B and shear at any point of CB. The shaded rectangles represent the distribution of shear due to the load at C, while *no* may be termed the datum line of shear. Let the load move to D, so that its distance from the left abutment is *x*+*a*. Draw a vertical at D, intersecting *fh*, *kg*, in *s* and *q*. Then *qr*/*ro* = *hk*/*hg* or *ro* = W(*l*-*x*-*a*)/*l*, which is the reaction at A and shear at any point of AD, for the new position of the load. Similarly, *rs* = W(*x*+*a*)/*l* is the shear on DB. The distribution of shear is given by the partially shaded rectangles. For the application of this method to a series of loads Prof. Eddy's paper must be referred to.

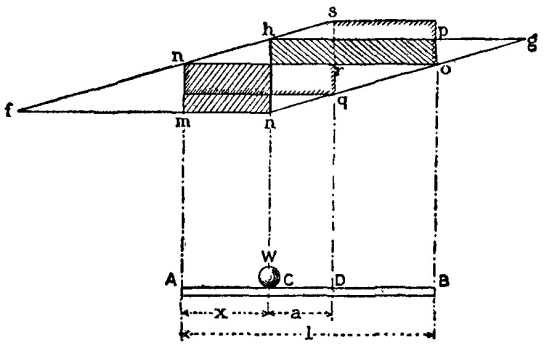


FIG. 56.

29. *Economic Span.*—In the case of a bridge of many spans, there is a length of span which makes the cost of the bridge least. The cost of abutments and bridge flooring is practically independent of the length of span adopted. Let P be the cost of one pier; C the cost of the main girders for one span, erected; *n* the number of spans; *l* the length of one span, and L the length of the bridge between abutments. Then, *n* = L/*l* nearly. Cost of piers (*n*-1)P. Cost of main girders *n*G. The cost of a pier will not vary materially with the span adopted. It depends mainly on the character of the foundations and height at which the bridge is carried. The cost of the main girders for one span will vary nearly as the square of the span for any given type of girder and intensity of live load. That is, G = al^2, where *a* is a constant. Hence the total cost of that part of the bridge which varies with the span adopted is—

$$C = (n-1)P+nal^2$$
$$= LP/l-P+Lal.$$

Differentiating and equating to zero, the cost is least when

$$\frac{dC}{dl} = \frac{-LP}{l^2} + La = 0,$$

$$P = al^2 = G;$$

that is, when the cost of one pier is equal to the cost erected of the main girders of one span. Sir Guilford Molesworth puts this in a convenient but less exact form. Let G be the cost of superstructure of a 100-ft. span erected, and P the cost of one pier with its protection. Then the economic span is $l = 100\sqrt{P}/\sqrt{G}$.

30. *Limiting Span.*—If the weight of the main girders of a bridge, per ft. run in tons, is—

$$w_3 = (w_1+w_2)lr/(K-lr)$$

according to a formula already given, then w_3 becomes infinite if *k*-*lr* = 0, or if

$$l = K/r,$$

[v.04 p.0554] where *l* is the span in feet and *r* is the ratio of span to depth of girder at centre. Taking K for steel girders as 7200 to 9000,

	Limiting Span in Ft.
r = 12	*l* = 600 to 750
r = 10	*l* = 720 to 900
r = 8	*l* = 900 to 1120

The practical limit of span would be less than this. Professor Claxton Fidier (*Treatise on Bridge Construction*, 1887) has made a very careful theoretical analysis of the weights of bridges of different types, and has obtained the following values for the limiting spans. For parallel girders when *r* = 10, the limiting span is 1070 ft. For parabolic or bowstring girders, when *r* = 8, the limiting span is 1280 ft. For flexible suspension bridges with wrought iron link chains, and dip = 1/10th of the span, the limiting span is 2800 ft. For stiffened suspension bridges with wire cables, if the dip is 1/10th of the span the limiting span is 2700 to 3600 ft., and if the dip is 1/8th of the span, 3250 to 4250 ft., according to the factor of safety allowed.

31. *Braced Girders.*—A frame is a rigid structure composed of straight struts and ties. The struts and ties are called bracing bars. The frame as a whole may be subject to a bending moment, but

each member is simply extended or compressed so that the total stress on a given member is the same at all its cross sections, while the intensity of stress is uniform for all the parts of any one cross section. This result must follow in any frame, the members of which are so connected that the joints offer little or no resistance to change in the relative angular position of the members. Thus if the members are pinned together, the joint consisting of a single circular pin, the centre of which lies in the axis of the piece, it is clear that the direction of the only stress which can be transmitted from pin to pin will coincide with this axis. The axis becomes, therefore, a line of resistance, and in reasoning of the stresses on frames we may treat the frame as consisting of simple straight lines from joint to joint. It is found in practice that the stresses on the several members do not differ sensibly whether these members are pinned together with a single pin or more rigidly jointed by several bolts or rivets. Frames are much used as girders, and they also give useful designs for suspension and arched bridges. A frame used to support a weight is often called a *truss*; the stresses on the various members of a truss can be computed for any given load with greater accuracy than the intensity of stress on the various parts of a continuous structure such as a tubular girder, or the rib of an arch. Many assumptions are made in treating of the flexure of a continuous structure which are not strictly true; no assumption is made in determining the stresses on a frame except that the joints are flexible, and that the frame shall be so stiff as not sensibly to alter in form under the load. Frames used as bridge trusses should never be designed so that the elongation or compression of one member can elongate or compress any other member. An example will serve to make the meaning of this limitation clearer. Let a frame consist of the five members AB, BD, DC, CA, CB (fig. 57), jointed at the points A, B, C and D, and all capable of resisting tension and compression. This frame will be *rigid*, i.e. it cannot be distorted without causing an alteration in the length of one or more of the members; but if from a change of temperature or any other cause one or all of the members change their length, this will not produce a stress on any member, but will merely cause a change in the form of the frame. Such a frame as this cannot be *self-strained*. A workman, for instance, cannot produce a stress on one member by making some other member of a wrong length. Any error of this kind will merely affect the form of the frame; if, however, another member be introduced between A and D, then if BC be shortened AD will be strained so as to extend it, and the four other members will be compressed; if CB is lengthened AD will thereby be compressed, and the four other members extended; if the workman does not make CB and AD of exactly the right length they and all the members will be permanently strained. These stresses will be unknown quantities, which the designer cannot take into account, and such a combination should if possible be avoided. A frame of this second type is said to have one *redundant member*.

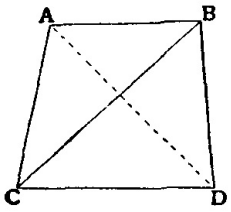


FIG. 57.

32. *Types of Braced Girder Bridges.*—Figs. 58, 59 and 60 show an independent girder, a cantilever, and a cantilever and suspended girder bridge.

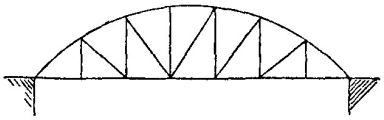


FIG. 58.

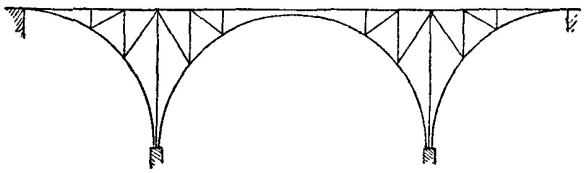


FIG. 59.

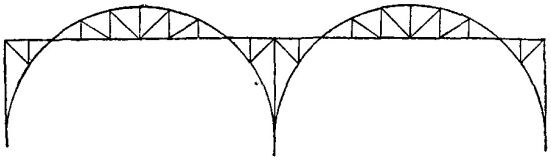


FIG. 60.

In a three-span bridge continuous girders are lighter than discontinuous ones by about 45% for the dead load and 15% for the live load, if no allowance is made for ambiguity due to uncertainty as to the level of the supports. The cantilever and suspended girder types are as economical and free from uncertainty as to the stresses. In long-span bridges the cantilever system permits erection by building out, which is economical and sometimes necessary. It is, however, unstable unless rigidly fixed at the piers. In the Forth bridge stability is obtained partly by the great excess of dead over live load, partly by the great width of the river piers. The majority of bridges not of great span have girders with parallel booms. This involves the fewest difficulties of workmanship and perhaps permits the closest approximation of actual to theoretical dimensions of the parts. In spans over 200 ft. it is economical to have one horizontal boom and one polygonal (approximately parabolic) boom. The hog-backed girder is a compromise between the two types, avoiding some difficulties of construction near the ends of the girder.

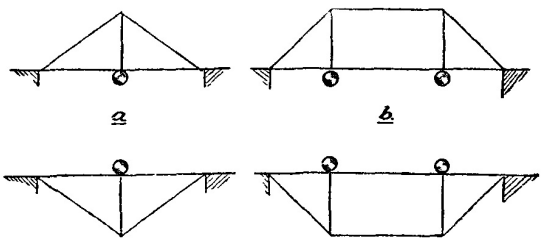


FIG. 61.

Most braced girders may be considered as built up of two simple forms of truss, the king-post truss (fig. 61, *a*), or the queen-post truss (fig. 61, *b*). These may be used in either the upright or the inverted position. A *multiple truss* consists of a number of simple trusses, e.g. Bollman truss. Some timber bridges consist of queen-post trusses in the upright position, as shown diagrammatically in fig. 62, where the circles indicate points at which the flooring girders transmit load to the main girders. *Compound* trusses consist of simple trusses used as primary, secondary and tertiary trusses, the secondary supported on the primary, and the tertiary on the secondary. Thus, the Fink truss consists of king-post trusses; the Pratt truss (fig. 63) and the Whipple truss (fig. 64) of queen-post trusses alternately upright and inverted.

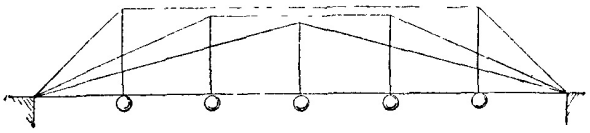


FIG. 62.

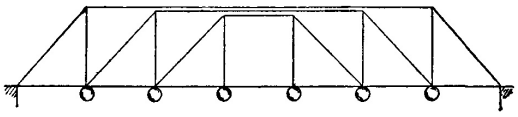


FIG. 63.

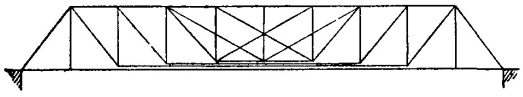


FIG. 64.

A combination bridge is built partly of timber, partly of steel, the compression members being generally of timber and the tension members of steel. On the Pacific coast, where excellent timber is obtainable and steel works are distant, combination bridges are still largely used (Ottewell, *Trans. Am. Soc. C.E.* xxvii. p. 467). The combination bridge at Roseburgh, Oregon, is a [v.04 p.0555] cantilever bridge, The shore arms are 147 ft. span, the river arms 105 ft., and the suspended girder 80 ft., the total distance between anchor piers being 584 ft. The floor beams, floor and railing are of timber. The compression members are of timber, except the struts and bottom chord panels next the river piers, which are of steel. The tension members are of iron and the pins of steel. The chord blocks and post shoes are of cast-iron.

33. *Graphic Method of finding the Stresses in Braced Structures.*—Fig. 65 shows a common form of bridge truss known as a *Warren girder*, with lines indicating external forces applied to the joints; half the load carried between the two lower joints next the piers on either side is directly carried by the abutments. The sum of the two upward vertical reactions must clearly be equal to the sum of the loads. The lines in the diagram represent the directions of a series of forces which must all be in equilibrium; these lines may, for an object to be explained in the next paragraph, be conveniently named by the letters in the spaces which they separate instead of by the method usually employed in geometry. Thus we shall call the first inclined line on the left hand the line AG, the line representing the first force on the top left-hand joint AB, the first horizontal member at the top left hand the line BH, &c; similarly each point requires at least three letters to denote it; the top first left-hand joint may be called ABHG, being the point where these four spaces meet. In this method of lettering, every enclosed space must be designated by a letter; all external forces must be represented by lines *outside* the frame, and each space between any two forces must receive a distinctive letter; this method of lettering was first proposed by O. Henrici and R. H. Bow (*Economics of Construction*), and is convenient in applying the theory of reciprocal figures to the computation of stresses on frames.

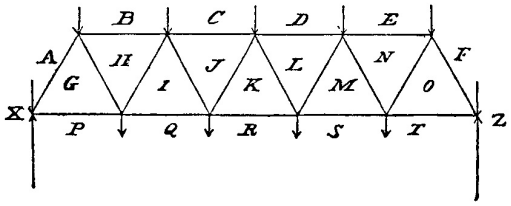


FIG. 65.

34. *Reciprocal Figures.*—J. Clerk Maxwell gave (*Phil. Mag. 1864*) the following definition of reciprocal figures:—"Two plane figures are reciprocal when they consist of an equal number of lines so that corresponding lines in the two figures are parallel, and corresponding lines which converge to a point in one figure form a closed polygon in the other."

Let a frame (without redundant members), and the external forces which keep it in equilibrium, be represented by a diagram constituting one of these two plane figures, then the lines in the other plane figure or the reciprocal will represent in direction and magnitude the forces between the joints of the frame, and, consequently, the stress on each member, as will now be explained.

Reciprocal figures are easily drawn by following definite rules, and afford therefore a simple method of computing the stresses on members of a frame.

The external forces on a frame or bridge in equilibrium under those forces may, by a well-known proposition in statics, be represented by a closed polygon, each side of which is parallel to one force, and represents the force in magnitude as well as in direction. The sides of the polygon may be arranged in any order, provided care is taken so to draw them that in passing round the polygon in one direction this direction may for each side correspond to the direction of the force which it represents.

This polygon of forces may, by a slight extension of the above definition, be called the *reciprocal figure* of the external forces, if the sides are arranged in the same order as that of the joints on which they act, so that if the joints and forces be numbered 1, 2, 3, 4, &c., passing round the outside of the frame in one direction, and returning at last to joint 1, then in the polygon the side representing the force 2 will be next the side representing the force 1, and will be followed by the side representing the force 3, and so forth. This polygon falls under the definition of a reciprocal figure given by Clerk Maxwell, if we consider the frame as a point in equilibrium under the external forces.

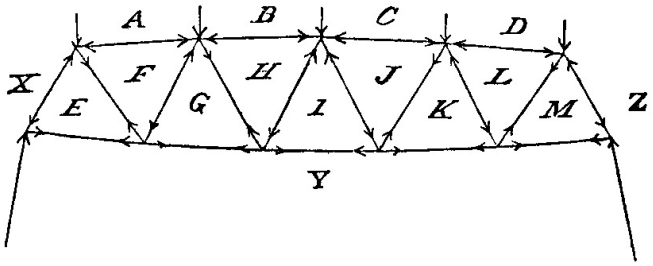


Fig. 66.

Fig. 66 shows a frame supported at the two end joints, and loaded at each top joint. The loads and the supporting forces are indicated by arrows. Fig. 67a shows the reciprocal figure or polygon for the external forces on the assumption that the reactions are slightly inclined. The lines in fig. 67 *a*, lettered in the usual manner, correspond to the forces indicated by arrows in fig. 66, and lettered according to Bow's method. When all the forces are vertical, as will be the case in girders, the polygon of external forces will be reduced to two straight lines, fig. 67 *b*, superimposed and divided so that the length AX represents the load AX, the length AB the load AB, the length YX the reaction YX, and so forth. The line XZ consists of a series of lengths, as XA, AB ... DZ, representing the loads taken in their order. In subsequent diagrams the two reaction lines will, for the sake of clearness, be drawn as if slightly inclined to the vertical.

If there are no redundant members in the frame there will be only two members abutting at the point of support, for these two members will be sufficient to balance the reaction, whatever its direction may be; we can therefore draw two triangles, each having as one side the reaction YX, and having the two other sides parallel to these two members; each of these triangles will represent a polygon of forces in equilibrium at the point of support. Of these two triangles, shown in fig. 67 *c*, select that in which the letters X and Y are so placed that (naming the apex of the triangle E) the lines XE and YE are the lines parallel to the two members of the same name in the frame (fig. 66). Then the triangle YXE is the reciprocal figure of the three lines YX, XE, EY in the frame, and represents the three forces in equilibrium at the point YXE of the frame. The direction of YX, being a thrust upwards, shows the direction in which we must go round the triangle YXE to find the direction of the two other forces; doing this we find that the force XE must act down towards the point YXE, and the force EY away from the same point. Putting arrows on the frame diagram to indicate the direction of the forces, we see that the member EY must pull and therefore act as a tie, and that the member XE must push and act as a strut. Passing to the point XEFA we find two known forces, the load XA acting downwards, and a push from the strut XE, which, being in compression, must push at both ends, as indicated by the arrow, fig. 66. The directions and magnitudes of these two forces are already drawn (fig. 67 *a*) in a fitting position to represent part of the polygon of forces at XEFA; beginning with the upward thrust EX, continuing down XA, and drawing AF parallel to AF in the frame we complete the polygon by drawing EF parallel to EF in the frame. The point F is determined by the intersection of the two lines, one beginning at A, and the other at E. We then have the polygon of forces EXAF, the reciprocal figure of the lines meeting at that point in the frame, and representing the forces at the point EXAF; the direction of the forces on EH and XA being known determines the direction of the forces due to the elastic reaction of the members AF and EF, showing AF to push as a strut, while EF is a tie. We have been guided in the selection of the particular quadrilateral adopted by the rule of arranging the order of the sides so that the same letters indicate corresponding sides in the diagram of the frame and its reciprocal. Continuing the construction of the diagram in the same way, we arrive at fig. 67 *d* as the complete reciprocal figure of the

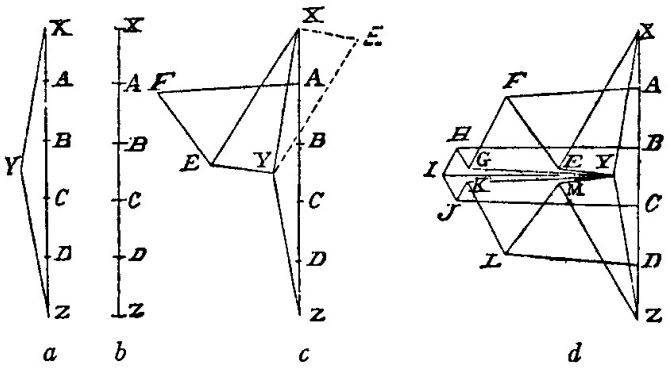


Fig. 67.

frame and forces upon it, and we see that each line in the reciprocal figure measures the stress on the corresponding member in the frame, and that the polygon of forces acting at any point, as
[v.04 p.0556] IJKY, in the frame is represented by a polygon of the same name in the reciprocal figure. The direction of the force in each member is easily ascertained by proceeding in the manner above described. A single known force in a polygon determines the direction of all the others, as these must all correspond with arrows pointing the same way round the polygon. Let the arrows be placed on the frame round each joint, and so as to indicate the direction of each force on that joint; then when two arrows point to one another on the same piece, that piece is a tie; when they point from one another the piece is a strut. It is hardly necessary to say that the forces exerted by the two ends of any one member must be equal and opposite. This method is universally applicable where there are no redundant members. The reciprocal figure for any loaded frame is a complete formula for the stress on every member of a frame of that particular class with loads on given joints.

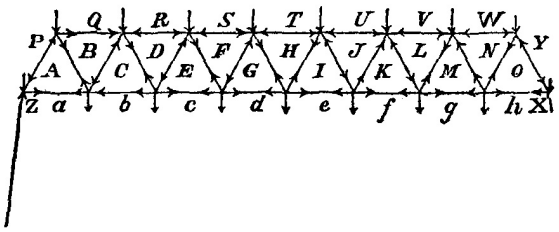


Fig. 68

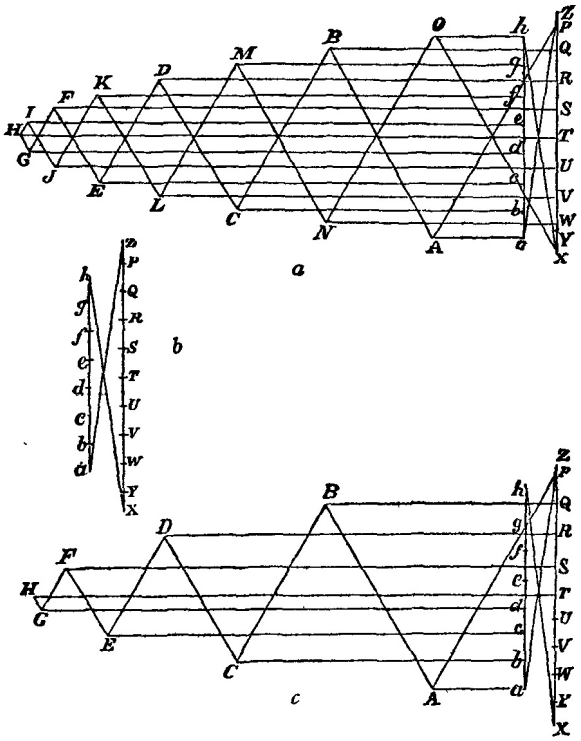


Fig. 69

Consider a Warren girder (fig. 68), loaded at the top and bottom joints. Fig. 69 *b* is the polygon of external forces, and 69 *c* is half the reciprocal figure. The complete reciprocal figure is shown in fig. 69 *a*.

The method of sections already described is often more convenient than the method of reciprocal figures, and the method of influence lines is also often the readiest way of dealing with braced girders.

35. *Chain Loaded uniformly along a Horizontal Line.*—If the lengths of the links be assumed indefinitely short, the chain under given simple distributions of load will take the form of comparatively simple mathematical curves known as catenaries. The true catenary is that assumed by a chain of uniform weight per unit of length, but the form generally adopted for suspension bridges is that assumed by a chain under a weight uniformly distributed relatively to a horizontal line. This curve is a parabola.

Remembering that in this case the centre bending moment $\sum wl$ will be equal to $w\mathrm{L}^2/8$, we see that the horizontal tension H at the vertex for a span L (the points of support being at equal heights) is given by the expression

$$1 \ldots \mathrm{H} = w\mathrm{L}^2/8y,$$

or, calling x the distance from the vertex to the point of support,

$$H = wx^2/2y,$$

The value of H is equal to the maximum tension on the bottom flange, or compression on the top flange, of a girder of equal span, equally and similarly loaded, and having a depth equal to the dip of the suspension bridge.

Consider any other point F of the curve, fig. 70, at a distance x from the vertex, the horizontal component of the resultant (tangent to the curve) will be unaltered; the vertical component V will be simply the sum of the loads between O and F, or wx. In the triangle FDC, let FD be tangent to the curve, FC vertical, and DC horizontal; these three sides will necessarily be proportional respectively to the resultant tension along the chain at F, the vertical force V passing through the point D, and the horizontal tension at O; hence

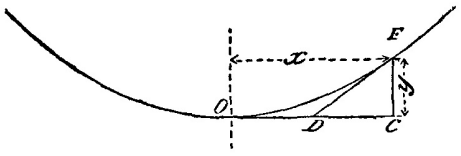


FIG. 70.

$$H : V = DC : FC = wx^2/2y : wx = x/2 : y,$$

hence DC is the half of OC, proving the curve to be a parabola.

The value of R, the tension at any point at a distance x from the vertex, is obtained from the equation

$$R^2 = H^2+V^2 = w^2x^4/4y^2+w^2x^2,$$

or,

$$2 \ldots R = wx\sqrt{(1+x^2/4y^2)}.$$

Let i be the angle between the tangent at any point having the co-ordinates x and y measured from the vertex, then

$$3 \ldots \tan i = 2y/x.$$

Let the length of half the parabolic chain be called s, then

$$4 \ldots s = x+2y^2/3x.$$

The following is the approximate expression for the relation between a change Δs in the length of the half chain and the corresponding change Δy in the dip:—

$$s+\Delta s = x+(2/3x)\{y^2+2y\Delta y+(\Delta y)^2\} = x+2y^2/3x+4y\Delta y/3x+2\Delta y^2/3x,$$

or, neglecting the last term,

$$5 \ldots \Delta s = 4y\Delta y/3x,$$

and

$$6 \ldots \Delta y = 3x\Delta s/4y.$$

From these equations the deflection produced by any given stress on the chains or by a change of temperature can be calculated.

36. *Deflection of Girders.*— Let fig. 71 represent a beam bent by external loads. Let the origin O be taken at the lowest point of the bent beam. Then the deviation y = DE of the neutral axis of the bent beam at any point D from the axis OX is given by the relation

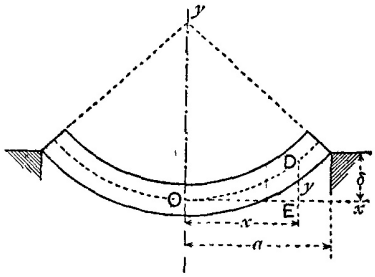


FIG. 71.

$$\frac{d^2y}{dx^2} = \frac{M}{EI}$$

where M is the bending moment and I the amount of inertia of the beam at D, and E is the coefficient of elasticity. It is usually accurate enough in deflection calculations to take for I the moment of inertia at the centre of the beam and to consider it constant for the length of the beam. Then

$$\frac{dy}{dx} = \frac{1}{EI}\int M\,dx$$

$$y = \frac{1}{EI}\int\int M\,dx^2.$$

The integration can be performed when M is expressed in terms of x. Thus for a beam supported

at the ends and loaded with w per inch length $M = w(a^2-x^2)$, where a is the half span. Then the deflection at the centre is the value of y for $x = a$, and is

$$\delta = \frac{5}{24}\frac{wa^4}{EI}.$$

The radius of curvature of the beam at D is given by the relation

$$R = EI/M.$$

37. *Graphic Method of finding Deflection.*—Divide the span L into any convenient number n of equal parts of length l, so that $nl = L$; compute the radii of curvature R_1, R_2, R_3 for the several sections. Let measurements along the beam be represented according to any convenient scale, so that calling L_1 and l_1 the lengths to be drawn on paper, we have $L = aL_1$; now let r_1, r_2, r_3 be a series of radii such that $r_1 = R_1/ab$, $r_2 = R_2/ab$, &c., where b is any convenient constant chosen of such magnitude as will allow arcs with the radii, r_1, r_2, &c., to be drawn with the means at the draughtsman's disposal. Draw a curve as shown in fig. 72 with arcs of the length l_1, l_2, l_3, &c., and with the radii r_1, r_2, &c. (note, for a length $\frac{1}{2}l_1$ at each end the radius will be infinite, and the curve must end with a straight line tangent to the last arc), then let v be the measured deflection of this curve from the straight line, and V the actual deflection of the bridge; we have $V = av/b$, approximately. This method distorts the curve, so that vertical ordinates of the curve are drawn to a scale b times greater than that of the horizontal ordinates. Thus if the horizontal scale be one-tenth of an inch to the foot, $a = 120$, and a beam 100 ft. in length would be drawn equal to 10 in.; then if the true radius at the centre were 10,000 ft., this radius, if the curve were undistorted, would be on paper 1000 in., but making $b = 50$ we can draw the curve with a radius of 20 in. The vertical distortion of the curve must not be so great that there is a very sensible difference between the length of the arc and its chord. This can be regulated by altering the value of b. In fig. 72 distortion is carried too far; this figure is merely used as an illustration.

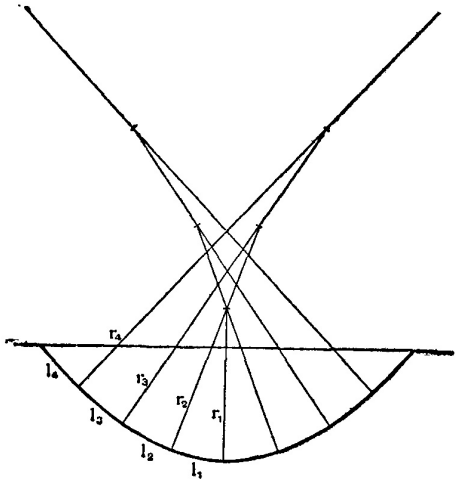


FIG. 72.

[v.04 p.0557]

38. *Camber.*—In order that a girder may become straight under its working load it should be constructed with a camber or upward convexity equal to the calculated deflection. Owing to the yielding of joints when a beam is first loaded a smaller modulus of elasticity should be taken than for a solid bar. For riveted girders E is about 17,500,000 lb per sq. in. for first loading. W.J.M. Rankine gives the approximate rule

$$\text{Working deflection} = \delta = l^2/10{,}000h,$$

where l is the span and h the depth of the beam, the stresses being those usual in bridgework, due to the total dead and live load.

(W. C. U.)

[1] For the ancient bridges in Rome see further ROME: *Archaeology*, and such works as R. Lanciani, *Ruins and Excavations of Ancient Rome* (Eng. trans., 1897), pp. 16 foll.

BRIDGET, SAINT, more properly BRIGID (c. 452-523), one of the patron saints of Ireland, was born at Faughart in county Louth, her father being a prince of Ulster. Refusing to marry, she chose a life of seclusion, making her cell, the first in Ireland, under a large oak tree, whence the place was called Kil-dara, "the church of the oak." The city of Kildare is supposed to derive its name from St Brigid's cell. The year of her death is generally placed in 523. She was buried at Kildare, but her remains were afterwards translated to Downpatrick, where they were laid beside the bodies of St Patrick and St Columba. Her feast is celebrated on the 1st of February. A large collection of miraculous stories clustered round her name, and her reputation was not confined to Ireland, for, under the name of St Bride, she became a favourite saint in England, and numerous churches were dedicated to her in Scotland.

See the five lives given in the Bollandist *Acta Sanctorum*, Feb. 1, i. 99, 119, 950. Cf. Whitley-Stokes, *Three Middle-Irish Homilies on the Lives of Saint Patrick, Brigit and Columba* (Calcutta, 1874); Colgan, *Acta SS. Hiberniae*; D. O'Hanlon, *Lives of Irish Saints*, vol. ii.; Knowles, *Life of St Brigid* (1907); further bibliography in Ulysse Chevalier, *Répertoire des sources hist. Bio.-Bibl.* (2nd ed., Paris, 1905), s.v.

BRIDGET, BRIGITTA, BIRGITTA, **OF SWEDEN, SAINT** (c. 1302-1373), the most celebrated saint of the northern kingdoms, was the daughter of Birger Persson, governor and *lagman* (provincial judge) of Uppland, and one of the richest landowners of the country. In 1316 she was married to Ulf Gudmarson, lord of Nericia, to whom she bore eight children, one of whom was afterwards honoured as St Catherine of Sweden. Bridget's saintly and charitable life soon made her known

far and wide; she gained, too, great religious influence over her husband, with whom (1341-1343) she went on pilgrimage to St James of Compostella. In 1344, shortly after their return, Ulf died in the Cistercian monastery of Alvastra in East Gothland, and Bridget now devoted herself wholly to religion. As a child she had already believed herself to have visions; these now became more frequent, and her records of these "revelations," which were translated into Latin by Matthias, canon of Linköping, and by her confessor, Peter, prior of Alvastra, obtained a great vogue during the middle ages. It was about this time that she founded the order of St Saviour, or Bridgittines (*q.v.*), of which the principal house, at Vadstena, was richly endowed by King Magnus II. and his queen. About 1350 she went to Rome, partly to obtain from the pope the authorization of the new order, partly in pursuance of her self-imposed mission to elevate the moral tone of the age. It was not till 1370 that Pope Urban V. confirmed the rule of her order; but meanwhile Bridget had made herself universally beloved in Rome by her kindness and good works. Save for occasional pilgrimages, including one to Jerusalem in 1373, she remained in Rome till her death on the 23rd of July 1373. She was canonized in 1391 by Pope Boniface IX., and her feast is celebrated on the 9th of October.

BIBLIOGRAPHY.—Cf. the Bollandist *Acta Sanctorum*, Oct. 8, iv. 368-560; the *Vita Sanctae Brigittae*, edited by C. Annerstedt in *Scriptores rerum Suedicarum medii aevi*, iii. 185-244 (Upsala, 1871). The best modern work on the subject is by the comtesse Catherine de Flavigny, entitled *Sainte Brigitte de Suède, sa vie, ses révélations et son œuvre* (Paris, 1892), which contains an exhaustive bibliography. The Revelations are contained in the critical edition of St Bridget's works published by the Swedish Historical Society and edited by G.E. Klemming (Stockholm, 1857-1884, II vols.). For full bibliography (to 1904) see Ulysse Chevalier, *Répertoire des sources hist. Bio.-Bibl.*, *s.v.* "Brigitte."

BRIDGETON, a city, port of entry, and the county-seat of Cumberland county, New Jersey, U.S.A., in the south part of the state, on Cohansey creek, 38 m. S. of Philadelphia. Pop. (1890) 11,424; (1900) 13,913, of whom 653 were foreign-born and 701 were negroes; (1905) 13,624; (1910) 14,209. It is served by the West Jersey & Sea Shore and the Central of New Jersey railways, by electric railways connecting with adjacent towns, and by Delaware river steamboats on Cohansey creek, which is navigable to this point. It is an attractive residential city, has a park of 650 acres and a fine public library, and is the seat of West Jersey academy and of Ivy Hall, a school for girls. It is an important market town and distributing centre for a rich agricultural region; among its manufactures are glass (the product, chiefly glass bottles, being valued in 1905 at $1,252,795—42.3% of the value of all the city's factory products—and Bridgeton ranking eighth among the cities of the United States in this industry), machinery, clothing, and canned fruits and vegetables; it also has dyeing and finishing works. Though Bridgeton is a port of entry, its foreign commerce is relatively unimportant. The first settlement in what is now Bridgeton was made toward the close of the 18th century. A pioneer iron-works was established here in 1814. The city of Bridgeton, formed by the union of the township of Bridgeton and the township of Cohansey (incorporated in 1845 and 1848 respectively), was chartered in 1864.

BRIDGETT, THOMAS EDWARD (1829-1899), Roman Catholic priest and historical writer, was born at Derby on the 20th of January 1829. He was brought up a Baptist, but in his sixteenth year joined the Church of England. In 1847 he entered St John's College, Cambridge, with the intention of taking orders. Being unable to subscribe to the Thirty-Nine Articles he could not take his degree, and in 1850 became a Roman Catholic, soon afterwards joining the Congregation of the Redemptorists. He went through his novitiate at St Trond in Belgium, and after a course of five years of theological study at Wittem, in Holland, was ordained priest. He returned to England in 1856, and for over forty years led an active life as a missioner in England and Ireland, preaching in over 80 missions and 140 retreats to the clergy and to nuns. His stay in Limerick was particularly successful, and he founded a religious confraternity of laymen which numbered 5000 members. Despite his arduous life as a priest, Bridgett found time to produce literary works of value, chiefly dealing with the history of the Reformation in England; among these are *The Life of Blessed John Fisher, Bishop of Rochester* (1888); *The Life and Writings of Sir Thomas More* (1890); *History of the Eucharist in Great Britain* (2 vols., 1881); *Our Lady's Dowry* (1875, 3rd ed. 1890). He died at Clapham on the 17th of February 1899.

[v.04 p.0558]

For a complete list of Bridgett's works see *The Life of Father Bridgett*, by C. Ryder (London, 1906).

BRIDGEWATER, FRANCIS EGERTON, 3RD DUKE OF (1736-1803), the originator of British inland navigation, younger son of the 1st duke, was born on the 21st of May 1736. Scroop, 1st duke of Bridgewater (1681-1745), was the son of the 3rd earl of Bridgewater, and was created a duke in 1720; he was the great-grandson of John Egerton, 1st earl of Bridgewater (d. 1649; cr. 1617), whose name is associated with the production of Milton's *Comus*; and the latter was the son of Sir Thomas Egerton (1540-1617), Queen Elizabeth's lord keeper and James I.'s lord chancellor, who was created baron of Ellesmere in 1603, and in 1616 Viscount Brackley (*q.v.*).

Francis Egerton succeeded to the dukedom at the age of twelve on the death of his brother, the 2nd duke. As a child he was sickly and of such unpromising intellectual capacity that at one time the idea of cutting the entail was seriously entertained. Shortly after attaining his majority he became engaged to the beautiful duchess of Hamilton, but her refusal to give up the acquaintance of her sister, Lady Coventry, led to the breaking off of the match. Thereupon the duke broke up his London establishment, and retiring to his estate at Worsley, devoted himself to the making of canals. The navigable canal from Worsley to Manchester which he projected for the transport of the coal obtained on his estates was (with the exception of the Sankey canal) the

first great undertaking of the kind executed in Great Britain in modern times. The construction of this remarkable work, with its famous aqueduct across the Irwell, was carried out by James Brindley, the celebrated engineer. The completion of this canal led the duke to undertake a still more ambitious work. In 1762 he obtained parliamentary powers to provide an improved waterway between Liverpool and Manchester by means of a canal. The difficulties encountered in the execution of the latter work were still more formidable than those of the Worsley canal, involving, as they did, the carrying of the canal over Sale Moor Moss. But the genius of Brindley, his engineer, proved superior to all obstacles, and though at one period of the undertaking the financial resources of the duke were almost exhausted, the work was carried to a triumphant conclusion. The untiring perseverance displayed by the duke in surmounting the various difficulties that retarded the accomplishment of his projects, together with the pecuniary restrictions he imposed on himself in order to supply the necessary capital (at one time he reduced his personal expenses to £400 a year), affords an instructive example of that energy and self-denial on which the success of great undertakings so much depends. Both these canals were completed when the duke was only thirty-six years of age, and the remainder of his life was spent in extending them and in improving his estates; and during the latter years of his life he derived a princely income from the success of his enterprise. Though a steady supporter of Pitt's administration, he never took any prominent part in politics.

He died unmarried on the 8th of March 1803, when the ducal title became extinct, but the earldom of Bridgewater passed to a cousin, John William Egerton, who became 7th earl. By his will he devised his canals and estates on trust, under which his nephew, the marquess of Stafford (afterwards first duke of Sutherland), became the first beneficiary, and next his son Francis Leveson Gower (afterwards first earl of Ellesmere) and his issue. In order that the trust should last as long as possible, an extraordinary use was made of the legal rule that property may be settled for the duration of lives in being and twenty-one years after, by choosing a great number of persons connected with the duke and their living issue and adding to them the peers who had taken their seats in the House of Lords on or before the duke's decease. Though the last of the peers died in 1857, one of the commoners survived till the 19th of October 1883, and consequently the trust did not expire till the 19th of October 1903, when the whole property passed under the undivided control of the earl of Ellesmere. The canals, however, had in 1872 been transferred to the Bridgewater Navigation Company, by whom they were sold in 1887 to the Manchester Ship Canal Company.

BRIDGEWATER, FRANCIS HENRY EGERTON, 8TH EARL OF (1756-1829), was educated at Eton and Christ Church, Oxford, and became fellow of All Souls in 1780, and F.R.S. in 1781. He held the rectories of Middle and Whitchurch in Shropshire, but the duties were performed by a proxy. He succeeded his brother (see above) in the earldom in 1823, and spent the latter part of his life in Paris. He was a fair scholar, and a zealous naturalist and antiquarian. When he died in February 1829 the earldom became extinct. He bequeathed to the British Museum the valuable Egerton MSS. dealing with the literature of France and Italy, and also £12,000. He also left £8000 at the disposal of the president of the Royal Society, to be paid to the author or authors who might be selected to write and publish 1000 copies of a treatise "On the Power, Wisdom and Goodness of God, as manifested in the Creation." Mr Davies Gilbert, who then filled the office, selected eight persons, each to undertake a branch of this subject, and each to receive £1000 as his reward, together with any benefit that might accrue from the sale of his work, according to the will of the testator.

The Bridgewater treatises were published as follows:—1. *The Adaptation of External Nature to the Moral and Intellectual Condition of Man*, by Thomas Chalmers, D.D. 2. *The Adaptation of External Nature to the Physical Condition of Man*, by John Kidd, M.D. 3. *Astronomy and General Physics considered with reference to Natural Theology*, by William Whewell, D.D. 4. *The Hand, its Mechanism and Vital Endowments as evincing Design*, by Sir Charles Bell. 5. *Animal and Vegetable Physiology considered with reference to Natural Theology*, by Peter Mark Roget. 6. *Geology and Mineralogy considered with reference to Natural Theology*, by William Buckland, D.D. 7. *The Habits and Instincts of Animals with reference to Natural Theology*, by William Kirby. 8. *Chemistry, Meteorology, and the Function of Digestion, considered with reference to Natural Theology*, by William Prout, M.D. The works are of unequal merit; several of them took a high rank in apologetic literature. They first appeared during the years 1833 to 1840, and afterwards in Bohn's Scientific Library.

BRIDGITTINES, an order of Augustinian canonesses founded by St Bridget of Sweden (*q.v.*) *c.* 1350, and approved by Urban V. in 1370. It was a "double order," each convent having attached to it a small community of canons to act as chaplains, but under the government of the abbess. The order spread widely in Sweden and Norway, and played a remarkable part in promoting culture and literature in Scandinavia; to this is to be attributed the fact that the head house at Vastein, by Lake Vetter, was not suppressed till 1595. There were houses also in other lands, so that the total number amounted to 80. In England, the famous Bridgittine convent of Syon at Isleworth, Middlesex, was founded and royally endowed by Henry V. in 1415, and became one of the richest and most fashionable and influential nunneries in the country. It was among the few religious houses restored in Mary's reign, when nearly twenty of the old community were re-established at Syon. On Elizabeth's accession they migrated to the Low Countries, and thence, after many vicissitudes, to Rouen, and finally in 1594 to Lisbon. Here they remained, always recruiting their numbers from England, till 1861, when they returned to England. Syon House is now established at Chudleigh in Devon, the only English community that can boast an unbroken conventual existence since pre-Reformation times. Some six other Bridgittine convents exist on

the Continent, but the order is now composed only of women.

See Helyot, *Histoire des ordres religieux* (1715), iv. c. 4; Max Heimbucher, *Orden u. Kongregationen* (1907), ii. § 83; Herzog-Hauck, *Realencyklopädie* (ed. 3), art. "Birgitta"; A. Hamilton in *Dublin Review*, 1888, "The Nuns of Syon."

(E. C. B.)

[v.04 p.0559] **BRIDGMAN, FREDERICK ARTHUR** (1847-), American artist, was born at Tuskegee, Alabama, on the 10th of November 1847. He began as a draughtsman in New York for the American Bank Note Company in 1864-1865, and studied art in the same years at the Brooklyn Art School and at the National Academy of Design; but he went to Paris in 1866 and became a pupil of J.L. Gérôme. Paris then became his headquarters. A trip to Egypt in 1873-1874 resulted in pictures of the East that attracted immediate attention, and his large and important composition, "The Funeral Procession of a Mummy on the Nile," in the Paris Salon (1877), bought by James Gordon Bennett, brought him the cross of the Legion of Honour. Other paintings by him were "An American Circus in Normandy," "Procession of the Bull Apis" (now in the Corcoran Art Gallery, Washington), and a "Rumanian Lady" (in the Temple collection, Philadelphia).

BRIDGMAN, LAURA DEWEY (1829-1889), American blind deaf-mute, was born on the 21st of December 1829 at Hanover, New Hampshire, U.S.A., being the third daughter of Daniel Bridgman (d. 1868), a substantial Baptist farmer, and his wife Harmony, daughter of Cushman Downer, and grand-daughter of Joseph Downer, one of the five first settlers (1761) of Thetford, Vermont. Laura was a delicate infant, puny and rickety, and was subject to fits up to twenty months old, but otherwise seemed to have normal senses; at two years, however, she had a very bad attack of scarlet fever, which destroyed sight and hearing, blunted the sense of smell, and left her system a wreck. Though she gradually recovered health she remained a blind deaf-mute, but was kindly treated and was in particular made a sort of playmate by an eccentric bachelor friend of the Bridgmans, Mr Asa Tenney, who as soon as she could walk used to take her for rambles a-field. In 1837 Mr James Barrett, of Dartmouth College, saw her and mentioned her case to Dr Mussey, the head of the medical department, who wrote an account which attracted the attention of Dr S.G. Howe (*q.v.*), the head of the Perkins Institution for the Blind at Boston. He determined to try to get the child into the Institution and to attempt to educate her; her parents assented, and in October 1837 Laura entered the school. Though the loss of her eye-balls occasioned some deformity, she was otherwise a comely child and of a sensitive and affectionate nature; she had become familiar with the world about her, and was imitative in so far as she could follow the actions of others; but she was limited in her communication with others to the narrower uses of touch—patting her head meant approval, rubbing her hand disapproval, pushing one way meant to go, drawing another to come. Her mother, preoccupied with house-work, had already ceased to be able to control her, and her father's authority was due to fear of superior force, not to reason. Dr Howe at once set himself to teach her the alphabet by touch. It is impossible, for reasons of space, to describe his efforts in detail. He taught words before the individual letters, and his first experiment consisting in pasting upon several common articles such as keys, spoons, knives, &c., little paper labels with the names of the articles printed in raised letters, which he got her to feel and differentiate; then he gave her the same labels by themselves, which she learnt to associate with the articles they referred to, until, with the spoon or knife alone before her she could find the right label for each from a mixed heap. The next stage was to give her the component letters and teach her to combine them in the words she knew, and gradually in this way she learnt all the alphabet and the ten digits, &c. The whole process depended, of course, on her having a human intelligence, which only required stimulation, and her own interest in learning became keener as she progressed. On the 24th of July 1839 she first wrote her own name legibly. Dr Howe devoted himself with the utmost patience and assiduity to her education and was rewarded by increasing success. On the 20th of June 1840 she had her first arithmetic lesson, by the aid of a metallic case perforated with square holes, square types being used; and in nineteen days she could add a column of figures amounting to thirty. She was in good health and happy, and was treated by Dr Howe as his daughter. Her case already began to interest the public, and others were brought to Dr Howe for treatment. In 1841 Laura began to keep a journal, in which she recorded her own day's work and thoughts. In January 1842 Charles Dickens visited the Institution, and afterwards wrote enthusiastically in *American Notes* of Dr Howe's success with Laura. In 1843 funds were obtained for devoting a special teacher to her, and first Miss Swift, then Miss Wight, and then Miss Paddock, were appointed; Laura by this time was learning geography and elementary astronomy. By degrees she was given religious instruction, but Dr Howe was intent upon not inculcating dogma before she had grasped the essential moral truths of Christianity and the story of the Bible. She grew up a gay, cheerful girl, loving, optimistic, but with a nervous system inclining to irritability, and requiring careful education in self-control. In 1860 her eldest sister Mary's death helped to bring on a religious crisis, and through the influence of some of her family she was received into the Baptist church; she became for some years after this more self-conscious and rather pietistic. In 1867 she began writing compositions which she called poems; the best-known is called "Holy Home." In 1872, Dr Howe having been enabled to build some separate cottages (each under a matron) for the blind girls, Laura was moved from the larger house of the Institution into one of them, and there she continued her quiet life. The death of Dr Howe in 1876 was a great grief to her; but before he died he had made arrangements by which she would be financially provided for in her home at the Institution for the rest of her life. In 1887 her jubilee was celebrated there, but in 1889 she was taken ill, and she died on the 24th of May. She was buried at Hanover. Her name has become familiar everywhere as an example of

the education of a blind deaf-mute, leading to even greater results in Helen Keller.

See *Laura Bridgman*, by Maud Howe and Florence Howe Hall (1903), which contains a bibliography; and *Life and Education of Laura Dewey Bridgman* (1878), by Mary S. Lamson.

(H. Ch.)

BRIDGNORTH, a market town and municipal borough in the Ludlow parliamentary division of Shropshire, England, 150 m. N.W. by W. from London by the Great Western railway, on the Worcester-Shrewsbury line. Pop. (1901) 6052. The river Severn separates the upper town on the right bank from the lower on the left. A steep line of rail connects them. The upper town is built on the acclivities and summit of a rock which rises abruptly from the river to the height of 180 ft., and gives the town a very picturesque appearance. The railway passes under by a long tunnel. On the summit is the tower of the old castle, leaning about 17° from the perpendicular. There are also two parish churches. That of St Leonard, formerly collegiate, was practically rebuilt in 1862. This parish was held by Richard Baxter, the famous divine, in 1640. St Mary's church is in classic style of the late 18th century. The picturesque half-timbered style of domestic building is frequently seen in the streets. In this style are the town hall (1652), and a house dated 1580, in which was born in 1729 Thomas Percy, bishop of Dromore, the editor of the *Reliques of Ancient English Poetry*. The grammar school, founded in 1503, occupies an Elizabethan building; there are also a college of divinity, a blue-coat school, and a literary institute with library and school of art. There are large charities. Near the town is a curious ancient hermitage cave, in the sandstone. At Quatford, 1 m. south-east, the site of a castle dating from 1085 may be traced. This dominated the ancient Forest of Morf. Here Robert de Belesme originally founded the college which was afterwards moved to Bridgnorth. Bridgnorth manufactures carpets; brewing is carried on, and there is trade in agricultural produce. The town is governed by a mayor, 4 aldermen and 12 councillors. Area, 3018 acres.

The early history of Bridgnorth is connected with Æthelfleda, lady of the Mercians, who raised a mound there in 912 as part of her offensive policy against the Danes of the five boroughs. After the Conquest William I. granted the manor of Bridgnorth to Earl Roger of Shrewsbury, whose son Robert de Belesme transferred his castle and borough from Quatford to Bridgnorth, but on Robert's attainder in 1102 the town became a royal borough. It is probable that Henry I. granted the burgesses certain privileges, for Henry II. confirmed to them all the franchises and customs which they had in the time of Henry I. King John in 1215 granted them freedom from toll throughout England except the city of London, and in 1227 Henry III. conferred several new rights and liberties, among which were a gild merchant with a hanse. These early charters were confirmed by several succeeding kings, Henry VI. granting in addition assize of bread and ale and other privileges. Bridgnorth was incorporated by James I. in 1546. The burgesses returned two members to parliament in 1295, and continued to do so until 1867, when they were assigned only one member. The town was disfranchised in 1885. A yearly fair on the feast of the Translation of St Leonard and three following days was granted to the burgesses in 1359, and in 1630 Charles I. granted them licence to hold another fair on the Thursday before the first week in Lent and two following days.

[v.04 p.0560]

BRIDGWATER, a market town, port and municipal borough in the Bridgwater parliamentary division of Somerset, England, on the river Parret, 10 m. from its mouth, and 151¾ m. by the Great Western railway W. by S. of London. Pop. (1901) 15,209. It is pleasantly situated in a level and well-wooded country, having on the east the Mendip range and on the west the Quantock hills. The town lies along both sides of the river, here crossed by a handsome iron bridge. Among several places of worship the chief is St Mary Magdalene's church; this has a north porch and windows dating from the 14th century, besides a lofty and slender spire; but it has been much altered by restoration. It possesses a fine painted reredos. A house in Blake Street, largely restored, was the birthplace of Admiral Blake in 1598. Near the town are the three fine old churches of Weston Zoyland, Chedzoy and Middlezoy, containing some good brasses and carved woodwork. The battlefield of Sedgemoor, where the Monmouth rebellion was finally crushed in 1685, is within 3 m.; while not far off is Charlinch, the home of the Agapemonites (*q.v.*). Bridgwater has a considerable coasting trade, importing grain, coal, wine, hemp, tallow and timber, and exporting Bath brick, farm produce, earthenware, cement and plaster of Paris. The river is navigable by vessels of 700 tons, though liable, when spring-tides are flowing, to a bore which rises, in rough weather, to a height of 9 ft. Bath brick, manufactured only here, and made of the mingled sand and clay deposited by every tide, is the staple article of commerce; iron-founding is also carried on. The town is governed by a mayor, 6 aldermen and 18 councillors. Area, 926 acres.

A settlement probably grew up in Saxon times at Bridgwater (*Briges*, *Briggewalteri*, *Brigewauter*), owing its origin as a trade centre to its position at the mouth of the chief river in Somerset. It became a mesne borough by the charter granted by John in 1201, which provided that the town should be a free borough, the burgesses to be free and quit of all tolls, and made William de Briwere overlord. Other charters were granted by Henry III. in 1227 (confirmed in 1318, 1370, 1380), which gave Bridgwater a gild merchant. It was incorporated by charter of Edward IV. (1468), confirmed in 1554, 1586, 1629 and 1684. Parliamentary representation began in 1295 and continued until the Reform Act of 1870. A Saturday market and a fair on the 24th of June were granted by the charter of 1201. Another fair at the beginning of Lent was added in 1468, and a second market on Thursday, and fairs at Midsummer and on the 21st of September were added in 1554. Charles II. granted another fair on the 29th of December. The medieval importance of these markets and fairs for the sale of wool and wine and later of cloth has gone.

The shipping trade of the port revived after the construction of the new dock in 1841, and corn and timber have been imported for centuries.

See S. G. Jarman, "History of Bridgwater," *Historical MSS. Commission*, Report 9, Appendix; *Victoria County History: Somerset*, vol. ii.

BRIDLINGTON, a market town, municipal borough and seaside resort in the Buckrose parliamentary division of the East Riding of Yorkshire, England, 31 m. N.N.E. from Hull by a branch of the North Eastern railway. Pop. (1891) 8919; (1901) 12,482. It is divided into two parts, the ancient market town lying about 1 m. from the coast, while the modern houses of Bridlington Quay, the watering-place, fringe the shore of Bridlington Bay. Southward the coast becomes low, but northward it is steep and very fine, where the great spur of Flamborough Head (*q.v.*) projects eastward. In the old town of Bridlington the church of St Mary and St Nicholas consists of the fine Decorated and Perpendicular nave, with Early English portions, of the priory church of an Augustinian foundation of the time of Henry I. There remains also the Perpendicular gateway, serving as the town-hall. The founder of the priory was Walter de Gaunt, about 1114, and the institution flourished until 1537, when the last prior was executed for taking part in the Pilgrimage of Grace. A Congregational society was founded in 1662, and its old church, dating from 1702, stood until 1906. At Bridlington Quay there is excellent sea-bathing, and the parade and ornamental gardens provide pleasant promenades. Extensive works have been carried out along the sea front. There is a chalybeate spring. The harbour is enclosed by two stone piers, and there is good anchorage in the bay. The municipal borough is under a mayor, 6 aldermen and 18 councillors, and has an area of 2751 acres.

The mention of four burgesses at Bridlington (Brellington, Burlington) in the Domesday survey shows it to have been a borough before the Conquest. With the rest of the north of England, Bridlington suffered from the ravages of the Normans, and decreased in value from £32 in the reign of Edward the Confessor, when it formed part of the possessions of Earl Morcar, to 8s. at the time of the Domesday survey. By that time it was in the hands of the king by the forfeiture of Earl Morcar. It was granted by William II. to Gilbert de Gaunt, whose son and heir Walter founded the priory and endowed it with the manor of Bridlington and other lands. From this date the importance of the town steadily increased. Henry I. and several succeeding kings confirmed Walter de Gaunt's gift, Stephen granting in addition the right to have a port. In 1546 Henry IV. granted the prior and convent exemption from fifteenths, tenths and subsidies, in return for prayer for himself and his queen in every mass sung at the high altar. After the Dissolution the manor remained with the crown until 1624, when Charles I. granted it to Sir John Ramsey, whose brother and heir, Sir George Ramsey, sold it in 1633 to thirteen inhabitants of the town on behalf of all the tenants of the manor. The thirteen lords were assisted by twelve other inhabitants chosen by the freeholders, and when the number of lords was reduced to six, seven others were chosen from the assistants. A chief lord was chosen every year. This system still holds good. It is evident from the fact of thirteen inhabitants being allowed to hold the manor that the town had some kind of incorporation in the 17th century, although its incorporation charter was not granted until 1899, when it was created a municipal borough. In 1200 King John granted the prior of Bridlington a weekly market on Saturday and an annual fair on the vigil, feast and morrow of the Assumption of the Virgin Mary. Henry VI. in 1446 granted the prior three new fairs yearly on the vigil, day and morrow of the Nativity of the Virgin Mary, the Deposition of St John, late prior of Bridlington, and the Translation of the same St John. All fairs and markets were sold with the manor to the inhabitants of the town.

See J. Thompson, *Historical Sketches of Bridlington* (1821); *Victoria County History: Yorkshire*.

BRIDPORT, ALEXANDER HOOD, Viscount (1727-1814), British admiral, was the younger brother of Samuel, Lord Hood, and cousin of Sir Samuel and Captain Alexander Hood. Entering the navy in January 1741, he was appointed lieutenant of the "Bridgewater" six years later, and in that rank served for ten years in various ships. He was then posted to the "Prince," the flag-ship of Rear-Admiral Saunders (under whom Hood had served as a lieutenant) and in this command served in the Mediterranean for some time. Returning home, he was appointed to the "Minerva" frigate, in which he was present at Hawke's great victory in Quiberon Bay (20th November 1759). In 1761 the "Minerva" recaptured, after a long struggle, the "Warwick" of equal force, and later in the same year Captain Alexander Hood went in the "Africa" to the Mediterranean, where he served until the conclusion of peace. From this time forward he was in continuous employment afloat and ashore, and in the "Robust" was present at the battle of Ushant in 1778. Hood was involved in the court-martial on Admiral (afterwards Viscount) Keppel which followed this action, and although adverse popular feeling was aroused by the course which he took in Keppel's defence, his conduct does not seem to have injured his professional career. Two years later he was made rear-admiral of the white, and succeeded Kempenfeldt as one of Howe's flag-officers, and in the "Queen" (90) he was present at the relief of Gibraltar in 1782. For a time he sat in the House of Commons. Promoted vice-admiral in 1787, he became K.B. in the following year, and on the occasion of the Spanish armament in 1790 flew his flag again for a short time. On the outbreak of the war with France in 1793 Sir Alexander Hood once more went to sea, this time as Howe's second in command, and he had his share in the operations which culminated in the "Glorius First of June," and for his services was made Baron Bridport of Cricket St Thomas in Somerset in the Irish peerage. Henceforth Bridport was practically in independent command. In 1795 he fought the much-criticized partial action of the 23rd of June off Belle-Ile, which, however unfavourably it was regarded in some quarters, was counted as a great victory by the public. Bridport's peerage was made English, and he became vice-admiral of England. In 1796-1797 he

practically directed the war from London, rarely hoisting his flag afloat save at such critical times as that of the Irish expedition in 1797. In the following year he was about to put to sea when the Spithead fleet mutinied. He succeeded at first in pacifying the crew of his flag-ship, who had no personal grudge against their admiral, but a few days later the mutiny broke out afresh, and this time was uncontrollable. For a whole week the mutineers were supreme, and it was only by the greatest exertions of the old Lord Howe that order was then restored and the men returned to duty. After the mutiny had been suppressed, Bridport took the fleet to sea as commander-in-chief in name as well as in fact, and from 1798 to 1800 personally directed the blockade of Brest, which grew stricter and stricter as time went on. In 1800 he was relieved by St Vincent, and retired from active duty after fifty-nine years' service. In reward for his fine record his peerage was made a viscounty. He spent the remaining years of his life in retirement. He died on the 2nd of May 1814. The viscounty in the English peerage died with him; the Irish barony passed to the younger branch of his brother's family, for whom the viscounty was recreated in 1868.

See Charnock, *Biographia Navalis*, vi. 153; *Naval Chronicle*, i. 265; Ralfe, *Nav. Biog.* i. 202.

BRIDPORT, a market town and municipal borough in the Western parliamentary division of Dorsetshire, England, 18 m. N.W. of Dorchester, on a branch of the Great Western railway. Pop. (1901) 5710. It is pleasantly situated in a hilly district on the river Brit, from which it takes its name. The main part of the town is about a mile from the sea, with which it is connected by a winding street, ending at a quay surrounded by the fishing village of West Bay, where the railway terminates. The church of St Mary is a handsome cruciform Perpendicular building. The harbour is accessible only to small vessels. There is some import trade in flax, timber and coal. The principal articles of manufacture have long been sailcloth, cordage, linen and fishing-nets. The municipal borough is under a mayor, 6 aldermen and 18 councillors. Area, 593 acres.

Bridport was evidently of some importance before the Conquest, when it consisted of 120 houses rated for all the king's services and paying geld for five hides. By 1086 the number of houses had decreased to 100, and of these 20 were in such a wretched condition that they could not pay geld. The town is first mentioned as a borough in the Pipe Roll of 1189, which states that William de Bendenges owed £9: 10s. for the ancient farm of Bridport, and that the men of the town owed tallage to the amount of 53s. 10d. Henry III. granted the first charter in 1252-1253, making the town a free borough and granting the burgesses the right to hold it at the ancient fee farm with an increase of 40s., and to choose two bailiffs to answer at the exchequer for the farm. A deed of 1381 shows that Henry III. also granted the burgesses freedom from toll. Bridport was incorporated by James I. in 1619, but Charles II. granted a new charter in 1667, and by this the town was governed until 1835. The first existing grant of a market and fairs to Bridport is dated 1593, but it appears from the *Quo Warranto* Rolls that Edward I. possessed a market there. The town was noted for the manufacture of ropes and cables as early as 1213, and an act of parliament (21 Henry VIII.) shows that the inhabitants had "from time out of mind" made the cables, ropes and hawsers for the royal navy and for most of the other ships. Bridport was represented in parliament by two members from 1395 to 1867. In the latter year the number was reduced to one, and in 1885 the town was disfranchised.

BRIE (*Briegus saltus*, from Celtic *briek*, clay), an agricultural district of northern France, to the E. of Paris, bounded W. and S. by the Seine, N. by the Marne. It has an area of 2400 sq. m., comprising the greater part of the department of Seine-et-Marne, together with portions of the departments of Seine, Seine-et-Oise, Aisne, Marne and Aube. The western portion was known as the *Brie française*, the eastern portion as the *Brie champenoise*. The Brie forms a plateau with few eminences, varying in altitude between 300 and 500 ft. in the west, and between 500 and 650 ft. in the east. Its scenery is varied by forests of some size—the chief being the Forêt de Senart, the Forêt de Crécy and the Forêt d'Armainvilliers. The surface soil is clay in which are embedded fragments of siliceous sandstone, used for millstones and constructional purposes; the subsoil is limestone. The Yères, a tributary of the Seine, and the Grand Morin and Petit Morin, tributaries of the Marne, are the chief rivers, but the region is not abundantly watered and the rainfall is only between 20 and 24 in. The Brie is famous for its grain and its dairy products, especially cheeses.

BRIEF (Lat. *brevis*, short), in English legal practice, the written statement given to a barrister to form the basis of his case. It was probably so called from its at first being only a copy of the original writ. Upon a barrister devolves the duty of taking charge of a case when it comes into court, but all the preliminary work, such as the drawing up of the case, serving papers, marshalling evidence, &c., is performed by a solicitor, so that a brief contains a concise summary for the information of counsel of the case which he has to plead, with all material facts in chronological order, and frequently such observations thereon as the solicitor may think fit to make, the names of witnesses, with the "proofs," that is, the nature of the evidence which each witness is ready to give, if called upon. The brief may also contain suggestions for the use of counsel when cross-examining witnesses called by the other side. Accompanying the brief may be copies of the pleadings (see PLEADING), and of all documents material to the case. The brief is always endorsed with the title of the court in which the action is to be tried, with the title of the action, and the names of the counsel and of the solicitor who delivers the brief. Counsel's fee is also marked. The delivery of a brief to counsel gives him authority to act for his client in all matters which the litigation involves. The result of the action is noted on the brief by counsel, or if the action is compromised, the terms of the compromise are endorsed on each brief and signed by the leading counsel on the opposite side. In Scotland a brief is called a memorial.

In the United States the word has, to a certain extent, a different meaning, a brief in its English

sense not being required, for the American attorney exercises all the functions distributed in England between barristers and solicitors. A lawyer sometimes prepares for his own use what is called a "trial brief" for use at the trial. This corresponds in all essential particulars with the "brief" prepared by the solicitor in England for the use of counsel. But the more distinctive use of the term in America is in the case of the brief "in error or appeal," before an appellate court. This is a written or printed document, varying according to circumstances, but embodying the argument on the question affected. Most of the appellate courts require the filing of printed briefs for the use of the court and opposing counsel at a time designated for each side before hearing. In the rules of the United States Supreme Court and circuit courts of appeals the brief is required to contain a concise statement of the case, a specification of errors relied on, including the substance of evidence, the admission or rejection of which is to be reviewed, or any extract from a charge excepted to, and an argument exhibiting clearly the points of law or fact to be discussed. This form of brief, it may be added, is also adopted for use at the trial in certain states of the Union which require printed briefs to be delivered to the court.

In English ecclesiastical law a brief meant letters patent issued out of chancery to churchwardens or other officers for the collection of money for church purposes. Such briefs were regulated by a statute of 1704, but are now obsolete, though they are still to be found named in one of the rubrics in the Communion service of the Book of Common Prayer.

The *brief-bag*, in which counsel's papers are carried to and from court, now forms an integral part of a barrister's outfit, but in the early part of the 19th century the possession of a brief-bag was strictly confined to those who had received one from a king's counsel. King's counsel were then few in number, were considered officers of the court, and had a salary of £40 a year, with a supply of paper, pens and purple bags. These bags they distributed among rising juniors of their
[v.04 p.0562] acquaintance, whose bundles of briefs were getting inconveniently large to be carried in their hands. These perquisites were abolished in 1830. English brief-bags are now either blue or red. Blue bags are those with which barristers provide themselves when first called, and it is a breach of etiquette to let this bag be visible in court. The only brief-bag allowed to be placed on the desks is the red bag, which by English legal etiquette is given by a leading counsel to a junior who has been useful to him in some important case.

BRIEG, a town of Germany, in the Prussian province of Silesia, on the left bank of the Oder, and on the Breslau and Beuthen railway, 27 m. S.E. of the former city. Pop. (1900) 24,090. It has a castle (the residence of the old counts of Brieg), a lunatic asylum, a gymnasium with a good library, several churches and hospitals, and a theatre. Its fortifications were destroyed by the French in 1807, and are now replaced by beautiful promenades. Brieg carries on a considerable trade, its chief manufactures being linen, embroideries, cotton and woollen goods, ribbons, leather, machinery, hats, pasteboard and cigars. Important cattle-markets are held here. Brieg, or, as it is called in early documents, *Civitas Altae Ripae*, obtained municipal rights in 1250 from Duke Henry III. of Breslau, and was fortified in 1297; its name is derived from the Polish *Brzeg* (shore). Burned by the Hussites in 1428, the town was soon afterwards rebuilt, and in 1595 it was again fortified by Joachim Frederick, duke of Brieg. In the Thirty Years' War it suffered greatly; in that of the Austrian succession it was heavily bombarded by the Prussian forces; and in 1807 it was captured by the French and Bavarians. From 1311 to 1675 Brieg was the capital of an independent line of dukes, a cadet branch of the Polish dukes of Lower Silesia, by one of whom the castle was built in 1341. In 1537 Frederick II., duke of Liegnitz, Brieg and Wohlau, concluded with Joachim II., elector of Brandenburg, a treaty according to which his duchy was to pass to the house of Brandenburg in the event of the extinction of his line. On the death of George William the last duke in 1675, however, Austria refused to acknowledge the validity of the treaty and annexed the duchies. It was the determination of Frederick II. of Prussia to assert his claim that led in 1740 to the war that ended two years later in the cession of Silesia to Prussia.

See Stokvis, *Manuel d'histoire*, iii. pp. 54, 64.

BRIEG, often now spelt Brig (Fr. *Brigue*, Ital. *Briga*), a picturesque small town in the Swiss canton of the Valais, situated at the foot of the northern slope of the Simplon Pass, on the right bank of the Saltine stream, and a little above its junction with the Rhone. Its older houses are very Italian in appearance, while its most prominent buildings (castle, former Jesuits' college and Ursuline convent) all date from the 17th century, and are due to the generosity of a single member of the local Stockalper family. The prosperity of Brieg is bound up with the Simplon Pass (*q.v.*), so that it gradually supplanted the more ancient village of Naters opposite, becoming a separate parish (the church is at Glis, a few minutes from the town) in 1517. Its medieval name was *Briga dives*. The opening of the carriage road across the Simplon (1807) and of the tunnel beneath the pass (1906), as well as the fact that above Brieg is the steeper and less fertile portion of the Upper Valais (now much frequented by tourists), have greatly increased the importance and size of the town. The opening of the railway tunnel beneath the Lötschen Pass, affording direct communication with Bern and the Bernese Oberland, is calculated still further to contribute to its prosperity. The new town extends below the old one and is closer to the right bank of the Rhone. In 1900 the population was 2182, almost all Romanists, while 1316 were German-speaking, 719 Italian-speaking (the Simplon tunnel workmen), and 142 French-speaking, one person only speaking Romonsch.

(W. A. B. C.)

BRIELLE (*Briel* or *Bril*), a seaport in the province of South Holland, Holland, on the north side of the island of Voorne, at the mouth of the New Maas, 5½ m. N. of Hellevoetsluis. Pop. (1900)

4107. It is a fortified place and has a good harbour, arsenal, magazine and barracks. It also possesses a quaint town hall, and an orphanage dating from 1533. The tower of the Groote Kerk of St Catherine serves as a lighthouse. Most of the trade of Brielle was diverted to Hellevoetsluis by the cutting of the Voornsche Canal in 1829, but it still has some business in corn and fodder, as well as a few factories. A large number of the inhabitants are also engaged in the fisheries and as pilots.

The chief event in the history of Brielle is its capture by the *Gueux sur Mer*, a squadron of privateers which raided the Dutch coast under commission of the prince of Orange. This event, which took place on the 1st of April 1572, was the first blow in the long war of Dutch independence, and was followed by a general outbreak of the patriotic party (Motley, *Rise of the Dutch Republic*, part iii. chapter vi.). "The Brill" was one of the four Dutch towns handed over to Queen Elizabeth in 1584 as security for English expenses incurred in aiding the Dutch. Brielle is the birthplace of the famous admiral Martin van Tromp, and also of Admiral van Almonde, a distinguished commander of the early 18th century.

BRIENNE-LE-CHÂTEAU, a town of north-eastern France, in the department of Aube, 1 m. from the right bank of the Aube and 26 m. N.E. of Troyes on the Eastern railway. Pop. (1906) 1761. The château, which overlooks the town, is an imposing building of the latter half of the 18th century, built by the cardinal de Brienne (see below). It possesses an important collection of pictures, many of them historical portraits of the 17th and 18th centuries. The church dates from the 16th century and contains good stained glass. A statue of Napoleon commemorates his sojourn at Brienne from 1779 to 1784, when he was studying at the military school suppressed in 1790. In 1814 Brienne was the scene of fighting between Napoleon and the Allies (see Napoleonic Campaigns). Brewing is carried on in the town. Brienne-la-Vieille, a village 1½ m. south of Brienne-le-Château, has a church of the 12th and 16th centuries with fine stained windows. The portal once belonged to the ancient abbey of Bassefontaine, the ruins of which are situated near the village.

Counts of Brienne.—Under the Carolingian dynasty Brienne-le-Château was the capital town of a French countship. In the 10th century it was captured by two adventurers named Engelbert and Gobert, and from the first of these sprang the noble house of Brienne. In 1210 John of Brienne (1148-1237) became king of Jerusalem, through his marriage with Mary of Montsserrat, heiress of the kingdom of Jerusalem. He led a crusade in Egypt which had no lasting success; and when in 1229 he was elected emperor of the East, for the period of Baldwin II.'s minority, he fought and conquered the Greek emperor John III. (Batatzes or Vatatzes). Walter V., count of Brienne and of Lecce (Apulia) and duke of Athens, fought against the Greeks and at first drove them from Thessaly, but was eventually defeated and killed near Lake Copais in 1311. His son, Walter VI., after having vainly attempted to reconquer Athens in 1331, served under Philip of Valois against the English. Having defended Florence against the Pisans he succeeded in obtaining dictatorial powers for himself in the republic; but his tyrannical conduct brought about his expulsion. He was appointed constable of France by John the Good, and was killed at the battle of Poitiers in 1356. His sister and heiress Isabelle married Walter of Enghien, and so brought Brienne to the house of Enghien, and, by his marriage with Margaret of Enghien, John of Luxemburg-St Pol (d. about 1397) became count of Brienne. The house of Luxemburg retained the countship until Margaret Charlotte of Luxemburg sold it to a certain Marpon, who ceded it to Henri Auguste de Loménie (whose wife, Louise de Béon, descended from the house of Luxemburg-Brienne) in 1640. The Limousin house of Loménie (the genealogies which trace this family to the 15th century are untrustworthy) produced many well-known statesmen, among others the celebrated cardinal Étienne Charles de Loménie de Brienne (1727-1794), minister of Louis XV.; and the last lords of Brienne were members of this family.

(M. P.*)

BRIENZ, LAKE OF, in the Swiss canton of Bern, the first lake into which the river Aar expands. [v.04 p.0563] It lies in a deep hollow between the village of Brienz on the east (2580 inhabitants, the chief centre of the Swiss wood-carving industry) and, on the west, Bönigen (1515 inhabitants), close to Interlaken. Its length is about 9 m., its width 1½ m., and its maximum depth 856 ft., while its area is 11½ sq. m., and the surface is 1857 ft. above the sea-level. On the south shore are the Giessbach Falls and the hamlet of Iseltwald. On the north shore are a few small villages. The character of the lake is gloomy and sad as compared with its neighbour, that of Thun. Its chief affluent is the Lütschine (flowing from the valleys of Grindelwald and Lauterbrunnen). The first steamer was placed on the lake in 1839.

(W. A. B. C.)

BRIERLEY, BENJAMIN (1825-1896), English weaver and writer in Lancashire dialect, was born near Manchester, the son of humble parents, and started life in a textile factory, educating himself in his spare time. At about the age of thirty he began to contribute articles to local papers, and the republication of some of his sketches of Lancashire character in *A Summer Day in Daisy Nook* (1859) attracted attention. In 1863 he definitely took to journalism and literature as his work, publishing in 1863 his *Chronicles of Waverlow*, and in 1864 a long story called *The Layrock of Langley Side* (afterwards dramatized), followed by others. He started in 1869 *Ben Brierley's Journal*, a weekly, which continued till 1891, and he gave public readings from his own writings, visiting America in 1880 and 1884. His various *Ab-o'-th'-Yate* sketches (about America, London, &c.), and his pictures of Lancashire common life were very popular, and were collected after his death. In 1884 he lost his savings by the failure of a building society, and a fund was

raised for his support. He died on the 18th of January 1896, and two years later a statue was erected to him in Queen's Park, Manchester.

BRIERLY, SIR OSWALD WALTERS (1817-1894), English marine painter, who came of an old Cheshire family, was born at Chester. He entered Sass's art-school in London, and after studying naval architecture at Plymouth he exhibited some drawings of ships at the Royal Academy in 1839. He had a passion for the sea, and in 1841 started round the world with Benjamin Boyd (1796-1851), afterwards well known as a great Australian squatter, in the latter's ship "Wanderer," and having got to New South Wales, made his home at Auckland for ten years. Brierly Point is called after him. He added to his sea experiences by voyages on H.M.S. "Rattlesnake" in 1848, and with Sir Henry Keppel on the "Meander" in 1850; he returned to England in 1851 on this ship, and illustrated Keppel's book about his cruise (1853). He was again with Keppel during the Crimean War, and published in 1855 a series of lithographs illustrating "The English and French fleets in the Baltic." He was now taken up by Queen Victoria and other members of the royal family, and was attached to the suites of the duke of Edinburgh and the prince of Wales on their tours by sea, the results being seen in further marine pictures by him; and in 1874 he was made marine-painter to the queen. He exhibited at the Academy, but more largely at the Royal Water-colour Society, his more important works including the historical pictures, "The Retreat of the Spanish Armada" (1871) and "The Loss of the Revenge" (1877). In 1885 he was knighted, and he died on the 14th of December 1894. He was twice married and had an active and prosperous life, but was no great artist; his best pictures are at Melbourne and Sydney.

BRIEUX, EUGÈNE (1858-), French dramatist, was born in Paris of poor parents on the 19th of January 1858. A one-act play, *Bernard Palissy*, written in collaboration with M. Gaston Salandri, was produced in 1879, but he had to wait eleven years before he obtained another hearing, his *Ménage d' artistes* being produced by Antoine at the Théâtre Libre in 1890. His plays are essentially didactic, being aimed at some weakness or iniquity of the social system. *Blanchette* (1892) pointed out the evil results of education of girls of the working classes; *M. de Réboval* (1892) was directed against pharisaism; *L'Engrenage* (1894) against corruption in politics; *Les Bienssaiteurs* (1896) against the frivolity of fashionable charity; and *L'Évasion* (1896) satirized an indicriminate belief in the doctrine of heredity. *Les Trois Filles de M. Dupont* (1897) is a powerful, somewhat brutal, study of the miseries imposed on poor middle-class girls by the French system of dowry; *Le Résultat des courses* (1898) shows the evil results of betting among the Parisian workmen; *La Robe rouge* (1900) was directed against the injustices of the law; *Les Remplaçantes* (1901) against the practice of putting children out to nurse. *Les Avariés* (1901), forbidden by the censor, on account of its medical details, was read privately by the author at the Théâtre Antoine; and *Petite amie* (1902) describes the life of a Parisian shop-girl. Later plays are *La Couvée* (1903, acted privately at Rouen in 1893), *Maternité* (1904), *La Déserteuse* (1904), in collaboration with M. Jean Sigaux, and *Les Hannetons*, a comedy in three acts (1906).

BRIGADE (Fr. and Ger. *brigade*, Ital. *brigata*, Span. *brigada*; the English use of the word dates from the early 17th century), a unit in military organization commanded by a major-general, brigadier-general or colonel, and composed of two or more regiments of infantry, cavalry or artillery. The British infantry brigade consists as a rule of four battalions (or about 4000 bayonets) with supply, transport and medical units attached; the cavalry brigade of two or three regiments of cavalry. An artillery "brigade" (field, horse, and heavy) is in Great Britain a smaller unit, forming a lieut.-colonel's command and consisting of two or three batteries. (See ARMY, ARTILLERY, INFANTRY, and CAVALRY.) The staff of an infantry or cavalry brigade usually consists of the brigadier commanding, his aide-de-camp, and the brigade-major, a staff officer whose duties are intermediate between those of an adjutant and those of a general staff officer.

BRIGANDAGE. The brigand is supposed to derive his name from the O. Fr. *brigan*, which is a form of the Ital. *brigante,* an irregular or partisan soldier. There can be no doubt as to the origin of the word "bandit," which has the same meaning. In Italy, which is not unjustly considered the home of the most accomplished European brigands, a *bandito* was a man declared outlaw by proclamation, or *bando*, called in Scotland "a decree of horning" because it was delivered by a blast of a horn at the town cross. The brigand, therefore, is the outlaw who conducts warfare after the manner of an irregular or partisan soldier by skirmishes and surprises, who makes the war support itself by plunder, by extorting blackmail, by capturing prisoners and holding them to ransom, who enforces his demands by violence, and kills the prisoners who cannot pay. In certain conditions the brigand has not been a mere malefactor. "It is you who are the thieves"—"*I Ladroni, siete voi,*"—was the defence of the Calabrian who was tried as a brigand by a French court-martial during the reign of Murat in Naples. Brigandage may be, and not infrequently has been, the last resource of a people subject to invasion. The Calabrians who fought for Ferdinand of Naples, and the Spanish irregular levies, which maintained the national resistance against the French from 1808 to 1814, were called brigands by their enemies. In the Balkan peninsula, under Turkish rule, the brigands (called *klephts* by the Greeks and *hayduks* or *haydutzi* by the Slavs) had some claim to believe themselves the representatives of their people against oppressors. The only approach to an attempt to maintain order was the permission given to part of the population to carry arms in order to repress the klephts. They were hence called "armatoli." As a matter of fact the armatole were rather the allies than the enemies of the klephts. The invader who reduces a nation to anarchy, and then suffers from the disorder he creates, always calls his opponents brigands. It is a natural consequence of such a war, but a very disastrous one, for the people who have to have recourse to these methods of defence, that the brigand acquires some measure of honourable prestige from his temporary association with patriotism and honest men. The patriot

band attracts the brigand proper, who is not averse to continue his old courses under an honourable pretext. "*Viva Fernando y vamos robando*" (Long life to Ferdinand, and let us go robbing) has been said by not unfair critics to have been the maxim of many Spanish guerrilleros. Italy and Spain suffered for a long time from the disorder developed out of the popular resistance to the French. Numbers of the guerrilleros of both countries, who in normal conditions might [v.04 p.0564] have been honest, had acquired a preference for living on the country, and for occasional booty, which they could not resign when the enemy had retired. Their countrymen had to work for a second deliverance from their late defenders. In the East the brigand has had a freer scope, and has even founded kingdoms. David's following in the cave of Adullam was such material as brigands are made of. "And every one that was in distress, and every one that was in debt, and every one that was discontented, gathered themselves unto him, and he became a captain over them: and there were with him about four hundred men." Nadir Shah of Persia began in just such a cave of Adullam, and lived to plunder Delhi with a host of Persians and Afghans.

The conditions which favour the development of brigandage may be easily summed up. They are first bad administration, and then, in a less degree, the possession of convenient hiding-places. A country of mountain and forest is favourable to the brigand. The highlands of Scotland supplied a safe refuge to the "gentlemen reavers," who carried off the cattle of the Sassenach landlords. The Apennines, the mountains of Calabria, the Sierras of Spain, were the homes of the Italian "banditos" and the Spanish "bandoleros" (banished men) and "salteadores" (raiders). The forests of England gave cover to the outlaws whose very much flattered portrait is to be found in the ballads of Robin Hood. The "maquis," i.e. the bush of Corsica, and its hills, have helped the Corsican brigand, as the bush of Australia covered the bushranger. But neither forest thicket nor mountain is a lasting protection against a good police, used with intelligence by the government, and supported by the law-abiding part of the community. The great haunts of brigands in Europe have been central and southern Italy and the worst-administered parts of Spain, except those which fell into the hands of the Turks. "Whenever numerous troops of banditti, multiplied by success and impunity, publicly defy, instead of eluding, the justice of their country, we may safely infer that the excessive weakness of the government is felt and abused by the lowest ranks of the community," is the judgment passed by Gibbon on the disorders of Sicily in the reign of the emperor Gallienus. This weakness has not always been a sign of real feebleness in the government. England was vigorously ruled in the reign of William III., when "a fraternity of plunderers, thirty in number according to the lowest estimate, squatted near Waltham Cross under the shades of Epping Forest, and built themselves huts, from which they sallied forth with sword and pistol to bid passengers stand." It was not because the state was weak that the Gubbings (so called in contempt from the trimmings and refuse of fish) infested Devonshire for a generation from their headquarters near Brent Tor, on the edge of Dartmoor. It was because England had not provided herself with a competent rural police. In relatively unsettled parts of the United States there has been a considerable amount of a certain kind of brigandage. In early days the travel routes to the far West were infested by highwaymen, who, however, seldom united into bands, and such outlaws, when captured, were often dealt with in an extra-legal manner, e.g. by "vigilance committees." The Mexican brigand Cortina made incursions into Texas before the Civil War. In Canada the mounted police have kept brigandage down, and in Mexico the "Rurales" have made an end of the brigands. Such curable evils as the highwaymen of England, and their like in the States, are not to be compared with the "Écorcheurs," or Skinners, of France in the 15th century, or the "Chauffeurs" of the revolutionary epoch. The first were large bands of discharged mercenary soldiers who pillaged the country. The second were ruffians who forced their victims to pay ransom by holding their feet in fires. Both flourished because the government was for the time disorganized by foreign invasion or by revolution. These were far more terrible evils than the licence of criminals, who are encouraged by a fair prospect of impunity because there is no permanent force always at hand to check them, and to bring them promptly to justice. At the same time it would be going much too far to say that the absence of an efficient police is the sole cause of brigandage in countries not subject to foreign invasion, or where the state is not very feeble. The Sicilian peasants of whom Gibbon wrote were not only encouraged by the hope of impunity, but were also maddened by an oppressive system of taxation and a cruel system of land tenure. So were the Gauls and Spaniards who throughout the 3rd and 4th centuries were a constant cause of trouble to the empire, under the name of Bagaudae, a word of uncertain origin. In the years preceding the French Revolution, the royal government commanded the services of a strong army, and a numerous *maréchaussée* or gendarmerie. Yet it was defied by the troops of smugglers and brigands known as *faux saulniers*, unauthorized salt-sellers, and gangs of poachers haunted the king's preserves round Paris. The salt monopoly and the excessive preservation of the game were so oppressive that the peasantry were provoked to violent resistance and to brigandage. They were constantly suppressed, but as the cause of the disorder survived, so its effects were continually renewed. The offenders enjoyed a large measure of public sympathy, and were warned or concealed by the population, even when they were not actively supported. The traditional outlaw who spared the poor and levied tribute on the rich was, no doubt, always a creature of fiction. The ballad which tells us how "Rich, wealthy misers were abhorred, By brave, free-hearted Bliss" (a rascal hanged for highway robbery at Salisbury in 1695) must have been a mere echo of the Robin Hood songs. But there have been times and countries in which the law and its administration have been so far regarded as enemies by people who were not themselves criminals, that all who defied them have been sure of a measure of sympathy. Then and there it was that brigandage has flourished, and has been difficult to extirpate. Schinder-Hannes, Jack the Skinner, whose real name was Johann Buckler, and who was born at Muklen on the Rhine, flourished from 1797 to 1802 because there was no proper police to stop him; it is also true that as he chiefly plundered the Jews he had a

good deal of Christian sympathy. When caught and beheaded he had no successors.

The brigandage of Greece, southern Italy, Corsica and Spain had deeper roots, and has never been quite suppressed. All four countries are well provided with hiding-places in forest and mountain. In all the administration has been bad, the law and its officers have been regarded as dangers, if not as deliberate enemies, so that they have found little native help, and, what is not the least important cause of the persistence of brigandage, there have generally been local potentates who found it to their interest to protect the brigand. The case of Greece under Turkish rule need not be dealt with. Whoever was not a klepht was the victim of some official extortioner. It would be grossly unfair to apply the name brigand to the Mainotes and similar clans, who had to choose between being flayed by the Turks or living by the sword under their own law. When it became independent Greece was extremely ill administered under a nominal parliamentary government by politicians who made use of the brigands for their own purposes. The result was the state of things described with only pardonable exaggeration in Edmond About's amusing *Roi de la montagne*. An authentic and most interesting picture of the Greek brigands will be found in the story of the captivity of S. Soteropoulos, an ex-minister who fell into their hands. It was translated into English under the title of *The Brigands of the Morea*, by the Rev. J.O. Bagdon (London, 1868). The misfortunes of Soteropoulos led to the adoption of strong measures which cleared the Morea, where the peasantry gave active support to the troops when they saw that the government was in earnest. But brigandage was not yet extinct in Greece. In 1870 an English party, consisting of Lord and Lady Muncaster, Mr Vyner, Mr Lloyd, Mr Herbert, and Count de Boyl, was captured at Oropos, near Marathon, and a ransom of £25,000 was demanded. Lord and Lady Muncaster were set at liberty to seek for the ransom, but the Greek government sent troops in pursuit of the brigands, and the other prisoners were then murdered. The scoundrels were hunted down, caught, and executed, and Greece has since then been tolerably free from this reproach. In the Balkan peninsula, under Turkish rule, brigandage continued to exist in
[v.04 p.0565] connexion with Christian revolt against the Turk, and the race conflicts of Albanians, Walachians, Pomuks, Bulgarians and Greeks. In Corsica the "maquis" has never been without its brigand hero, because industry has been stagnant, family feuds persist, and the government has never quite succeeded in persuading the people to support the law. The brigand is always a hero to at least one faction of Corsicans.

The conditions which favour brigandage have been more prevalent, and for longer, in Italy than elsewhere in western Europe, with the standing exception of Corsica, which is Italian in all but political allegiance. Until the middle of the 19th century Italy was divided into small states, so that the brigand who was closely pursued in one could flee to another. Thus it was that Marco Sciarra of the Abruzzi, when hard pressed by the Spanish viceroy of Naples—just before and after 1600—could cross the border of the papal states and return on a favourable opportunity. When pope and viceroy combined against him he took service with Venice, from whence he could communicate with his friends at home, and pay them occasional visits. On one such visit he was led into a trap and slain. Marco Sciarra had terrorized the country far and wide at the head of 600 men. He was the follower and imitator of Benedetto Mangone, of whom it is recorded that, having stopped a party of travellers which included Torquato Tasso, he allowed them to pass unharmed out of his reverence for poets and poetry. Mangone was finally taken, and beaten to death with hammers at Naples. He and his like are the heroes of much popular verse, written in *ottava rima*, and beginning with the traditional epic invocation to the muse. A fine example is "The most beautiful history of the life and death of Pietro Mancino, chief of Banditti," which has remained popular with the people of southern Italy. It begins:—

> "Io canto li ricatti, e il fiero ardire
> Del gran Pietro Mancino fuoruscito"
> (Pietro Mancino that great outlawed man
> I sing, and all his rage.)

In Naples the number of competing codes and jurisdictions, the survival of the feudal power of the nobles, who sheltered banditti, just as a Highland chief gave refuge to "caterans" in Scotland, and the helplessness of the peasantry, made brigandage chronic, and the same conditions obtained in Sicily. The Bourbon dynasty reduced brigandage very much, and secured order on the main high-roads. But it was not extinguished, and it revived during the French invasion. This was the flourishing time of the notorious Fra Diavolo, who began as brigand and blossomed into a patriot. Fra Diavolo was captured and executed by the French. When Ferdinand was restored on the fall of Napoleon he employed an English officer, General Sir Richard Church, to suppress the brigands. General Church, who kept good order among his soldiers, and who made them pay for everything, gained the confidence of the peasantry, and restored a fair measure of security. It was he who finally brought to justice the villainous Don Ciro Anicchiarico—priest and brigand—who declared at his trial with offhand indifference that he supposed he had murdered about seventy people first and last. When a brother priest was sent to give him the consolations of religion, Ciro cut him short, saying, "Stop that chatter, we are two of a trade: we need not play the fool to one another" (*Lasciate queste chiacchiere, siamo dell' istessa professione: non ci burliamo fra noi*). Every successive revolutionary disturbance in Naples saw a recrudescence of brigandage down to the unification of 1860-1861, and then it was years before the Italian government rooted it out. The source of the trouble was the support the brigands received from various kinds of "*manuténgoli*" (maintainers)—great men, corrupt officials, political parties, and the peasants who were terrorized, or who profited by selling the brigands food and clothes. In Sicily brigandage has been endemic. In 1866 two English travellers, Mr E.J.C. Moens and the Rev. J.C. Murray Aynesley, were captured and held to ransom. Mr Moens found that the

"manuténgoli" of the brigands among the peasants charged famine prices for food, and extortionate prices for clothes and cartridges. What is true of Naples and Sicily is true of other parts of Italy *mutatis mutandis*. In Tuscany, Piedmont and Lombardy the open country has been orderly, but the borders infested with brigands. The worst district outside Calabria has been the papal states. The Austrian general, Frimont, did, however, partly clear the Romagna about 1820, though at a heavy cost of life to his soldiers—mostly Bohemian Jägers—from the malaria.

The history of brigandage in Spain is very similar. It may be said to have been endemic in and south of the Sierra Morena. In the north it has flourished when government was weak, and after foreign invasion and civil wars. But it has always been put down easily by a capable administration. It reached its greatest heights in Catalonia, where it began in the strife of the peasants against the feudal exactions of the landlords. It had its traditional hero, Roque Guinart, who figures in the second part of Don Quixote. The revolt against the house of Austria in 1640, and the War of the Succession (1700-1714), gave a great stimulus to Catalan brigandage. But it was then put down in a way for which Italy offers no precedent. A country gentleman named Pedro Veciana, hereditary *balio* (military and civil lieutenant) of the archbishop of Tarragona in the town of Valls, armed his farm-servants, and resisted the attacks of the brigands. With the help of neighbouring country gentlemen he formed a strong band, known as the Mozos (Boys) of Veciana. The brigands combined to get rid of him by making an attack on the town of Valls, but were repulsed with great loss. The government of Philip V. then commissioned Veciana to raise a special corps of police, the "escuadra de Cataluna," which still exists. For five generations the colonel of the escuadra was always a Veciana. At all times in central and northern Spain the country population has supported the police when the government would act firmly. Since the organization of the excellent constabulary called "La Guardia Civil" by the duke of Ahumada, about 1844, brigandage has been well kept down. At the close of the Carlist War in 1874 a few bands infested Catalonia, but one of the worst was surprised, and all its members battered to death with boxwood cudgels by a gang of charcoal-burners on the ruins of the castle of San Martin de Centellas. In such conditions as these brigandage cannot last. More sympathy is felt for "bandoleros" in the south, and there also they find Spanish equivalents for the "manuténgoli" of Italy. The tobacco smuggling from Gibraltar keeps alive a lawless class which sinks easily into pure brigandage. Perhaps the influence of the Berber blood in the population helps to prolong this barbarism. The Sierra Morena, and the Serrania de Ronda, have produced the bandits whose achievements form the subject of popular ballads, such as Francisco Esteban El Guapo (Francis Stephen, the Buck or Dandy), Don Juan de Serralonga, Pedranza, &c. The name of José Maria has been made familiar to all the world by Merimée's story, *Carmen*, and by Bizet's opera. José Maria, called El Tempranillo (the early bird), was a historical personage, a liberal in the rising against Ferdinand VII., 1820-1823, then a smuggler, then a "bandolero." He was finally bought off by the government, and took a commission to suppress the other brigands. Jose Maria was at last shot by one of them, whom he was endeavouring to arrest. The civil guard prevents brigandage from reaching any great height in normal times, but in 1905 a bandit of the old stamp, popularly known as "El Vivillo" (the Vital Spark), haunted the Serrania de Ronda.

The brigand life has been made the subject of much romance. But when stripped of fiction it appears that the bands have been mostly recruited by men who had been guilty of homicide, out of jealousy or in a gambling quarrel, and who remained in them not from love of the life, but from fear of the gallows. A reformed brigand, known as Passo di Lupo (Wolf's Step), confessed to Mr McFarlane about 1820 that the weaker members of the band were terrorized and robbed by the bullies, and that murderous conflicts were constant among them.

The "dacoits" or brigands of India were of the same stamp as their European colleagues. The Pindaris were more than brigands, and the Thugs were a religious sect.

[v.04 p.0566]

AUTHORITIES.—The literature of brigandage, apart from pure romances, or official reports of trials, is naturally extensive. Mr McFarlane's *Lives and Exploits of Banditti and Robbers* (London, 1837) is a useful introduction to the subject. The author saw a part of what he wrote about, and gives many references, particularly for Italy. A good bibliography of Spanish brigandage will be found in the *Reseña Historica de la Guardia Civil* of Eugenio de la Iglesia (Madrid, 1898). For actual pictures of the life, nothing is better than the *English Travellers and Italian Brigands* of W.J.C. Moens (London, 1866), and *The Brigands of the Morea*, by S. Soteropoulos, translated by the Rev. J.O. Bagdon (London, 1868).

(D. H.)

BRIGANDINE, a French word meaning the armour for the *brigandi* or *brigantes*, light-armed foot soldiers; part of the armour of a foot soldier in the middle ages, consisting of a padded tunic of canvas, leather, &c., and lined with closely sewn scales or rings of iron.

BRIGANTES (Celtic for "mountaineers" or "free, privileged"), a people of northern Britain, who inhabited the country from the mouth of the Abus (Humber) on the east and the Belisama (Mersey; according to others, Ribble) on the west as far northwards as the Wall of Antoninus. Their territory thus included most of Yorkshire, the whole of Lancashire, Durham, Westmorland, Cumberland and part of Northumberland. Their chief town was Eburacum (or Eboracum; York). They first came into contact with the Romans during the reign of Claudius, when they were defeated by Publius Ostorius Scapula. Under Vespasian they submitted to Petillius Cerealis, but were not finally subdued till the time of Antoninus Pius (Tac. *Agricola*, 17; Pausan. viii. 43. 4). The name of their eponymous goddess Brigantia is found on inscriptions (*Corp. Inscr. Lat.* vii. 200, 875, 1062; F. Haverfield in *Archaeological Journal*, xlix., 1892), and also that of a god

Bergans = Brigans (*Ephemeris Epigraphica*, vii. No. 920). A branch of the Brigantes also settled in the south-east corner of Ireland, near the river Birgus (Barrow).

See A. Holder, *Altceltischer Sprachschatz*, i. (1896), for ancient authorities; J. Rhys, *Celtic Britain* (3rd ed., 1904); Pauly-Wissowa, *Realencyclopädie*, iii. pt. i. (1897).

BRIGG (properly Glanford Briggs or Glamford Bridge), a market town in the North Lindsey or Brigg parliamentary division of Lincolnshire, England, situated on the river Ancholme, which affords water communication with the Humber. Pop. of urban district (1901) 3137. It is 23 m. by road north of Lincoln, and is served by the Grimsby line of the Great Central railway. Trade is principally agricultural. In 1885 a remarkable boat, assigned to early British workmanship, was unearthed near the river; it is hollowed out of the trunk of an oak, and measures 48 ft. 6 in. by about 5 ft. Other prehistoric relics have also been discovered.

BRIGGS, CHARLES AUGUSTUS (1841-), American Hebrew scholar and theologian, was born in New York City on the 15th of January 1841. He was educated at the university of Virginia (1857-1860), graduated at the Union Theological Seminary in 1863, and studied further at the university of Berlin. He was pastor of the Presbyterian church of Roselle, New Jersey, 1869-1874, and professor of Hebrew and cognate languages in Union Theological Seminary 1874-1891, and of Biblical theology there from 1891 to 1904, when he became professor of theological encyclopaedia and symbolics. From 1880 to 1890 he was an editor of the *Presbyterian Review*. In 1892 he was tried for heresy by the presbytery of New York and acquitted. The charges were based upon his inaugural address of the preceding year. In brief they were as follows: that he had taught that reason and the Church are each a "fountain of divine authority which apart from Holy Scripture may and does savingly enlighten men"; that "errors may have existed in the original text of the Holy Scripture"; that "many of the Old Testament predictions have been reversed by history" and that "the great body of Messianic prediction has not and cannot be fulfilled"; that "Moses is not the author of the Pentateuch," and that "Isaiah is not the author of half of the book which bears his name"; that "the processes of redemption extend to the world to come"—he had considered it a fault of Protestant theology that it limits redemption to this world—and that "sanctification is not complete at death." The general assembly, to which the case was appealed, suspended Dr Briggs in 1893, being influenced, it would seem, in part, by the manner and tone of his expressions—by what his own colleagues in the Union Theological Seminary called the "dogmatic and irritating" nature of his inaugural address. He was ordained a priest of the Protestant Episcopal Church in 1899. His scholarship procured for him the honorary degree of D.D. from Edinburgh (1884) and from Glasgow (1901), and that of Litt.D. from Oxford (1901). With S.R. Driver and Francis Brown he prepared a revised *Hebrew and English Lexicon* (1891-1905), and with Driver edited the "International Commentary Series." His publications include *Biblical Study: Its Principles, Methods and History* (1883); *Hebrew Poems of the Creation* (1884); *American Presbyterianism: Its Origin and Early History* (1885); *Messianic Prophecy* (1886); *Whither? A Theological Question for the Times* (1889); *The Authority of the Holy Scripture* (1891); *The Bible, the Church and the Reason* (1892); *The Higher Criticism of the Hexateuch* (1893); *The Messiah of the Gospels* (1804), *The Messiah of the Apostles* (1894); *New Light on the Life of Jesus* (1904); *The Ethical Teaching of Jesus* (1904); *A Critical and Exegetical Commentary on the Book of Psalms* (2 vols., 1906-1907), in which he was assisted by his daughter; and *The Virgin Birth of Our Lord* (1909).

BRIGGS, HENRY (1556-1630), English mathematician, was born at Warley Wood, near Halifax, in Yorkshire. He graduated at St John's College, Cambridge, in 1581, and obtained a fellowship in 1588. In 1592 he was made reader of the physical lecture founded by Dr Thomas Linacre, and in 1596 first professor of geometry in Gresham House (afterwards College), London. In his lectures at Gresham House he proposed the alteration of the scale of logarithms from the hyperbolic form which John Napier had given them, to that in which unity is assumed as the logarithm of the ratio of ten to one; and soon afterwards he wrote to the inventor on the subject. In 1616 he paid a visit to Napier at Edinburgh in order to discuss the suggested change; and next year he repeated his visit for a similar purpose. During these conferences the alteration proposed by Briggs was agreed upon; and on his return from his second visit to Edinburgh in 1617 he accordingly published the first chiliad of his logarithms. (See Napier, John.) In 1619 he was appointed Savilian professor of geometry at Oxford, and resigned his professorship of Gresham College on the 25th of July 1620. Soon after his settlement at Oxford he was incorporated master of arts. In 1622 he published a small tract on the *North-West Passage to the South Seas, through the Continent of Virginia and Hudson's Bay*; and in 1624 his *Arithmetica Logarithmica*, in folio, a work containing the logarithms of thirty thousand natural numbers to fourteen places of figures besides the index. He also completed a table of logarithmic sines and tangents for the hundredth part of every degree to fourteen places of figures besides the index, with a table of natural sines to fifteen places, and the tangents and secants for the same to ten places; all of which were printed at Gouda in 1631 and published in 1633 under the title of *Trigonometria Britannica* (see Table, Mathematical). Briggs died on the 26th of January 1630, and was buried in Merton College chapel, Oxford. Dr Smith, in his *Lives of the Gresham Professors*, characterizes him as a man of great probity, a contemner of riches, and contented with his own station, preferring a studious retirement to all the splendid circumstances of life.

His works are: *A Table to find the Height of the Pole, the Magnetical Declination being given* (London, 1602, 4to); "Tables for the Improvement of Navigation," printed in the second edition of Edward Wright's treatise entitled *Certain Errors in Navigation detected and corrected* (London, 1610, 4to); *A Description of an Instrumental Table to find the part proportional, devised by Mr*

Edward Wright (London, 1616 and 1618, 12mo); *Logarithmorum Chilias prima* (London, 1617, 8vo); *Lucubrationes et Annotationes in opera posthuma J. Neperi* (Edinburgh, 1619, 4to); *Euclidis Elementorum VI. libri priores* (London, 1620. folio); *A Treatise on the North-West Passage to the South Sea* (London, 1622, 4to), reprinted in Purchas's *Pilgrims*, vol. iii. p. 852; *Arithmetica Logarithmica* (London, 1624, folio); *Trigonometria Britannica* (Goudae, 1663, folio); two *Letters* to Archbishop Usher; *Mathematica ab Antiquis minus cognita*. Some other works, as his *Commentaries on the Geometry of Peter Ramus*, and *Remarks on the Treatise of Longomontanus respecting the Quadrature of the Circle*, have not been published.

[v.04 p.0567] **BRIGHOUSE,** a municipal borough in the Elland parliamentary division of the West Riding of Yorkshire, England, 5½ m. N. of Huddersfield by the Lancashire & Yorkshire railway, on the river Calder. Pop. (1901) 21,735. It is in the heart of the manufacturing district of the West Riding, and has large woollen and worsted factories; carpets, machinery and soap are also produced. The town was incorporated in 1893, and is governed by a mayor, 8 aldermen and 24 councillors. Area, 2231 acres.

BRIGHT, SIR CHARLES TILSTON (1832-1888), English telegraph engineer, who came of an old Yorkshire family, was born on the 8th of June 1832, at Wanstead, Essex. At the age of fifteen he became a clerk under the Electric Telegraph Company. His talent for electrical engineering was soon shown, and his progress was rapid; so that in 1852 he was appointed engineer to the Magnetic Telegraph Company, and in that capacity superintended the laying of lines in various parts of the British Isles, including in 1853 the first cable between Great Britain and Ireland, from Portpatrick to Donaghadee. His experiments convinced him of the practicability of an electric submarine cable connexion between Ireland and America; and having in 1855 already discussed the question with Cyrus Field, who with J. W. Brett controlled the Newfoundland Telegraph Company on the other side of the ocean, Bright organized with them the Atlantic Telegraph Company in 1856 for the purpose of carrying out the idea, himself becoming engineer-in-chief. The story of the first Atlantic cable is told elsewhere (see TELEGRAPH), and it must suffice here to say that in 1858, after two disappointments, Bright successfully accomplished what to many had seemed an impossible feat, and within a few days of landing the Irish end of the line at Valentia he was knighted in Dublin. Subsequently Sir Charles Bright supervised the laying of submarine cables in various regions of the world, and took a leading part as pioneer in other developments of the electrical industry. In conjunction with Josiah Latimer Clark, with whom he entered into partnership in 1861, he invented improved methods of insulating submarine cables, and a paper on electrical standards read by them before the British Association in the same year led to the establishment of the British Association committee on that subject, whose work formed the foundations of the system still in use. From 1865 to 1868 he was Liberal M.P. for Greenwich. He died on the 3rd of May 1888, at Abbey Wood, near London.

See *Life Story of Sir C. T. Bright*, by his son Charles Bright (revised ed. 1908).

BRIGHT, JOHN (1811-1889), British statesman, was born at Rochdale on the 16th of November 1811. His father, Jacob Bright, was a much-respected Quaker, who had started a cottonmill at Rochdale in 1809. The family had reached Lancashire by two migrations. Abraham Bright was a Wiltshire yeoman, who, early in the 18th century, removed to Coventry, where his descendants remained, and where, in 1775, Jacob Bright was born. Jacob Bright was educated at the Ackworth school of the Society of Friends, and was apprenticed to a fustian manufacturer at New Mills. He married his employer's daughter, and settled with his two brothers-in-law at Rochdale in 1802, going into business for himself seven years later. His first wife died without children, and in 1809 he married Martha Wood, daughter of a tradesman of Bolton-le-Moors. She had been educated at Ackworth school, and was a woman of great strength of character and refined taste. There were eleven children of this marriage, of whom John Bright was the second, but the death of his elder brother in childhood made him the eldest son. He was a delicate child, and was sent as a day-scholar to a boarding-school near his home, kept by Mr William Littlewood. A year at the Ackworth school, two years at a school at York, and a year and a half at Newton, near Clitheroe, completed his education. He learned, he himself said, but little Latin and Greek, but acquired a great love of English literature, which his mother fostered, and a love of outdoor pursuits. In his sixteenth year he entered his father's mill, and in due time became a partner in the business. Two agitations were then going on in Rochdale—the first (in which Jacob Bright was a leader) in opposition to a local church-rate, and the second for parliamentary reform, by which Rochdale successfully claimed to have a member allotted to it under the Reform Bill. In both these movements John Bright took part. He was an ardent Nonconformist, proud to number among his ancestors John Gratton, a friend of George Fox, and one of the persecuted and imprisoned preachers of the Society of Friends. His political interest was probably first kindled by the Preston election in 1830, in which Lord Stanley, after a long struggle, was defeated by "Orator" Hunt. But it was as a member of the Rochdale Juvenile Temperance Band that he first learned public speaking. These young men went out into the villages, borrowed a chair of a cottager, and spoke from it at open-air meetings. In Mrs John Mills's life of her husband is an account of John Bright's first extempore speech. It was at a temperance meeting. Bright got his notes muddled, and broke down. The chairman gave out a temperance song, and during the singing told Bright to put his notes aside and say what came into his mind. Bright obeyed, began with much hesitancy, but found his tongue and made an excellent address. On some early occasions, however, he committed his speech to memory. In 1832 he called on the Rev. John Aldis, an eminent Baptist minister, to accompany him to a local Bible meeting. Mr Aldis described him as a slender, modest young gentleman, who surprised him by his intelligence and thoughtfulness, but who seemed nervous as they walked to the meeting together. At the meeting he made a stimulating speech,

and on the way home asked for advice. Mr Aldis counselled him not to learn his speeches, but to write out and commit to memory certain passages and the peroration. Bright took the advice, and acted on it all his life.

This "first lesson in public speaking," as Bright called it, was given in his twenty-first year, but he had not then contemplated entering on a public career. He was a fairly prosperous man of business, very happy in his home, and always ready to take part in the social, educational and political life of his native town. He was one of the founders of the Rochdale Literary and Philosophical Society, took a leading part in its debates, and on returning from a holiday journey in the East, gave the society a lecture on his travels. He first met Richard Cobden in 1836 or 1837. Cobden was an alderman of the newly formed Manchester corporation, and Bright went to ask him to speak at an education meeting in Rochdale. "I found him," said Bright, "in his office in Mosley Street, introduced myself to him, and told him what I wanted." Cobden consented, and at the meeting was much struck by Bright's short speech, and urged him to speak against the Corn Laws. His first speech on the Corn Laws was made at Rochdale in 1838, and in the same year he joined the Manchester provisional committee which in 1839 founded the Anti-Corn Law League He was still only the local public man, taking part in all public movements, especially in opposition to John Feilden's proposed factory legislation, and to the Rochdale church-rate. In 1839 he built the house which he called "One Ash," and married Elizabeth, daughter of Jonathan Priestman of Newcastle-on-Tyne. In November of the same year there was a dinner at Bolton to Abraham Paulton, who had just returned from a successful Anti-Corn Law tour in Scotland. Among the speakers were Cobden and Bright, and the dinner is memorable as the first occasion on which the two future leaders appeared together on a Free Trade platform. Bright is described by the historian of the League as "a young man then appearing for the first time in any meeting out of his own town, and giving evidence, by his energy and by his grasp of the subject, of his capacity soon to take a leading part in the great agitation." But his call had not yet come. In 1840 he led a movement against the Rochdale church-rate, speaking from a tombstone in the churchyard, where it looks down on the town in the valley below. A very happy married life at home contented him, and at the opening of the Free Trade hall in January 1840 he sat with the Rochdale deputation, undistinguished in the body of the meeting. A daughter, Helen, was born to him; but his young wife, after a long illness, died of consumption in September 1841. Three days after her death at Leamington, Cobden called to see him. "I was in the depths of grief," said
[v.04 p.0568] Bright, when unveiling the statue of his friend at Bradford in 1877, "I might almost say of despair, for the life and sunshine of my house had been extinguished." Cobden spoke some words of condolence, but after a time he looked up and said, 'There are thousands of homes in England at this moment where wives, mothers and children are dying of hunger. Now, when the first paroxysm of your grief is past, I would advise you to come with me, and we will never rest till the Corn Laws are repealed.' "I accepted his invitation," added Bright, "and from that time we never ceased to labour hard on behalf of the resolution which we had made." At the general election in 1841 Cobden was returned for Stockport, and in 1843 Bright was the Free Trade candidate at a by-election at Durham. He was defeated, but his successful competitor was unseated on petition, and at the second contest Bright was returned. He was already known in the country as Cobden's chief ally, and was received in the House of Commons with a suspicion and hostility even greater than had met Cobden himself. In the Anti-Corn Law movement the two speakers were the complements and correlatives of each other. Cobden had the calmness and confidence of the political philosopher, Bright had the passion and the fervour of the popular orator. Cobden did the reasoning, Bright supplied the declamation, but like Demosthenes he mingled argument with appeal. No orator of modern times rose more rapidly to a foremost place. He was not known beyond his own borough when Cobden called him to his side in 1841, and he entered parliament towards the end of the session of 1843 with a formidable reputation as an agitator. He had been all over England and Scotland addressing vast meetings and, as a rule, carrying them with him; he had taken a leading part in a conference held by the Anti-Corn Law League in London, had led deputations to the duke of Sussex, to Sir James Graham, then home secretary, and to Lord Ripon and Mr Gladstone, the secretary and under secretary of the Board of Trade; and he was universally recognized as the chief orator of the Free Trade movement. Wherever "John Bright of Rochdale" was announced to speak, vast crowds assembled. He had been so announced, for the last time, at the first great meeting in Drury Lane theatre on 15th March 1843; henceforth his name was enough. He took his seat in the House of Commons as one of the members for Durham on 28th July 1843, and on 7th August delivered his maiden speech in support of a motion by Mr Ewart for reduction of import duties. He was there, he said, "not only as one of the representatives of the city of Durham, but also as one of the representatives of that benevolent organization, the Anti-Corn Law League." A member who heard the speech described Bright as "about the middle size, rather firmly and squarely built, with a fair, clear complexion, and an intelligent and pleasing expression of countenance. His voice is good, his enunciation distinct, and his delivery free from any unpleasant peculiarity or mannerism." He wore the usual Friend's coat, and was regarded with much interest and hostile curiosity on both sides of the House.

Mr Ewart's motion was defeated, but the movement of which Cobden and Bright were the leaders continued to spread. In the autumn the League resolved to raise £100,000; an appeal was made to the agricultural interest by great meetings in the farming counties, and in November *The Times* startled the world by declaring, in a leading article, "The League is a great fact. It would be foolish, nay, rash, to deny its importance." In London great meetings were held in Covent Garden theatre, at which William Johnson Fox was the chief orator, but Bright and Cobden were the leaders of the movement. Bright publicly deprecated the popular tendency to regard Cobden and himself as the chief movers in the agitation, and Cobden told a Rochdale audience that he

always stipulated that he should speak first, and Bright should follow. His "more stately genius," as Mr John Morley calls it, was already making him the undisputed master of the feelings of his audiences. In the House of Commons his progress was slower. Cobden's argumentative speeches were regarded more sympathetically than Bright's more rhetorical appeals, and in a debate on Villiers's annual motion against the Corn Laws Bright was heard with so much impatience that he was obliged to sit down. In the next session (1845) he moved for an inquiry into the operation of the Game Laws. At a meeting of county members earlier in the day Peel had advised them not to be led into discussion by a violent speech from the member for Durham, but to let the committee be granted without debate. Bright was not violent, and Cobden said that he did his work admirably, and won golden opinions from all men. The speech established his position in the House of Commons. In this session Bright and Cobden came into opposition, Cobden voting for the Maynooth Grant and Bright against it. On only one other occasion—a vote for South Kensington—did they go into opposite lobbies, during twenty-five years of parliamentary life. In the autumn of 1845 Bright retained Cobden in the public career to which Cobden had invited him four years before. Bright was in Scotland when a letter came from Cobden announcing his determination, forced on him by business difficulties, to retire from public work. Bright replied that if Cobden retired the mainspring of the League was gone. "I can in no degree take your place," he wrote. "As a second I can fight, but there are incapacities about me, of which I am fully conscious, which prevent my being more than second in such a work as we have laboured in." A few days later he set off for Manchester, posting in that wettest of autumns through "the rain that rained away the Corn Laws," and on his arrival got his friends together, and raised the money which tided Cobden over the emergency. The crisis of the struggle had come. Peel's budget in 1845 was a first step towards Free Trade. The bad harvest and the potato disease drove him to the repeal of the Corn Laws, and at a meeting in Manchester on 2nd July 1846 Cobden moved and Bright seconded a motion dissolving the league. A library of twelve hundred volumes was presented to Bright as a memorial of the struggle.

Bright married, in June 1847, Miss Margaret Elizabeth Leatham, of Wakefield, by whom he had seven children, Mr John Albert Bright being the eldest. In the succeeding July he was elected for Manchester, with Mr Milner Gibson, without a contest. In the new parliament, as in the previous session, he opposed legislation restricting the hours of labour, and, as a Nonconformist, spoke against clerical control of national education. In 1848 he voted for Hume's household suffrage motion, and introduced a bill for the repeal of the Game Laws. When Lord John Russell brought forward his Ecclesiastical Titles Bill, Bright opposed it as "a little, paltry, miserable measure," and foretold its failure. In this parliament he spoke much on Irish questions. In a speech in favour of the government bill for a rate in aid in 1849, he won loud cheers from both sides, and was complimented by Disraeli for having sustained the reputation of that assembly. From this time forward he had the ear of the House, and took effective part in the debates. He spoke against capital punishment, against church-rates, against flogging in the army, and against the Irish Established Church. He supported Cobden's motion for the reduction of public expenditure, and in and out of parliament pleaded for peace. In the election of 1852 he was again returned for Manchester on the principles of free trade, electoral reform and religious freedom. But war was in the air, and the most impassioned speeches he ever delivered were addressed to this parliament in fruitless opposition to the Crimean War. Neither the House nor the country would listen. "I went to the House on Monday," wrote Macaulay in March 1854, "and heard Bright say everything I thought." His most memorable speech, the greatest he ever made, was delivered on the 23rd of February 1855. "The angel of death has been abroad throughout the land. You may almost hear the beating of his wings," he said, and concluded with an appeal to the prime minister that moved the House as it had never been moved within living memory. There was a tremor in Bright's voice in the touching parts of his great speeches which stirred the feelings even of hostile listeners. It was noted for the first time in this February speech, but the most striking instance was in a speech on Mr Osborne Morgan's Burials Bill in April 1875, in which he described a Quaker funeral, and protested against the "miserable superstition of the phrase
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'buried like a dog.'" "In that sense," he said, "I shall be buried like a dog, and all those with whom I am best acquainted, whom I best love and esteem, will be 'buried like a dog.' Nay more, my own ancestors, who in past time suffered persecution for what is now held to be a righteous cause, have all been buried like dogs, if that phrase is true." The tender, half-broken tones in which these words were said, the inexpressible pathos of his voice and manner, were never forgotten by those who heard that Wednesday morning speech.

Bright was disqualified by illness during the whole of 1856 and 1857. In Palmerston's penal dissolution in the latter year, Bright was rejected by Manchester, but in August, while ill and absent, Birmingham elected him without a contest. He returned to parliament in 1858, and in February seconded the motion which threw out Lord Palmerston's government. Lord Derby thereupon came into office for the second time, and Bright had the satisfaction of assisting in the passing of two measures which he had long advocated—the admission of Jews to parliament and the transfer of the government of India from the East India Company to the crown. He was now restored to full political activity, and in October addressed his new constituents, and started a movement for parliamentary reform. He spoke at great gatherings at Edinburgh, Glasgow, Bradford and Manchester, and his speeches filled the papers. For the next nine years he was the protagonist of Reform. Towards the close of the struggle he told the House of Commons that a thousand meetings had been held, that at every one the doors were open for any man to enter, yet that an almost unanimous vote for reform had been taken. In the debates on the Reform Bills submitted to the House of Commons from 1859. to 1867, Bright's was the most influential voice. He rebuked Lowe's "Botany Bay view," and described Horsman as retiring to his "cave of

Adullam," and hooking in Lowe. "The party of two," he said, "reminds me of the Scotch terrier, which was so covered with hair that you could not tell which was the head and which was the tail." These and similar phrases, such as the excuse for withdrawing the Reform Bill in the year of the great budget of 1860—"you cannot get twenty wagons at once through Temple Bar"—were in all men's mouths. It was one of the triumphs of Bright's oratory that it constantly produced these popular cries. The phrase "a free breakfast table" was his; and on the rejection of Forster's Compensation for Disturbance Bill he used the phrase as to Irish discontent, "Force is not a remedy."

During his great reform agitation Bright had vigorously supported Cobden in the negotiations for the treaty of commerce with France, and had taken, with his usual vehemence, the side of the North in the discussions in England on the American Civil War. In March 1865 Cobden died, and Bright told the House of Commons he dared not even attempt to express the feelings which oppressed him, and sat down overwhelmed with grief. Their friendship was one of the most characteristic features of the public life of their time. "After twenty years of intimate and almost brotherly friendship with him," said Bright, "I little knew how much I loved him till I had lost him." In June 1865 parliament was dissolved, and Bright was returned for Birmingham without opposition. Palmerston's death in the early autumn brought Lord John Russell into power, and for the first time Bright gave his support to the government. Russell's fourth Reform Bill was introduced, was defeated by the Adullamites, and the Derby-Disraeli ministry was installed. Bright declared Lord Derby's accession to be a declaration of war against the working classes, and roused the great towns in the demand for reform. Bright was the popular hero of the time. As a political leader the winter of 1866-1867 was the culminating point in his career. The Reform Bill was carried with a clause for minority representation, and in the autumn of 1868 Bright, with two Liberal colleagues, was again returned for Birmingham. Mr Gladstone came into power with a programme of Irish reform in church and land such as Bright had long urged, and he accepted the post of president of the Board of Trade. He thus became a member of the privy council, with the title of Right Honourable, and from this time forth was a recognized leader of the Liberal party in parliament and in the country. He made a great speech on the second reading of the Irish Church Bill, and wrote a letter on the House of Lords, in which he said, "In harmony with the nation they may go on for a long time, but throwing themselves athwart its course they may meet with accidents not pleasant for them to think of." He also spoke strongly in the same session in favour of the bill permitting marriage with a deceased wife's sister. The next session found him disqualified by a severe illness, which caused his retirement from office at the end of the year, and kept him out of public life for four years. In August 1873 Mr Gladstone reconstructed his cabinet, and Bright returned to it as chancellor of the duchy of Lancaster. But his hair had become white, and though he spoke again with much of his former vigour, he was now an old man. In the election in January 1874 Bright and his colleagues were returned for Birmingham without opposition. When Mr Gladstone resigned the leadership of his party in 1875, Bright was chairman of the party meeting which chose Lord Hartington as his successor. He took a less prominent part in political discussion till the Eastern Question brought Great Britain to the verge of war with Russia, and his old energy flamed up afresh. In the debate on the vote of credit in February 1878, he made one of his impressive speeches, urging the government not to increase the difficulties manufacturers had in finding employment for their workpeople by any single word or act which could shake confidence in business. The debate lasted five days. On the fifth day a telegram from Mr Layard was published announcing that the Russians were nearing Constantinople. The day, said *The Times*, "was crowded with rumours, alarms, contradictions, fears, hopes, resolves, uncertainties." In both Houses Mr Layard's despatch was read, and in the excited Commons Mr Forster's resolution opposing the vote of credit was withdrawn. Bright, however, distrusted the ambassador at the Porte, and gave reasons for doubting the alarming telegram. While he was speaking a note was put into the hands of Sir Stafford Northcote, and when Bright sat down he read it to the House. It was a confirmation from the Russian prime minister of Bright's doubts: "There is not a word of truth in the rumours which have reached you." At the general election in 1880 he was re-elected at Birmingham, and joined Mr Gladstone's new government as chancellor of the duchy of Lancaster. For two sessions he spoke and voted with his colleagues, but after the bombardment of the Alexandria forts he left the ministry and never held office again. He felt most painfully the severance from his old and trusted leader, but it was forced on him by his conviction of the danger and impolicy of foreign entanglements. He, however, gave a general support to Mr Gladstone's government. In 1883 he took the chair at a meeting of the Liberation Society in Mr Spurgeon's chapel; and in June of that year was the object of an unparalleled demonstration at Birmingham to celebrate his twenty-five years of service as its representative. At this celebration he spoke strongly of "the Irish rebel party," and accused the Conservatives of "alliance" with them, but withdrew the imputation when Sir Stafford Northcote moved that such language was a breach of the privileges of the House of Commons. At a banquet to Lord Spencer he accused the Irish members of having "exhibited a boundless sympathy for criminals and murderers." He refused in the House of Commons to apologise for these words, and was supported in his refusal by both sides of the House. At the Birmingham election in 1885 he stood for the central division of the redistributed constituency; he was opposed by Lord Randolph Churchill, but was elected by a large majority. In the new parliament he voted against the Home Rule Bill, and it was generally felt that in the election of 1886 which followed its defeat, when he was re-elected without opposition, his letters told with fatal effect against the Home Rule Liberals. His contribution to the discussion was a suggestion that the Irish members should form a grand committee to which every Irish bill should go after first reading. The break-up of the Liberal party filled him with gloom. His last speech at Birmingham was on 29th March 1888, at a banquet to celebrate Mr Chamberlain's return from

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his peace mission to the United States. He spoke of imperial federation as a "dream and an absurdity." In May his illness returned, he took to his bed in October, and died on the 27th of March 1889. He was buried in the graveyard of the meeting-house of the Society of Friends in Rochdale.

Bright had much literary and social recognition in his later years. In 1882 he was elected lord rector of the university of Glasgow, and Dr Dale wrote of his rectorial address: "It was not the old Bright." "I am weary of public speaking," he had told Dr Dale; "my mind is almost a blank." He was given an honorary degree of the university of Oxford in 1886, and in 1888 a statue of him was erected at Birmingham. The 3rd marquess of Salisbury said of him, and it sums up his character as a public man: "He was the greatest master of English oratory that this generation—I may say several generations—has seen.... At a time when much speaking has depressed, has almost exterminated eloquence, he maintained that robust, powerful and vigorous style in which he gave fitting expression to the burning and noble thoughts he desired to utter."

See *The Life and Speeches of the Right Hon. John Bright, M.P.*, by George Barnett Smith, 2 vols. 8vo (1881); *The Life of John Bright, M.P.*, by John M^{c}Gilchrist, in Cassell's Representative Biographies (1868); *John Bright*, by C.A. Vince (1898); *Speeches on Parliamentary Reform by John Bright, M.P., revised by Himself* (1866); *Speeches on Questions of Public Policy*, by John Bright, M.P., edited by J.E. Thorold Rogers, 2 vols. 8vo (1868); *Public Addresses*, edited by J.E. Thorold Rogers, 8vo (1879); *Public Letters of the Right Hon. John Bright, M.P.*, collected by H.J. Leech (1885).

(P. W. C.)

BRIGHTLINGSEA (pronounced Brittlesea), a port and fishing station in the Harwich parliamentary division of Essex, England, on a creek opening from the east shore of the Colne estuary, the terminus of a branch from Colchester of the Great Eastern railway, 62½ m. E.N.E. of London. Pop. of urban district (1901) 4501. The Colchester oyster beds are mainly in this part of the Colne, and the oyster fishery is the chief industry. Boat-building is carried on. This is also a favourite yachting centre. The church of All Saints, principally Perpendicular, has interesting monuments and brasses, and a fine lofty tower and west front. Brightlingsea, which appears in Domesday, is a member of the Cinque Port of Sandwich in Kent. Near the opposite shore of the creek is St Osyth's priory, which originated as a nunnery founded by Osyth, a grand-daughter of Penda, king of Mercia, martyred (*c.* 653) by Norse invaders. A foundation for Augustinian canons followed on the site early in the 12th century. The remains, incorporated with a modern residence, include a late Perpendicular gateway, abbots' tower, clock tower and crypt. The gateway, an embattled structure with flanking turrets, is particularly fine, the entire front being panelled and ornamented with canopied niches. The church of St Osyth, also Perpendicular in the main, is of interest.

BRIGHTON, a watering-place of Bourke county, Victoria, Australia, 7½ m. by rail S.E. of Melbourne, of which it is practically a suburb. It stands on the east shore of Port Phillip, and has two piers, a great extent of sandy beach and numerous beautiful villas. Pop. (1901) 10,029.

BRIGHTON, a municipal, county and parliamentary borough of Sussex, England, one of the best-known seaside resorts in the United Kingdom, 51 m. S. from London by the London, Brighton & South Coast railway. Pop. (1901) 123,478. Its ready accessibility from the metropolis is the chief factor in its popularity. It is situated on the seaward slope of the South Downs; the position is sheltered from inclement winds, and the climate is generally mild. The sea-front, overlooking the English Channel, stretches nearly 4 m. from Kemp Town on the east to Hove (a separate municipal borough) on the west. Inland, including the suburb of Preston, the town extends some 2 m. The tendency of the currents in the Channel opposite Brighton is to drive the shingle eastward, and encroachments of the sea were frequent and serious until the erection of a massive sea-wall, begun about 1830, 60 ft. high, 23 ft. thick at the base, and 3 ft. at the summit. There are numerous modern churches and chapels, many of them very handsome; and the former parish church of St Nicholas remains, a Decorated structure containing a Norman font and a memorial to the great duke of Wellington. The incumbency of Trinity Chapel was held by the famous preacher Frederick William Robertson (1847-1853). The town hall and the parochial offices are the principal administrative buildings. Numerous institutions contribute to the entertainment of visitors. Of these the most remarkable is the Pavilion, built as a residence for the prince regent (afterwards George IV.) and remodelled in 1819 by the architect, John Nash, in a grotesque Eastern style of architecture. In 1849 it was purchased by the town for £53,000, and is devoted to various public uses, containing a museum, assembly-rooms and picture-galleries. The detached building, formerly the stables, is converted into a fine concert hall; it is lighted by a vast glazed dome approaching that of St Paul's cathedral, London, in dimensions. There are several theatres and music-halls. The aquarium, the property of the corporation, contains an excellent marine collection, but is also used as a concert hall and winter garden, and a garden is laid out on its roof. The Booth collection of British birds, bequeathed to the corporation by E.T. Booth, was opened in 1893. There are two piers, of which the Palace pier, near the site of the old chain pier (1823), which was washed away in 1896, is near the centre of the town, while the West pier is towards Hove. Preston and Queen's parks are the principal of several public recreation grounds; and the racecourse at Kemp Town is also the property of the town. Educational establishments are numerous, and include Brighton College, which ranks high among English public schools. There are municipal schools of science, technology and art. St Mary's Hall (1836) is devoted to the education of poor clergymen's daughters. Among many hospitals, the county

hospital (1828), "open to the sick and lame poor of every country and nation," may be mentioned. There are an extensive mackerel and herring fishery, and motor engineering works. The parliamentary borough, which includes the parish of Hove, returns two members. The county borough was created in 1888. The municipal borough is under a mayor, 14 aldermen and 42 councillors. Area, 2536 acres.

Although there is evidence of Roman and Saxon occupation of the site, the earliest mention of Brighton (Bristelmeston, Brichelmestone, Brighthelmston) is the Domesday Book record that its three manors belonged to Earl Godwin and were held by William de Warenne. Of these, two passed to the priories of Lewes and Michelham respectively, and after the dissolution of the monasteries were subject to frequent sale and division. The third descended to the earls of Arundel, falling to the share of the duke of Norfolk in 1415, and being divided in 1502 between the families of Howard and Berkeley. That Brighton was a large fishing village in 1086 is evident from the rent of 4000 herrings; in 1285 it had a separate constable, and in 1333 it was assessed for a tenth, and fifteenth at £5:4:6¾, half the assessment of Shoreham. In 1340 there were no merchants there, only tenants of lands, but its prosperity increased during the 15th and 16th centuries, and it was assessed at £6:12:8 in 1534. There is, however, no indication that it was a borough. In 1580 commissioners sent to decide disputes between the fishermen and landsmen found that from time immemorial Brighton had been governed by two head boroughs sitting in the borough court, and assisted by a council called the Twelve. This constitution disappeared before 1772, when commissioners were appointed. Brighton refused a charter offered by George, prince of Wales, but was incorporated in 1854. It had become a parliamentary borough in 1832. From a fishing town in 1656 it became a fashionable resort in 1756; its popularity increased after the visit of the prince of Wales (see GEORGE IV.) to the duke of Cumberland in 1783, and was ensured by his building the Pavilion in 1784-1787, and his adoption of it as his principal residence; and his association with Mrs Fitzherbert at Brighton was the starting-point of its fashionable repute.

See *Victoria County History—Sussex; Sussex Archaeological Society Transactions*, vol. ii.; L. Melville, *Brighton, its History, its Follies and its Fashions* (London, 1909).

BRIGHT'S DISEASE, a term in medicine applied to a class of diseases of the kidneys (acute and chronic nephritis) which have as their most prominent symptom the presence of albumen in the urine, and frequently also the coexistence of dropsy. These associated symptoms in connexion with kidney disease were first described in 1827 by Dr Richard Bright (1789-1858). Since that period it has been established that the symptoms, instead of being, as was formerly supposed, the result of one form of disease of the kidneys, may be dependent on various morbid conditions of those organs (see KIDNEY DISEASES). Hence the term Bright's disease, which is retained in medical nomenclature in honour of Dr Bright, must be understood as having a generic application.

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The symptoms are usually of a severe character. Pain in the back, vomiting and febrile disturbance commonly usher in the attack. Dropsy, varying in degree from slight puffiness of the face to an accumulation of fluid sufficient to distend the whole body, and to occasion serious embarrassment to respiration, is a very common accompaniment. The urine is reduced in quantity, is of dark, smoky or bloody colour, and exhibits to chemical reaction the presence of a large amount of albumen, while, under the microscope, blood corpuscles and casts, as above mentioned, are found in abundance.

This state of acute inflammation may by its severity destroy life, or, short of this, may by continuance result in the establishment of one of the chronic forms of Bright's disease. On the other hand an arrest of the inflammatory action frequently occurs, and this is marked by the increased amount of the urine, and the gradual disappearance of its albumen and other abnormal constituents; as also by the subsidence of the dropsy and the rapid recovery of strength.

In the treatment of acute Bright's disease, good results are often obtained from local depletion, from warm baths and from the careful employment of diuretics and purgatives. Chronic Bright's disease is much less amenable to treatment, but by efforts to maintain the strength and improve the quality of the blood by strong nourishment, and at the same time by guarding against the risks of complications, life may often be prolonged in comparative comfort, and even a certain measure of improvement be experienced.

BRIGNOLES, a town in the department of Var in the S.E. of France, 36 m. by rail N. of Toulon. Pop. (1906) 3639. It is built at a height of 754 ft. above the sea-level, in a fertile valley, and on the right bank of the Carami river. It contains the old summer palace of the counts of Provence, and has an active trade, especially in prunes, known as *prunes de Brignoles*. Its old name was *Villa Puerorum*, as the children of the counts of Provence were often brought up here. It was sacked on several occasions during the religious wars in the 16th century. Twelve miles to the N.W. is St Maximin (with a fine medieval church), which is one of the best starting-points for the most famous pilgrimage resort in Provence, the Sainte Baume, wherein St Mary Magdalene is said to have taken refuge. This is 20 m. distant by road.

(W. A. B. C.)

BRIHASPATI, or BRAHMANASPATI ("god of strength"), a deity of importance in early Hindu mythology. In the Rigveda he is represented as the god of prayer, aiding Indra in his conquest of the cloud-demon, and at times appears to be identified with Agni, god of fire. He is the offspring of Heaven and Earth, the two worlds; is the inspirer of prayer and the guide and protector of the pious. He is pictured as having seven mouths, a hundred wings and horns and is armed with bow

and arrows and an axe. He rides in a chariot drawn by red horses. In the later scriptures he is represented as a Rishi or seer.

See A.A. Macdonell, *Vedic Mythology* (Strassburg, 1897).

BRIL, PAUL (1554-1626), Flemish painter, was born at Antwerp. The success of his elder brother Matthew (1550-1584) in the Vatican induced him to go to Rome to live. On the death of Matthew, Paul, who far surpassed him as an artist, succeeded to his pensions and employments. He painted landscapes with a depth of chiaroscuro then little practised in Italy, and introduced into them figures well drawn and finely coloured. One of his best compositions is the "Martyrdom of St Clement," in the Sala Clementina of the Vatican.

BRILL, the name given to a flat-fish (*Psetta laevis*, or *Rhombus laevis*) which is a species closely related to the turbot, differing from it in having very small scales, being smaller in size, having no bony tubercules in the skin, and being reddish in colour. It abounds on parts of the British coast, and is only less favoured for the table than the turbot itself.

BRILLAT-SAVARIN, ANTHELME (1755-1826), French gastronomist, was born at Belley, France, on the 1st of April 1755. In 1789 he was a deputy, in 1793 mayor of Belley. To escape proscription he fled from France to Switzerland, and went thence to the United States, where he played in the orchestra of a New York theatre. On the fall of Robespierre he returned to France, and in 1797 became a member of the court of cassation. He wrote various volumes on political economy and law, but his name is famous for his *Physiologie du goût*, a compendium of the art of dining. Many editions of this work have been published. Brillat-Savarin died in Paris on the 2nd of February 1826.

BRIMSTONE, the popular name of sulphur (*q.v.*), particularly of the commercial "roll sulphur." The word means literally "burning stone"; the first part being formed from the stem of the Mid. Eng. *brennen*, to burn. Earlier forms of the word are *brenstone*, *bernstone*, *brynstone,* &c.

BRIN, BENEDETTO (1833-1898), Italian naval administrator, was born at Turin on the 17th of May 1833, and until the age of forty worked with distinction as a naval engineer. In 1873 Admiral Saint-Bon, minister of marine, appointed him under-secretary of state. The two men completed each other; Saint-Bon conceived a type of ship, Brin made the plans and directed its construction. On the advent of the Left to power in 1876, Brin was appointed minister of marine by Depretis, a capacity in which he continued the programme of Saint-Bon, while enlarging and completing it in such way as to form the first organic scheme for the development of the Italian fleet. The huge warships "Italia" and "Dandolo" were his work, though he afterwards abandoned their type in favour of smaller and faster vessels of the "Varese" and the "Garibaldi" class. By his initiative Italian naval industry, almost non-existent in 1873, made rapid progress. During his eleven years' ministry (1876-1878 with Depretis, 1884-1891 with Depretis and Crispi, 1896-1898 with Rudini), he succeeded in creating large private shipyards, engine works and metallurgical works for the production of armour, steel plates and guns. In 1892 he entered the Giolitti cabinet as minister for foreign affairs, accompanying, in that capacity, the king and queen of Italy to Potsdam, but showed weakness towards France on the occasion of the massacre of Italian workmen at Aigues-Mortes. He died on the 24th of May 1898, while minister of marine in the Rudini cabinet. He, more than any other man, must be regarded as the practical creator of the Italian navy.

BRINDABAN, a town of British India, in the Muttra district of the United Provinces, on the right bank of the Jumna, 6 m. N. of Muttra. Pop. (1901) 22,717. Brindaban is one of the most popular places of pilgrimage in India, being associated with the cult of Krishna as a shepherd. It contains bathing-stairs, tanks and wells, and a great number of handsome temples, of which the finest is that of Govind Deva, a cruciform vaulted building of red sandstone, dating from 1590. The town was founded earlier in the same century.

BRINDISI (anc. *Brundisium*, *q.v.*), a seaport town and archiepiscopal see of Apulia, Italy, in the province of Lecce, 24 m. N.W. by rail from the town of Lecce, and 346 m. from Ancona. Pop. (1861) 8000; (1871) 13,755; (1901) 25,317. The chief importance of Brindisi is due to its position as a starting-point for the East. The inner harbour, admirably sheltered and 27 to 30 ft. in depth, allows ocean steamers to lie at the quays. Brindisi has, however, been abandoned by the large steamers of the Peninsular & Oriental Steam Navigation Company, which had called there since 1870, but since 1898 call at Marseilles instead; small express boats, carrying the mails, still leave every week, connecting with the larger steamers at Port Said; but the number of passengers leaving the port, which for the years 1893-1897 averaged 14,728, was only 7608 in 1905, and only 943 of these were carried by the P. & O. boats. The harbour railway station was not
[v.04 p.0572] completed until 1905 (*Consular Report*, No. 3672, 1906, pp. 13 sqq.). The port was cleared in 1905 by 1492 vessels of 1,486,269 tons. The imports represented a value of £629,892 and the exports a value of £663,201—an increase of £84,077 and £57,807 respectively on the figures of the previous year, while in 1899 the amounts, which were below the average, were only £298,400 and £253,000. The main imports are coal, flour, sulphur, timber and metals; and the main exports, wine and spirits, oil and dried fruits.

Frederick II. erected a castle, with huge round towers, to guard the inner harbour; it is now a convict prison. The cathedral, ruined by earthquakes, was restored in 1743-1749, but has some remains of its mosaic pavement (1178). The baptismal church of S. Giovanni al Sepolcro (11th century) is now a museum. The town was captured in 836 by the Saracens, and destroyed by them; but was rebuilt in the 11th century by Lupus the protospatharius, Byzantine governor. In 1071 it fell into the hands of the Normans, and frequently appears in the history of the Crusades.

Early in the 14th century the inner port was blocked by Giovanni Orsini, prince of Taranto; the town was devastated by pestilence in 1348, and was plundered in 1352 and 1383; but even greater damage was done by the earthquake of 1456.

(T. As.)

BRINDLEY, JAMES (1716-1772), English engineer, was born at Thornsett, Derbyshire, in 1716. His parents were in very humble circumstances, and he received little or no education. At the age of seventeen he was apprenticed to a millwright near Macclesfield, and soon after completing his apprenticeship he set up in business for himself as a wheelwright at Leek, quickly becoming known for his ingenuity and skill in repairing all kinds of machinery. In 1752 he designed and set up an engine for draining some coal-pits at Clifton in Lancashire. Three years later he extended his reputation by completing the machinery for a silk-mill at Congleton. In 1759, when the duke of Bridgewater was anxious to improve the outlets for the coal on his estates, Brindley advised the construction of a canal from Worsley to Manchester. The difficulties in the way were great, but all were surmounted by his genius, and his crowning triumph was the construction of an aqueduct to carry the canal at an elevation of 39 ft. over the river Irwell at Barton. The great success of this canal encouraged similar projects, and Brindley was soon engaged in extending his first work to the Mersey, at Runcorn. He then designed and nearly completed what he called the Grand Trunk Canal, connecting the Trent and Humber with the Mersey. The Staffordshire and Worcestershire, the Oxford and the Chesterfield Canals were also planned by him, and altogether he laid out over 360 m. of canals. He died at Turnhurst, Staffordshire, on the 30th of September 1772. Brindley retained to the last a peculiar roughness of character and demeanour; but his innate power of thought more than compensated for his lack of training. It is told of him that when in any difficulty he used to retire to bed, and there remain thinking out his problem until the solution became clear to him. His mechanical ingenuity and fertility of resource were very remarkable, and he undoubtedly possessed the engineering faculty in a very high degree. He was an enthusiastic believer in canals, and his reported answer, when asked the use of navigable rivers, "To feed canals," is characteristic, if not altogether authentic.

BRINTON, DANIEL GARRISON (1837-1899), American archaeologist and ethnologist, was born at Thornbury, Pennsylvania, on the 13th of May 1837. He graduated at Yale in 1858, studied for two years in the Jefferson Medical College, and then for one year travelled in Europe and continued his studies at Paris and Heidelberg. From 1862 to 1865, during the Civil War in America, he was a surgeon in the Union army, acting for one year, 1864-1865, as surgeon in charge of the U.S. Army general hospital at Quincy, Illinois. After the war he practised medicine at Westchester, Pennsylvania, for several years; was the editor of a weekly periodical, the *Medical and Surgical Reporter*, in Philadelphia, from 1874 to 1887; became professor of ethnology and archaeology in the Academy of Natural Sciences in Philadelphia in 1884, and was professor of American linguistics and archaeology in the university of Pennsylvania from 1886 until his death at Philadelphia on the 31st of July 1899. He was a member of numerous learned societies in the United States and in Europe, and was president at different times of the Numismatic and Antiquarian Society of Philadelphia, of the American Folk-Lore Society and of the American Association for the Advancement of Science. During the period from 1859 (when he published his first book) to 1899, he wrote a score of books, several of them of great value, and a large number of pamphlets, brochures, addresses and magazine articles. His principal works are: —*The Myths of the New World* (1868), the first attempt to analyse and correlate, according to true scientific principles, the mythology of the American Indians; *The Religious Sentiment: Its Sources and Aim: A Contribution to the Science and Philosophy of Religion* (1876); *American Hero Myths* (1882); *Essays of an Americanist* (1890); *Races and Peoples* (1890); *The American Race* (1891); *The Pursuit of Happiness* (1893); and *Religions of Primitive People* (1897). In addition, he edited and published a *Library of American Aboriginal Literature* (8 vols. 1882-1890), a valuable contribution to the science of anthropology in America. Of the eight volumes, six were edited by Brinton himself, one by Horatio Hale and one by A.S. Gatschet.

BRINVILLIERS, MARIE MADELEINE MARGUERITE D'AUBRAY, MARQUISE DE (*c.* 1630-1676), French poisoner, daughter of Dreux d'Aubray, civil lieutenant of Paris, was born in Paris about 1630. In 1651 she married the marquis de Brinvilliers, then serving in the regiment of Normandy. Contemporary evidence describes the marquise at this time as a pretty and much-courted little woman, with a fascinating air of childlike innocence. In 1659 her husband introduced her to his friend Godin de Sainte-Croix, a handsome young cavalry officer of extravagant tastes and bad reputation, whose mistress she became. Their relations soon created a public scandal, and as the marquis de Brinvilliers, who had left France to avoid his creditors, made no effort to terminate them, M. d'Aubray secured the arrest of Sainte-Croix on a *lettre de cachet*. For a year Sainte-Croix remained a prisoner in the Bastille, where he is popularly supposed to have acquired a knowledge of poisons from his fellow-prisoner, the Italian poisoner Exili. When he left the Bastille, he plotted with his willing mistress his revenge upon her father. She cheerfully undertook to experiment with the poisons which Sainte-Croix, possibly with the help of a chemist, Christopher Glaser, prepared, and found subjects ready to hand in the poor who sought her charity, and the sick whom she visited in the hospitals. Meanwhile Sainte-Croix, completely ruined financially, enlarged his original idea, and determined that not only M. Dreux d'Aubray but also the latter's two sons and other daughter should be poisoned, so that the marquise de Brinvilliers and himself might come into possession of the large family fortune. In February 1666, satisfied with the efficiency of Sainte-Croix's preparations and with the ease with which they could be administered without detection, the marquise poisoned her father, and in 1670, with the connivance of their valet La Chaussée, her two brothers. A post-mortem examination suggested

the real cause of death, but no suspicion was directed to the murderers. Before any attempt could be made on the life of Mlle Théresè d'Aubray, Sainte-Croix suddenly died. As he left no heirs the police were called in, and discovered among his belongings documents seriously incriminating the marquise and La Chaussée. The latter was arrested, tortured into a complete confession, and broken alive on the wheel (1673), but the marquise escaped, taking refuge first probably in England, then in Germany, and finally in a convent at Liége, whence she was decoyed by a police emissary disguised as a priest. A full account of her life and crimes was found among her papers. Her attempt to commit suicide was frustrated, and she was taken to Paris, where she was beheaded and her body burned on the 16th of July 1676.

See G. Roullier, *La Marquise de Brinvilliers* (Paris, 1883); Toiseleur, *Trois énigmes historiques* (Paris, 1882).

[v.04 p.0573]

BRIONIAN ISLANDS, a group of small islands, in the Adriatic Sea, off the west coast of Istria, from which they are separated by the narrow Canale di Fasana. They belong to Austria and are twelve in number. Up to a recent period they were chiefly noted for their quarries, which have been worked for centuries and have supplied material not only for the palaces and bridges of Venice and the whole Adriatic coast, but latterly for Vienna and Berlin also. As they command the entrance to the naval harbour of Pola, a strong fortress, "Fort Tegetthoff," has been erected on the largest of them (Brioni), together with minor fortifications on some of the others. The islands are inhabited by about 100 Italian quarrymen.

BRIOSCO, ANDREA (*c.* 1470-1532), Italian sculptor and architect, known as Riccio ("curly-headed"), was born at Padua. In architecture he is known by the church of Sta Giustina in his native city, but he is most famous as a worker in metal. His masterpieces are the bronze Paschal candelabrum (11 ft. high) in the choir of the Santo (S. Antonio) at Padua (1515), and the two bronze reliefs (1507) of "David dancing before the Ark" and "Judith and Holofernes" in the same church. His bronze and marble tomb of the physician Girolamo della Torre in San Fermo at Verona was beautifully decorated with reliefs, which were taken away by the French and are now in the Louvre. A number of other works which emanated from his workshop are attributed to him; and he has been suggested, but doubtfully, as the author of a fine bronze relief, a "Dance of Nymphs," in the Wallace collection at Hertford House, London.

BRIOUDE, a town of central France, capital of an arrondissement in the department of Haute-Loire, on the left bank of the Allier, 1467 ft. above the sea, 47 m. N.W. of Le Puy on the Paris-Lyon railway. Pop. (1906) 4581. Brioude has to a great extent escaped modernization and still has many old houses and fountains. Its streets are narrow and irregular, but the town is surrounded by wide boulevards lined with trees. The only building of consequence is the church of St Julian (12th and 13th centuries) in the Romanesque style of Auvergne, of which the choir, with its apse and radiating chapels and the mosaic ornamentation of the exterior, is a fine example. Brioude is the seat of a sub-prefect, and of tribunals of first instance and of commerce. The plain in which it is situated is of great fertility; the grain trade of the town is considerable, and market-gardening is carried on in the outskirts. The industries include brewing, saw-milling, lace-making and antimony mining and founding.

Brioude, the ancient *Brinas*, was formerly a place of considerable importance. It was in turn besieged and captured by the Goths (532), the Burgundians, the Saracens (732) and the Normans. In 1181 the viscount of Polignac, who had sacked the town two years previously, made public apology in front of the church, and established a body of twenty-five knights to defend the relics of St Julian. For some time after 1361 the town was the headquarters of Bérenger, lord of Castelnau, who was at the head of one of the bands of military adventurers which then devastated France. The knights (or canons, as they afterwards became) of St Julian bore the title of counts of Brioude, and for a long time opposed themselves to the civic liberties of the inhabitants.

BRIQUEMAULT (or BRIQUEMAUT), **FRANÇOIS DE BEAUVAIS,** SEIGNEUR DE (*c.* 1502-1572), leader of the Huguenots during the first religious wars, was the son of Adrien de Briquemault and Alexane de Sainte Ville, and was born about 1502. His first campaign was under the count of Brissac in the Piedmontese wars. On his return to France in 1554 he joined Admiral Coligny. Charged with the defence of Rouen, in 1562, he resigned in favour of Montgomery, to whom the prince of Condé had entrusted the task, and went over to England, where he concluded the treaty of Hampton Court on the 20th of September. He then returned to France, and took Dieppe from the Catholics before the conclusion of peace. If his share in the second religious war was less important, he played a very active part in the third. He fought at Jarnac, Roche-Abeille and Montcontour, assisted in the siege of Poitiers, was nearly captured by the Catholics at Bourg-Dieu, re-victualled Vézelay, and almost surprised Bourges. In 1570, being charged by Coligny to stop the army of the princes in its ascent of the Rhone valley, he crossed Burgundy and effected his junction with the admiral at St. Étienne in May. On the 21st of the following June he assisted in achieving the victory of Arnay-le-Duc, and was then employed to negotiate a marriage between the prince of Navarre and Elizabeth of England. Being in Paris on the night of St Bartholomew he took refuge in the house of the English ambassador, but was arrested there. With his friend Arnaud da Cavagnes he was delivered over to the parlement, and failed in courage when confronted with his judges, seeking to escape death by unworthy means. He was condemned, nevertheless, on the 27th of October 1572, to the last penalty and to the confiscation of his property, and on the 29th of October he and Cavagnes were executed.

See *Histoire ecclésiastique des Églises réformées au royaume de France* (new edition, 1884), vol.

ii.; *La France protestante* (2nd edition), vol. ii., article "Beauvais."

BRIQUETTE (diminutive of Fr. *brique*, brick), a form of fuel, known also as "patent fuel," consisting of small coal compressed into solid blocks by the aid of some binding material. For making briquettes the small coal, if previously washed, is dried to reduce the moisture to at most 4%, and if necessary crushed in a disintegrator. It is then incorporated in a pug mill with from 8 to 10% of gas pitch, and softened by heating to between 70° and 90° C. to a plastic mass, which is moulded into blocks and compacted by a pressure of ½ to 2 tons per sq. in. in a machine with a rotating die-plate somewhat like that used in making semi-plastic clay bricks. When cold, the briquettes, which usually weigh from 7 to 20 lb each, although smaller sizes are made for domestic use, become quite hard, and can be handled with less breakage than the original coal. Their principal use is as fuel for marine and locomotive boilers, the evaporative value being about the same as, or somewhat greater than, that of coal. The principal seat of the manufacture in Great Britain is in South Wales, where the dust and smalls resulting from the handling of the best steam coals (which are very brittle) are obtainable in large quantities and find no other use. Some varieties of lignite, when crushed and pressed at a steam heat, soften sufficiently to furnish compact briquettes without requiring any cementing material. Briquettes of this kind are made to a large extent from the tertiary lignites in the vicinity of Cologne; they are used mainly for house fuel on the lower Rhine and in Holland, and occasionally come to London.

BRISBANE, SIR THOMAS MAKDOUGALL (1773-1860), Scottish soldier and astronomer, was born on the 23rd of July 1773 at Brisbane House, near Largs, in Ayrshire. He entered the army in 1789, and served in Flanders, the West Indies and the Peninsula. In 1814 he was sent to North America; on the return of Napoleon from Elba he was recalled, but did not arrive in time to take part in the battle of Waterloo. In 1821 he was appointed governor of New South Wales. During the four years for which he held that office, although he allowed the finances of the colony to get into confusion, he endeavoured to improve its condition by introducing the vine, sugar-cane and tobacco plant, and by encouraging the breeding of horses and the reclamation of land. At his instigation exploring parties were sent out, and one of these discovered the Brisbane river which was named after him. He established an astronomical observatory at Paramatta in 1822, and the *Brisbane Catalogue*, which was printed in 1835 and contained 7385 stars, was the result of observations made there in 1822-1826. The observatory was discontinued in 1855. After his return to Scotland he resided chiefly at Makerstoun in Roxburghshire, where, as at Brisbane House, he had a large and admirably equipped observatory. Important magnetic observations were begun at Makerstoun in 1841, and the results gained him in 1848 the Keith prize of the Royal Society of Edinburgh, in whose *Transactions* they were published. In 1836 he was made a baronet, and G.C.B. in 1837; and in 1841 he became general. He was elected president of the Royal Society of Edinburgh after the death of Sir Walter Scott in 1833, and in the following year acted as president of the British Association. He died at Brisbane House on the 27th of January
[v.04 p.0574] 1860. He founded two gold medals for the encouragement of scientific research, one in the award of the Royal Society of Edinburgh, and the other in that of the Scottish Society of Arts.

BRISBANE, the capital of Queensland, Australia. It is situated in Stanley county, on the banks of the river Brisbane, 25 m. from its mouth in Moreton Bay. It is built on a series of hills rising from the river-banks, but some parts of it, such as Woollongabba and South Brisbane, occupy low-lying flats, which have sometimes been the scene of disastrous floods. The main streets and principal buildings of the city are situated on a tongue of land formed by a southward bend of the river. The extremity of the tongue, however, is open. Here, adjoining one another, are the botanical gardens, the grounds surrounding Government House, the official residence of the governor of the colony, and the Houses of Parliament, and Queen's Park, which is used as a recreation ground. From this park Albert Street runs for about three-quarters of a mile through the heart of the city, leading to Albert Park, in which is the observatory. Queen's Street, the main thoroughfare of Brisbane, crosses Albert Street midway between the two parks and leads across the Victoria Bridge to the separate city of South Brisbane on the other side of the river. The Victoria Bridge is a fine steel structure, which replaced the bridge swept away by floods in February 1893. Brisbane has a large number of buildings of architectural merit, though in some cases their effect is marred by the narrowness of the streets in which they stand. Among the most prominent are the Houses of Parliament, the great domed custom-house on the river-bank, the lands office, the general post-office, the town halls of Brisbane and South Brisbane, and the opera house. The Roman Catholic cathedral of St Stephen (Elizabeth Street) is an imposing building, having a detached campanile containing the largest bell in Australia. The foundation-stone of the Anglican cathedral, on an elevated site in Ann Street, was laid by the prince of Wales (as duke of York) in 1901. The city is the seat of a Roman Catholic archbishop and of an Anglican bishop. Many of the commercial and private buildings are also worthy of notice, especially the Queensland National Bank, a classic Italian structure, the massive treasury buildings, one of the largest erections in Australia, the Queensland Club with its wide colonnades in Italian Renaissance style, and the great buildings of the Brisbane Newspaper Company. Brisbane is well provided with parks and open spaces; the Victoria Park and Bowen Park are the largest; the high-lying Mount Coot-tha commands fine views, and there are other parks and numerous recreation grounds in various parts of the city, besides the admirable botanical gardens and the gardens of the Acclimatization Society. Electric tramways and omnibuses serve all parts of the city, and numerous ferries ply across the river. There is railway communication to north, south and west. By careful dredging, the broad river is navigable as far as Brisbane for ocean-going vessels, and the port is the terminal port for the Queensland mail steamers to Europe, and is visited by steamers to China, Japan and America, and for various inter-colonial lines. There is wharf accommodation on both banks of the river, a graving dock which can be used by vessels up to

5000 tons, and two patent slips which can take up ships of 1000 and 400 tons respectively. The exports are chiefly coal, sheep, tallow, wool, frozen meat and hides. The annual value of imports and exports exceeds seven and nine millions sterling respectively. There are boot factories, soap works, breweries, tanneries, tobacco works, &c. The climate is on the whole dry and healthy, but during summer the temperature is high, the mean shade temperature being about 70° F.

Brisbane was founded in 1825 as a penal settlement, taking its name from Sir Thomas Brisbane, then governor of Australia; in 1842 it became a free settlement and in 1859 capital of Queensland, the town up to that time having belonged to New South Wales. It was incorporated in the same year. South Brisbane became a separate city in 1903. The municipal government of the city, and also of South Brisbane, is in the hands of a mayor and ten alderman; the suburbs are controlled by shire councils and divisional boards. The chief suburbs are Kangaroo Point, Fortitude Valley, New Farm, Red Hill, Paddington, Milon, Toowong, Breakfast Creek, Bulimba, Woolongabba, Highgate and Indooroopilly. The population of the metropolitan area in 1901 was 119,907; of the city proper, 28,953; of South Brisbane, 25,481.

BRISEUX, CHARLES ÉTIENNE (*c.* 1680-1754), French architect. He was especially successful as a designer of internal decorations—mantelpieces, mirrors, doors and overdoors, ceilings, consoles, candelabra, wall panellings and other fittings, chiefly in the Louis Quinze mode. He was also an industrious writer on architectural subjects. His principal works are:—*L'Architecture moderne* (2 vols., 1728); *L'Art de bâtir les maisons de campagne* (2 vols., 1743); *Traité du beau essentiel dans les arts, appliqué particulièrement à l'architecture* (1752); and *Traité des proportions harmoniques.*

BRISSAC, DUKES OF. The fief of Brissac in Anjou was acquired at the end of the 15th century by a noble French family named Cossé belonging to the same province. René de Cossé married into the Gouffier family, just then very powerful at court, and became *premier panelier* (chief pantler) to Louis XII. Two of his sons were marshals of France. Brissac was made a countship in 1560 for Charles, the eldest, who was grandmaster of artillery, and governor of Piedmont and of Picardy. The second, Artus, who held the offices of *grand panetier* of France and superintendent of finance, distinguished himself in the religious wars. Charles II. de Cossé fought for the League, and as governor of Paris opened the gates of that town to Henry IV., who created him marshal of France in 1594. Brissac was raised to a duchy in the peerage of France in 1611. Louis Hercule Timoléon de Cossé, due de Brissac, and commandant of the constitutional guard of Louis XVI., was killed at Versailles on the 9th of September 1792 for his devotion to the king.

(M. P.*)

BRISSON, EUGÈNE HENRI (1835-), French statesman, was born at Bourges on the 31st of July 1835. He followed his father's profession of advocate, and having made himself conspicuous in opposition during the last days of the empire, was appointed deputy-mayor of Paris after its overthrow. He was elected to the Assembly on the 8th of February 1871, as a member of the extreme Left. While not approving of the Commune, he was the first to propose amnesty for the condemned (on the 13th of September 1871), but the proposal was voted down. He strongly supported obligatory primary education, and was a firm anti-clerical. He was president of the chamber from 1881—replacing Gambetta—to March 1885, when he became prime minister upon the resignation of Jules Ferry; but he resigned when, after the general elections of that year, he only just obtained a majority for the vote of credit for the Tongking expedition. He remained conspicuous as a public man, took a prominent part in exposing the Panama scandals, was a powerful candidate for the presidency after the murder of President Carnot in 1894, and was again president of the chamber from December 1894 to 1898. In June of the latter year he formed a cabinet when the country was violently excited over the Dreyfus affair; his firmness and honesty increased the respect in which he was already held by good citizens, but a chance vote on an occasion of especial excitement overthrew his ministry in October. As one of the leaders of the radicals he actively supported the ministries of Waldeck-Rousseau and Combes, especially concerning the laws on the religious orders and the separation of church and state. In 1899 he was a candidate for the presidency. In May 1906 he was elected president of the chamber of deputies by 500 out of 581 votes.

BRISSON, MATHURIN JACQUES (1723-1806), French zoologist and natural philosopher, was born at Fontenay le Comte on the 30th of April 1723. The earlier part of his life was spent in the pursuit of natural history, his published works in this department including *Le Règne animal* (1756) and *Ornithologie* (1760). After the death of R.A.F. Réaumur (1683-1757), whose assistant he was, he abandoned natural history, and was appointed professor of natural philosophy at Navarre and later at Paris. His most important work in this department was his *Poids spécifiques des corps* (1787), but he published several other books on physical subjects which were in considerable repute for a time. He died at Croissy near Paris, on the 23rd of June 1806.

[v.04 p.0575] **BRISSOT, JACQUES PIERRE** (1754-1793), who assumed the name of DE WARVILLE, a celebrated French Girondist, was born at Chartres, where his father was an inn-keeper, in January 1754. Brissot received a good education and entered the office of a lawyer at Paris. His first works, *Théorie des lois criminelles* (1781) and *Bibliothèque philosophique du législateur* (1782), were on the philosophy of law, and showed how thoroughly Brissot was imbued with the ethical precepts of Rousseau. The first work was dedicated to Voltaire, and was received by the old *philosophe* with much favour. Brissot became known as a facile and able writer, and was engaged on the *Mercure*, on the *Courrier de l'Europe*, and on other papers. Ardently devoted to the service of humanity, he projected a scheme for a general concourse of all the savants in Europe, and

started in London a paper, *Journal du Lycée de Londres*, which was to be the organ of their views. The plan was unsuccessful, and soon after his return to Paris Brissot was lodged in the Bastille on the charge of having published a work against the government. He obtained his release after four months, and again devoted himself to pamphleteering, but had speedily to retire for a time to London. On this second visit he became acquainted with some of the leading Abolitionists, and founded later in Paris a Société des Amis des Noirs, of which he was president during 1790 and 1791. As an agent of this society he paid a visit to the United States in 1788, and in 1791 published his *Nouveau Voyage dans les États-Unis de l'Amerique Septentrionale* (3 vols.).

From the first, Brissot threw himself heart and soul into the Revolution. He edited the *Patriote français* from 1789 to 1793, and being a well-informed and capable man took a prominent part in affairs. Upon the demolition of the Bastille the keys were presented to him. Famous for his speeches at the Jacobin club, he was elected a member of the municipality of Paris, then of the Legislative Assembly, and later of the National Convention. During the Legislative Assembly his knowledge of foreign affairs enabled him as member of the diplomatic committee practically to direct the foreign policy of France, and the declaration of war against the emperor on the 20th of April 1792, and that against England on the 1st of July 1793, were largely due to him. It was also Brissot who gave these wars the character of revolutionary propaganda. He was in many ways the leading spirit of the Girondists, who were also known as Brissotins. Vergniaud certainly was far superior to him in oratory, but Brissot was quick, eager, impetuous, and a man of wide knowledge. But he was at the same time vacillating, and not qualified to struggle against the fierce energies roused by the events of the Revolution. His party fell before the Mountain; sentence of arrest was passed against the leading members of it on the 2nd of June 1793. Brissot attempted to escape in disguise, but was arrested at Moulins. His demeanour at the trial was quiet and dignified; and on the 31st of October 1793 he died bravely with several other Girondists.

See *Mémoires de Brissot, sur ses contemporains et la Révolution française*, published by his sons, with notes by F. de Montrol (Paris, 1830); Helena Williams, *Souvenirs de la Révolution française* (Paris, 1827); F. A. Aulard, *Les Orateurs de la Législative et de la Convention* 2nd ed., (Paris, 1905); F. A. Aulard, *Les Portraits littéraires à la fin du XVIII^e siècle, pendant la Révolution* (Paris, 1883).

BRISTOL, EARLS AND MARQUESSES OF. This English title has been held in the Hervey family since 1714, though previously an earldom of Bristol, in the Digby family, is associated with two especially famous representatives, of whom separate biographies are given. The Herveys are mentioned during the 13th century as seated in Bedfordshire, and afterwards in Suffolk, where they have held the estate of Ickworth since the 15th century. John Hervey (1616-1679) was the eldest son of Sir William Hervey (d. 1660), and was born on the 18th of August 1616. He held a high position in the household of Catherine, wife of Charles II., and was for many years member of parliament for Hythe. He married Elizabeth, the only surviving child of his kinsman, William, Lord Hervey of Kidbrooke (d. 1642), but left no children when he died on the 18th of January 1679, and his estates passed to his brother, Sir Thomas Hervey. Sir Thomas, who was member of parliament for Bury St Edmunds, died on the 27th of May 1694, and was succeeded by his son, John, who became the 1st earl of Bristol.

JOHN HERVEY, 1st earl of Bristol (1665-1751), born on the 27th of August 1665, was educated at Clare Hall, Cambridge, and became member of parliament for Bury St Edmunds in March 1694. In March 1703 he was created Baron Hervey of Ickworth, and in October 1714 was made earl of Bristol as a reward for his zeal in promoting the principles of the revolution and supporting the Hanoverian succession. He died on the 20th of January 1751. By his first wife, Isabella (d. 1693), daughter of Sir Robert Carr, Bart., of Sleaford, he had one son, Carr, Lord Hervey (1691-1723), who was educated at Clare Hall, Cambridge, and was member for Bury St Edmunds from 1713 to 1722. (It has been suggested that Carr, who died unmarried on the 14th of November 1723, was the father of Horace Walpole.) He married secondly Elizabeth (d. 1741), daughter and co-heiress of Sir Thomas Felton, Bart., of Playford, Suffolk, by whom he had ten sons and six daughters. His eldest son, John (1696-1743), took the courtesy title of Lord Hervey on the death of his half-brother, Carr, in 1723, and gained some renown both as a writer and a politician (see HERVEY OF ICKWORTH). Another son, Thomas (1699-1775), was one of the members for Bury from 1733 to 1747; held various offices at court; and eloped with Elizabeth, wife of Sir Thomas Hanmer. He had very poor health, and his reckless life frequently brought him into pecuniary and other difficulties. He wrote numerous pamphlets, and when he died Dr Johnson said of him, "Tom Hervey, though a vicious man, was one of the genteelest men who ever lived." Another of the 1st earl's sons, Felton (1712-1773), was also member for the family borough of Bury St Edmunds. Having assumed the additional name of Bathurst, Felton's grandson, Felton Elwell Hervey-Bathurst (1782-1819), was created a baronet in 1818, and on his death a year later the title descended to his brother, Frederick Anne (1783-1824), the direct ancestor of the present baronet. The 1st earl died in January 1751, the title and estates descending to his grandson.

GEORGE WILLIAM HERVEY, 2nd earl of Bristol (1721-1775), the eldest son of John, Lord Hervey of Ickworth, by his marriage with Mary (1700-1768), daughter of Nicholas Lepell, was born on the 31st of August 1721. He served for some years in the army, and in 1755 was sent to Turin as envoy extraordinary. He was ambassador at Madrid from 1758 to 1761, filling a difficult position with credit and dignity, and ranked among the followers of Pitt. Appointed lord-lieutenant of Ireland in 1766, he never visited that country during his short tenure of this office, and, after having served for a short time as keeper of the privy seal, became groom of the stole to George

III. in January 1770. He died unmarried on the 18th or 20th of March 1775, and was succeeded by his brother.

Augustus John Hervey, 3rd earl of Bristol (1724-1779), was born on the 19th of May 1724, and entered the navy, where his promotion was rapid. He distinguished himself in several encounters with the French, and was of great assistance to Admiral Hawke in 1759, although he had returned to England before the battle of Quiberon Bay in November 1759. Having served with distinction in the West Indies under Rodney, his active life at sea ceased when the peace of Paris was concluded in February 1763. He was, however, nominally commander-in-chief in the Mediterranean in this year, and was made vice-admiral of the blue in January 1778. Hervey was member of parliament for Bury from 1757 to 1763, and after being for a short time member for Saltash, again represented Bury from 1768 until he succeeded his brother in the peerage in 1775. He often took part in debates in parliament, and was a frequent contributor to periodical literature. Having served as a lord of the admiralty from 1771 to 1775 he won some notoriety as an opponent of the Rockingham ministry and a defender of Admiral Keppel. In August 1744 he had been secretly married to Elizabeth Chudleigh (1720-1788), afterwards duchess of Kingston (*q.v.*), but this union was dissolved in 1769. The earl died in London on the 23rd of December 1779, leaving no legitimate issue, and having, as far as possible, alienated his property from the
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title. He was succeeded by his brother. Many of his letters are in the Record Office, and his journals in the British Museum. Other letters are printed in the *Grenville Papers*, vols. iii. and iv. (London, 1852-1853), and the *Life of Admiral Keppel*, by the Hon. T. Keppel (London, 1852).

Frederick Augustus Hervey, bishop of Derry (1730-1803), who now became 4th earl of Bristol, was born on the 1st of August 1730, and educated at Westminster school and Corpus Christi College, Cambridge, graduating in 1754. Entering the church he became a royal chaplain; and while waiting for other preferment spent some time in Italy, whither he was led by his great interest in art. In February 1767, while his brother, the 2nd earl, was lord-lieutenant of Ireland, he was made bishop of Cloyne, and having improved the property of the see he was translated to the rich bishopric of Derry a year later. Here again he was active and philanthropic. While not neglecting his luxurious personal tastes he spent large sums of money on making roads and assisting agriculture, and his munificence was shared by the city of Londonderry. He built splendid residences at Downhill and Ballyscullion, which he adorned with rare works of art. As a bishop, Hervey was industrious and vigilant; he favoured complete religious equality, and was opposed to the system of tithes. In December 1779 he became earl of Bristol, and in spite of his brother's will succeeded to a considerable property. Having again passed some time in Italy, he returned to Ireland and in 1782 threw himself ardently into the Irish volunteer movement, quickly attaining a prominent position among the volunteers, and in great state attending the convention held in Dublin in November 1783. Carried away by his position and his popularity he talked loudly of rebellion, and his violent language led the government to contemplate his arrest. Subsequently he took no part in politics, spending his later years mainly on the continent of Europe. In 1798 he was imprisoned by the French at Milan, remaining in custody for eighteen months. He died at Albano on the 8th of July 1803, and was buried in Ickworth church. Varying estimates have been found of his character, including favourable ones by John Wesley and Jeremy Bentham. He was undoubtedly clever and cultured, but licentious and eccentric. In later life he openly professed materialistic opinions; he fell in love with the countess Lichtenau, mistress of Frederick William II., king of Prussia; and by his bearing he gave fresh point to the saying that "God created men, women and Herveys." In 1752 he had married Elizabeth (d. 1800), daughter of Sir Jermyn Davers, Bart., by whom he had two sons and three daughters. His elder son, Augustus John, Lord Hervey (1757-1796), had predeceased his father, and he was succeeded in the title by his younger son.

Frederick William Hervey, 5th earl and 1st marquess of Bristol (1769-1859), was born on the 2nd of October 1769. He married Elizabeth Albana (d. 1844), daughter of Clotworthy, 1st Baron Templetown, by whom he had six sons and three daughters. In 1826 he was created marquess of Bristol and Earl Jermyn, and died on the 15th of February 1859. He was succeeded by his son Frederick William (1800-1864), M.P. for Bury St Edmunds 1830-1859, as 2nd marquess; and by the latter's son Frederick William John (1834-1907), M.P. for West Suffolk 1859-1864, as 3rd marquess. The latter's nephew, Frederick William Fane Hervey (b. 1863), who succeeded as 4th marquess, served with distinction in the royal navy, and was M.P. for Bury St Edmunds from 1906 to 1907.

See John, Lord Hervey, *Memoirs of the Reign of George II.*, edited by J.W. Croker (London, 1884); John Hervey, 1st earl of Bristol, *Diary* (Wells, 1894); and *Letter Books of Bristol; with Sir T. Hervey's Letters during Courtship and Poems during Widowhood* (Wells, 1894). Also the articles in the *Dictionary of National Biography*, vol. xxvi. (London, 1891).

BRISTOL, GEORGE DIGBY, 2nd Earl of[1] (1612-1677), eldest son of the 1st earl (see below), was born in October 1612. At the age of twelve he appeared at the bar of the House of Commons and pleaded for his father, then in the Tower, when his youth, graceful person and well-delivered speech made a great impression. He was admitted to Magdalen College, Oxford, on the 15th of August 1626, where he was a favourite pupil of Peter Heylin, and became M.A. in 1636. He spent the following years in study and in travel, from which he returned, according to Clarendon, "the most accomplished person of our nation or perhaps any other nation," and distinguished by a remarkably handsome person. In 1638 and 1639 were written the *Letters between Lord George Digby and Sir Kenelm Digby, Knt. concerning Religion* (publ. 1651), in which Digby attacked Roman Catholicism. In June 1634 Digby was committed to the Fleet till July for striking Crofts, a

gentleman of the court, in Spring Gardens; and possibly his severe treatment and the disfavour shown to his father were the causes of his hostility to the court. He was elected member for Dorsetshire in both the Short and Long parliaments in 1640, and in conjunction with Pym and Hampden he took an active part in the opposition to Charles. He moved on the 9th of November for a committee to consider the "deplorable state" of the kingdom, and on the 11th was included in the committee for the impeachment of Strafford, against whom he at first showed great zeal. He, however, opposed the attainder, made an eloquent speech on the 21st of April 1641, accentuating the weakness of Vane's evidence against the prisoner, and showing the injustice of *ex post facto* legislation. He was regarded in consequence with great hostility by the parliamentary party, and was accused of having stolen from Pym's table Vane's notes on which the prosecution mainly depended. On the 15th of July his speech was burnt by the hangman by the order of the House of Commons. Meanwhile on the 8th of February he had made an important speech in the Commons advocating the reformation and opposing the abolition of episcopacy. On the 8th of June, during the angry discussion on the army plot, he narrowly escaped assault in the House; and the following day, in order to save him from further attacks, the king called him up to the Lords in his father's barony of Digby.

He now became the evil genius of Charles, who had the incredible folly to follow his advice in preference to such men as Hyde and Falkland. In November he is recorded as performing "singular good service," and "doing beyond admiration," in speaking in the Lords against the instruction concerning evil counsellors. He suggested to Charles the impeachment of the five members, and urged upon him the fatal attempt to arrest them on the 4th of January 1642; but he failed to play his part in the Lords in securing the arrest of Lord Mandeville, to whom on the contrary he declared that "the king was very mischievously advised"; and according to Clarendon his imprudence was responsible for the betrayal of the king's plan. Next day he advised the attempt to seize them in the city by force. The same month he was ordered to appear in the Lords to answer a charge of high treason for a supposed armed attempt at Kingston, but fled to Holland, where he joined the queen, and on the 26th of February was impeached. Subsequently he visited Charles at York disguised as a Frenchman, but on the return voyage to Holland he was captured and taken to Hull, where he for some time escaped detection; and at last he cajoled Sir John Hotham, after discovering himself, into permitting his escape. Later he ventured on a second visit to Hull to persuade Hotham to surrender the place to Charles, but this project failed. He was present at Edgehill, and greatly distinguished himself at Lichfield, where he was wounded while leading the assault. He soon, however, threw down his commission in consequence of a quarrel with Prince Rupert, and returned to the king at Oxford, over whom he obtained more influence as the prospect became more gloomy. On the 28th of September 1643 he was appointed secretary of state and a privy councillor, and on the 31st of October high steward of Oxford University. He now supported the queen's disastrous policy of foreign alliances and help from Ireland, and engaged in a series of imprudent and ill-conducted negotiations which greatly injured the king's affairs, while his fierce disputes with Rupert and his party further embarrassed them. On the 14th of October 1645 he was made lieutenant general of the royal forces north of the Trent, with the object of pushing through to join Montrose, but he was
[v.04 p.0577] defeated on the 15th at Sherburn, where his correspondence was captured, disclosing the king's expectations from abroad and from Ireland and his intrigues with the Scots; and after reaching Dumfries, he found his way barred. He escaped on the 24th to the Isle of Man, thence crossing to Ireland, where he caused Glamorgan to be arrested. Here, on this new stage, he believed he was going to achieve wonders. "Have I not carried my body swimmingly," he wrote to Hyde in irrepressible good spirits, "who being before so irreconcilably hated by the Puritan party, have thus seasonably made myself as odious to the Papists?"[2] His project now was to bring over Prince Charles to head a royalist movement in the island; and having joined Charles at Jersey in April 1646, he intended to entrap him on board, but was dissuaded by Hyde. He then travelled to Paris to gain the queen's consent to his scheme, but returned to persuade Charles to go to Paris, and accompanied him thither, revisiting Ireland on the 29th of June once more, and finally escaping to France on the surrender of the island to the parliament. At Paris amongst the royalists he found himself in a nest of enemies eager to pay off old scores. Prince Rupert challenged him, and he fought a duel with Lord Wilmot. He continued his adventures by serving in Louis XIV.'s troops in the war of the Fronde, in which he greatly distinguished himself. He was appointed in 1651 lieutenant-general in the French army, and commander of the forces in Flanders. These new honours, however, were soon lost. During Mazarin's enforced absence from the court Digby aspired to become his successor; and the cardinal, who had from the first penetrated his character and regarded him as a mere adventurer,[3] on his restoration to power sent Digby away on an expedition in Italy; and on his return informed him that he was included in the list of those expelled from France, in accordance with the new treaty with Cromwell. In August 1656 he joined Charles II. at Bruges, and desirous of avenging himself upon the cardinal offered his services to Don John of Austria in the Netherlands, being instrumental in effecting the surrender of the garrison of St Ghislain to Spain in 1657. On the 1st of January 1657 he was appointed by Charles II. secretary of state, but shortly afterwards, having become a Roman Catholic—probably with the view of adapting himself better to his new Spanish friends—he was compelled to resign office. Charles, however, on account of his "jollity" and Spanish experience took him with him to Spain in 1659, though his presence was especially deprecated by the Spanish; but he succeeded in ingratiating himself, and was welcomed by the king of Spain subsequently at Madrid.

By the death of his father Digby had succeeded in January 1659 to the peerage as 2nd earl of Bristol, and had been made K.G. the same month. He returned to England at the restoration,

when he found himself excluded from office on account of his religion, and relegated to only secondary importance. His desire to make a brilliant figure induced a restless and ambitious activity in parliament. He adopted an attitude of violent hostility to Clarendon. In foreign affairs he inclined strongly to the side of Spain, and opposed the king's marriage with Catherine of Portugal. He persuaded Charles to despatch him to Italy to view the Medici princesses, but the royal marriage and treaty with Portugal were settled in his absence. In June 1663 he made an attempt to upset Clarendon's management of the House of Commons, but his intrigue was exposed to the parliament by Charles, and Bristol was obliged to attend the House to exonerate himself, when he confessed that he had "taken the liberty of enlarging," and his "comedian-like speech" excited general amusement. Exasperated by these failures, in a violent scene with the king early in July, he broke out into fierce and disrespectful reproaches, ending with a threat that unless Charles granted his requests within twenty-four hours "he would do somewhat that should awaken him out of his slumbers, and make him look better to his own business." Accordingly on the 10th he impeached Clarendon in the Lords of high treason, and on the charge being dismissed renewed his accusation, and was expelled from the court, only avoiding the warrant issued for his apprehension by a concealment of two years. In January 1664 he caused a new sensation by his appearance at his house at Wimbledon, where he publicly renounced before witnesses his Roman Catholicism, and declared himself a Protestant, his motive being probably to secure immunity from the charge of recusancy preferred against him.[4] When, however, the fall of Clarendon was desired, Bristol was again welcomed at court. He took his seat in the Lords on the 29th of July 1667. "The king," wrote Pepys in November, "who not long ago did say of Bristoll that he was a man able in three years to get himself a fortune in any kingdom in the world and lose all again in three months, do now hug him and commend his parts everywhere above all the world."[5] He pressed eagerly for Clarendon's commital, and on the refusal of the Lords accused them of mutiny and rebellion, and entered his dissent with "great fury."[6] In March 1668 he attended prayers in the Lords. On the 15th of March 1673 though still ostensibly a Roman Catholic, he spoke in favour of the Test Act, describing himself as "a Catholic of the church of Rome, not a Catholic of the court of Rome," and asserting the unfitness of Romanists for public office. His adventurous and erratic career closed by death on the 20th of March 1677.

Bristol was one of the most striking and conspicuous figures of his time, a man of brilliant abilities, a great orator, one who distinguished himself without effort in any sphere of activity he chose to enter, but whose natural gifts were marred by a restless ambition and instability of character fatal to real greatness. Clarendon describes him as "the only man I ever knew of such incomparable parts that was none the wiser for any experience or misfortune that befell him," and records his extraordinary facility in making friends and making enemies. Horace Walpole characterized him in a series of his smartest antitheses as "a singular person whose life was one contradiction." "He wrote against popery and embraced it; he was a zealous opposer of the court and a sacrifice for it; was conscientiously converted in the midst of his prosecution of Lord Strafford and was most unconscientiously a persecutor of Lord Clarendon. With great parts, he always hurt himself and his friends; with romantic bravery, he was always an unsuccessful commander. He spoke for the Test Act, though a Roman Catholic; and addicted himself to astrology on the birthday of true philosophy." Besides his youthful correspondence with Sir K. Digby on the subject of religion already mentioned, he was the author of an *Apologie* (1643, Thomason Tracts, E. 34 (32)), justifying his support of the king's cause; of *Elvira ... a comedy* (1667), printed in R. Dodsley's *Select Collect. of Old English Plays* (Hazlitt, 1876), vol. xv., and of *Worse and Worse*, an adaptation from the Spanish, acted but not printed. Other writings are also ascribed to him, including the authorship with Sir Samuel Tuke of *The Adventures of Five Hours* (1663). His eloquent and pointed speeches, many of which were printed, are included in the article in the *Biog. Brit.* and among the *Thomason Tracts*; see also the general catalogue in the British Museum. The catalogue of his library was published in 1680. He married Lady Anne Russell, daughter of Francis, 4th earl of Bedford, by whom, besides two daughters, he had two sons, Francis, who predeceased him unmarried, and John, who succeeded him as 3rd earl of Bristol, at whose death without issue the peerage became extinct.

Authorities.—See the article in *Dict. Nat. Biog.*; Wood's *Ath. Oxon.* (Bliss), iii. 1100-1105; *Biographia Brit.* (Kippis), v. 210-238; H. Walpole's *Royal and Noble Authors* (Park, 1806), iii. 191; *Roscius Anglicanus*, by J. Downes, pp. 31, 36 (1789); Cunningham's *Lives of Eminent Englishmen* (1837), iii. 29; *Somers Tracts* (1750), iii. (1809), iv.; *Harleian Miscellany* (1808), v., vi.; *Life* by T. H. Lister (1838); *State Papers*.

(P. C. Y.)

[1] *I.e.* in the Digby line; for the Herveys see above.

[2] *Clarendon State Papers*, ii. 201.

[3] *Mémoires du Cardinal de Retz* (1859), app. iii. 437, 442.

[4] Pepys's *Diary*, iv. 51.

[5] *Ib.* vii. 199.

[6] *Ib.* 207; *Protests of the Lords*, by J.E.T. Rogers, i. 36.

BRISTOL, JOHN DIGBY, 1st Earl of[1] (1580-1653) English diplomatist, son of Sir George Digby of Coleshill, Warwickshire, and of Abigail, daughter of Sir Arthur Henningham, was born in

1580, and entered Magdalen College, Oxford, in 1595 (M.A. 1605), becoming a member of the Inner Temple in 1598. In 1605 he was sent to James to inform him of the safety of the princess Elizabeth at the time of the Gunpowder Plot. He gained his favour, was made a gentleman of the privy chamber and one of the king's carvers, and was knighted in 1607. From 1610 to 1611 he was member of parliament for Heydon. In 1611 he was sent as ambassador to Spain to negotiate a marriage between Prince Henry and the infanta Anne, and to champion the cause of the English merchants, for whom he obtained substantial concessions, and arranged the appointment of consuls at Lisbon and Seville. He also discovered a list of the English pensioners of the Spanish court, which included some of the ministers, and came home in 1613 to communicate this important intelligence to the king. In 1614 he again went to Spain to effect a union between the infanta Maria and Charles, though he himself was in favour of a Protestant marriage, and desired a political and not a matrimonial treaty. In 1616, on the disgrace of Somerset, he was recalled home to give evidence concerning the latter's connexions with Spain, was made vice-chamberlain and a privy councillor, and obtained from James the manor of Sherborne forfeited by the late favourite. In 1618 he went once more to Spain to reopen the negotiations, returning in May, and being created Baron Digby on the 25th of November. He endeavoured to avoid a breach with Spain on the election of the elector palatine, the king's son-in-law, to the Bohemian throne; and in March 1621, after the latter's expulsion from Bohemia, Digby was sent to Brussels to obtain a suspension of hostilities in the Palatinate. On the 4th of July he went to Vienna and drew up a scheme of pacification with the emperor, by which Frederick was to abandon Bohemia and be secured in his hereditary territories, but the agreement could never be enforced. After raising money for the defence of Heidelberg he returned home in October, and on the 21st of November explained his policy to the parliament, and asked for money and forces for its execution. The sudden dissolution of parliament, however, prevented the adoption of any measure of support, and entirely ruined Digby's plans. In 1622 he returned to Spain with nothing on which to rely but the goodwill of Philip IV., and nothing to offer but entreaties.

On the 15th of September he was created earl of Bristol. He urged on the marriage treaty, believing it would include favourable conditions for Frederick, but the negotiations were taken out of his control, and finally wrecked by the arrival of Charles himself and Buckingham in March 1623. He incurred their resentment, of which the real inspiration was Buckingham's implacable jealousy, by a letter written to James informing him of Buckingham's unpopularity among the Spanish ministers, and by his endeavouring to maintain the peace with Spain after their departure. In January 1624 he left Spain, and on arriving at Dover in March, Buckingham and Charles having now complete ascendancy over the king, he was forbidden to appear at court and ordered to confine himself at Sherborne. He was required by Buckingham to answer a series of interrogatories, but he refused to inculpate himself and demanded a trial by parliament. On the death of James he was removed by Charles I. from the privy council, and ordered to absent himself from his first parliament. On his demand in January 1626 to be present at the coronation Charles angrily refused, and accused him of having tried to pervert his religion in Spain. In March 1626, after the assembling of the second parliament, Digby applied to the Lords, who supported his rights, and Charles sent him his writ accompanied by a letter from Lord Keeper Coventry desiring him not to use it. Bristol, however, took his seat and demanded justice against Buckingham (Thomason Tracts, E. 126 (20)). The king endeavoured to obstruct his attack by causing Bristol on the 1st of May to be himself brought to the bar, on an accusation of high treason by the attorney-general. The Lords, however, ordered that both charges should be investigated simultaneously. Further proceedings were stopped by the dissolution of parliament on the 15th of June; a prosecution was ordered by Charles in the Star Chamber, and Bristol was sent to the Tower, where he remained till the 17th of March 1628, when the peers, on the assembling of Charles's third parliament, insisted on his liberation and restoration to his seat in the Lords.

In the discussions upon the Petition of Right, Bristol supported the use of the king's prerogative in emergencies, and asserted that the king besides his legal had a regal power, but joined in the demand for a full acceptance of the petition by the king after the first unsatisfactory answer. He was now restored to favour, but took no part in politics till the outbreak of the Scottish rebellion, when he warned Charles of the danger of attacking with inadequate forces. He was the leader in the Great Council held at York, was a commissioner to treat with the Scots in September 1640 at Ripon, and advised strongly the summoning of the parliament. In February 1641 he was one of the peers who advocated reforms in the administration and were given seats in the council. Though no friend to Strafford, he endeavoured to save his life, desiring only to see him excluded from office, and as a witness was excused from voting on the attainder. He was appointed gentleman of the bedchamber on the king's departure for Scotland, and on the 27th of December he was declared an evil counsellor by the House of Commons, Cromwell on the 28th moving an address to the king to dismiss him from his councils, on the plea that he had advocated the bringing up of the northern army to overawe parliament in the preceding spring. There is no evidence to support the charge, but Digby was regarded by the parliamentary party with special hatred and distrust, of which the chief causes were probably his Spanish proclivities and his indifference on the great matter of religion, to which was added the unpopularity reflected from his misguided son. On the 28th of March 1642 he was sent to the Tower for having failed to disclose to parliament the Kentish petition. Liberated in April, he spoke in the Lords on the 20th of May in favour of an accommodation, and again in June in vindication of the king; but finding his efforts ineffectual, and believing all armed rebellion against the king a wicked violation of the most solemn oaths, he joined Charles at York, was present at Edgehill and accompanied him to Oxford. On the 1st of February 1643 he was named with Lord Herbert of Raglan for removal from

the court and public office for ever, and in the propositions of November 1644 was one of those excepted from pardon. In January he had endeavoured to instigate a breach of the Independents with the Scots. Bristol, however, was not in favour of continuing the war, and withdrew to Sherborne, removing in the spring of 1644 to Exeter, and after the surrender of the city retiring abroad on the 11th of July by order of the Houses, which rejected his petition to compound for his estate. He took up his residence at Caen, passing the rest of his life in exile and poverty, and occasionally attending the young king. In 1647 he printed at Caen *An Apology*, defending his support of the royal cause. This was reprinted in 1656 (Thomason Tracts, E. 897, 6). He died at Paris on the 16th of January 1653.

He is described by Clarendon as "a man of grave aspect, of a presence that drew respect, and of great parts and ability, but passionate and supercilious and too voluminous a discourser in council." His aim was to effect a political union between England and Spain apart from the religious or marriage questions—a policy which would probably have benefited both English and European interests; but it was one understood neither in Spain nor in England, and proved impracticable. He was a man of high character, who refused to compound with falsehood and injustice, whose misfortune it was to serve two Stuart sovereigns, and whose firm resistance to the king's tyranny led the way to the great movement which finally destroyed it. Besides his *Apology*, he was the author of several printed speeches and poems, and translated *A Defence of the Catholic Faith* by Peter du Moulin (1610). He married Beatrix, daughter of Charles Walcot, and widow of Sir John Dyve, and besides two daughters left two sons, George, who succeeded him as 2nd earl of Bristol, and John, who died unmarried.

BIBLIOGRAPHY.—The best account of Bristol will be found in the scattered notices of him in the *Hist. of England* and of the *Civil War*, by S. R. Gardiner, who also wrote the short sketch of his career in the *Dict. of Nat. Biog.*, and who highly eulogizes his character and diplomacy. For lives, see *Biographia Britannica* (Kippis), v. 199; Wood's *Ath. Oxon.* (Bliss), iii. 338; D. Lloyd's *Memoires* (1668), 579; Collins's *Peerage* (Brydges, 1812), v. 362; Fuller's *Worthies* (Nichols, 1811), ii. 412; H. Walpole's *Royal and Noble Authors* (Park, 1806), iii. 49; also Clarendon's *Hist of the Rebellion*, esp. vi. 388; *Clarendon State Papers* and *Cal. of Cl. State Papers*; *Old Parliamentary History*; *Cabala* (1691; letters); Camden Soc., *Miscellany*, vol. vi. (1871); *Defence of his Spanish Negotiations*, ed. by S.R. Gardiner; *Somers Tracts* (1809), ii. 501; *Thomason Tracts* in Brit. Museum; *Hardwicke State Papers*, i. 494. The MSS. at Sherborne Castle, of which a selection was transcribed and deposited in the Public Record Office, were calendared by the Hist. MSS. Commission in *Rep.* viii. app. i. p. 213 and 10th *Rep.* app. i. p. 520; there are numerous references to Bristol in various collections calendared in the same publication and in the *Cal. of State Papers, Dom. Series*; see also *Harleian MSS.*, Brit. Mus. 1580, art. 31-48, and *Add. MSS.* indexes and calendars.

[v.04 p.0579]

(P. C. Y.)

[1] *I.e.* in the Digby line; for the Herveys see above.

BRISTOL, a township of Hartford county, Connecticut, U.S.A., in the central part of the state, about 16 m. S.W. of Hartford. It has an area of 27 sq. m., and contains the village of Forestville and the borough of Bristol (incorporated in 1893). Both are situated on the Pequabuck river, and are served by the western branch of the midland division of the New York, New Haven & Hartford railway, and by electric railway to Hartford, New Britain and Terryville. Pop. (1890) 7382; (1900) 9643, including that of the borough, 6268 (1910) 13,502 (borough, 9527). Among the manufactures of the borough of Bristol are clocks, woollen goods, iron castings, hardware, brass ware, silverplate and bells. Bristol clocks, first manufactured soon after the War of Independence, have long been widely known. Bristol, originally a part of the township of Farmington, was first settled about 1727, but did not become an independent corporation until the formation, in 1742, of the first church, known after 1744 as the New Cambridge Society. In 1748 a Protestant Episcopal Church was organized, and before and during the War of Independence its members belonged to the Loyalist party; their rector, Rev. James Nichols, was tarred and feathered by the Whigs, and Moses Dunbar, a member of the church, was hanged for treason by the Connecticut authorities. Chippen's Hill (about 3 m. from the centre of the township) was a favourite rendezvous of the local Loyalists; and a cave there, known as "The Tories' Den," is a well-known landmark. In 1785 New Cambridge and West Britain, another ecclesiastical society of Farmington, were incorporated as the township of Bristol, but in 1806 they were divided into the present townships of Bristol and Burlington.

BRISTOL, a city, county of a city, municipal, county and parliamentary borough, and seaport of England, chiefly in Gloucestershire but partly in Somersetshire, 118½ m. W. of London. Pop. (1901) 328,945. The Avon, here forming the boundary between Gloucestershire and Somerset, though entering the estuary of the Severn (Bristol Channel) only 8 m. below the city, is here confined between considerable hills, with a narrow valley-floor on which the nucleus of the city rests. Between Bristol and the Channel the valley becomes a gorge, crossed at a single stride by the famous Clifton Suspension Bridge. Above Bristol the hills again close in at Keynsham, so that the city lies in a basin-like hollow some 4 m. in diameter, and extends up the heights to the north. The Great Western railway, striking into the Avon valley near Bath, serves Bristol from London, connects it with South Wales by the Severn tunnel, and with the southern and south-western counties of England. Local lines of this company encircle the city on the north and the south, serving the outports of Avonmouth and Portishead on the Bristol Channel. A trunk line of the Midland railway connects Bristol with the north of England by way of Gloucester, Worcester, Birmingham and Derby. Both companies use the central station, Temple Meads.

The nucleus of Bristol lies to the north of the river. The business centre is in the district traversed by Broad Street, High Street, Wine Street and Corn Street, which radiate from a centre close to the Floating Harbour. To the south of this centre, connected with it by Bristol Bridge, an island is formed between the Floating Harbour and the New Course of the Avon, and here are Temple Meads station, above Victoria Street, two of the finest churches (the Temple and St Mary Redcliffe) the general hospital and other public buildings. Immediately above the bridge the little river Frome joins the Avon. Owing to the nature of the site the streets are irregular; in the inner part of the city they are generally narrow, and sometimes, with their ancient gabled houses, extremely picturesque. The principal suburbs surround the city to the west, north and east.

Churches, &c.—In the centre of Bristol a remarkable collection of architectural antiquities is found, principally ecclesiastical. This the city owes mainly to a few great baronial families, such as the earls of Gloucester and the Berkeleys, in its early history, and to a few great merchants, the Canyngs, Shipwards and Framptons, in its later career. The see of Bristol, founded by Henry VIII. in 1542, was united to that of Gloucester in 1836; but again separated in 1896. The diocese includes parts of Gloucestershire and Wiltshire, and a small but populous portion of Somerset. The cathedral, standing above the so-called Canons' Marsh which borders the Floating Harbour, is pleasantly situated on the south side of College Green. It has two western towers and a central tower, nave, short transepts, choir with aisles, an eastern Lady chapel and other chapels; and on the south, a chapter-house and cloister court. The nave is modern (by Street, 1877), imitating the choir of the 14th century, with its curious skeleton-vaulting in the aisles. Besides the canopied tombs of the Berkeleys with their effigies in chain mail, and similarly fine tombs of the crosiered abbots, there are memorials to Bishop Butler, to Sterne's Eliza (Elizabeth Draper), and to Lady Hesketh (the friend of Cowper), who are all interred here. There is also here William Mason's fine epitaph to his wife (d. 1767), beginning "Take, holy earth, all that my soul holds dear." Of Fitz-Harding's abbey of St Augustine, founded in 1142 (of which the present cathedral was the church), the stately entrance gateway, with its sculptured mouldings, remains hardly injured. The abbot's gateway, the vestibule to the chapter-house, and the chapter-house itself, which is carved with Byzantine exuberance of decoration, and acknowledged to be one of the finest Norman chambers in Europe, are also perfect. On the north side of College Green is the small but ornate Mayor's chapel (originally St Mark's), devoted to the services of the mayor and corporation. It is mainly Decorated and Perpendicular. Of the churches within the centre of the city, the following are found within a radius of half-a-mile from Bristol Bridge. St Stephen's church, built between 1450 and 1490, is a dignified structure, chiefly interesting for its fan-traceried porch and stately tower. It was built entirely by the munificence of John Shipward, a wealthy merchant. The tower and spire of St John's (15th century) stand on one of the gateways of the city. This church is a parallelogram, without east or west windows or aisles, and is built upon a fine groined crypt. St James's church, the burial place of its founder, Robert, earl of Gloucester, dates from 1130, and fine Norman work remains in the nave. The tower is of the 14th century. St Philip's has an Early English tower, but its external walls and windows are for the most part debased Perpendicular. Robert FitzHamon's Norman tower of St Peter, the oldest church tower in Bristol, still presents its massive square to the eye. This church stands in Castle Street, which commemorates the castle of Robert, earl of Gloucester, the walls of which were 25 ft. thick at the base. Nothing remains of this foundation, but there still exist some walls and vaults of the later stronghold, including a fine Early English cell. Adjacent to the church is St Peter's hospital, a picturesque gabled building of Jacobean and earlier date, with a fine court room. St Mary le Port and St Augustine the Less are churches of the Perpendicular era, and not the richest specimens of their kind. St Nicholas church is modern, on a crypt of the date 1503, and earlier. On the island south of the Floating Harbour are two of the most interesting churches in the city. Temple church, with its leaning tower, 5 ft. off the perpendicular, retains nothing of the Templars' period, but is a fine building of the Decorated and Perpendicular periods. The church of St Mary Redcliffe, for grandeur of proportion and elaboration of design and finish, is the first ecclesiastical building in Bristol, and takes high rank among the parish churches of England. It was built for the most part in the latter part of the 14th century by William Canyng or Canynges (*q.v.*), but the sculptured north porch is externally Decorated, and internally Early English. The fine tower is also Decorated, on an Early English base. The spire, Decorated in style, is modern. Among numerous monuments is that of Admiral Penn (d. 1718), the father of the founder of Pennsylvania. The church exhibits the rare feature of transeptal aisles. Of St Thomas's, in the vicinity, only the tower (15th century) remains of the old structures. All Hallows church has a modern Italian campanile, but is in the main of the 15th century, with the retention of four Norman piers in the nave; and is interesting from its connexion with the ancient gild of calendars, whose office it was "to convert Jews, instruct youths," and keep the archives of the town. Theirs was the first free library in the city, possibly in England. The records of the church contain a singularly picturesque representation of the ancient customs of the fraternity.

Cathedral.

[v.04 p.0580]

Among conventual remains, besides those already mentioned, there exist of the Dominican priory the Early English refectory and dormitory, the latter comprising a row of fifteen original windows and an oak roof of the same date; and of St Bartholomew's hospital there is a double arch, with intervening arcades, also Early English. These, with the small chapel of the Three Kings of Cologne, Holy Trinity Hospital, both Perpendicular, and the remains of the house of the Augustinian canons attached to the cathedral, comprise the whole of the monastic relics.

There are many good specimens of ancient domestic architecture—notably some arches of a grand Norman hall and some Tudor windows of Colston's house, Small Street; and Canyng's house, with good Perpendicular oak roof. Of buildings to which historic interest attaches, there

are the Merchant Venturers' almshouses (1699), adjoining their hall. This gild was established in the 16th century. A small house near St Mary Redcliffe was the school where the poet Chatterton received his education. His memorial is in the churchyard of St Mary, and in the church a chest contains the records among which he claimed to have discovered some of the manuscripts which were in reality his own. A house in Wine Street was the birthplace of the poet-laureate Robert Southey (1744).

Public Buildings, &c.—The public buildings are somewhat overshadowed in interest by the ecclesiastical. The council house, at the "Cross" of the four main thoroughfares, dates from 1827, was enlarged in 1894, and contains the city archives and many portraits, including a Van Dyck and a Kneller. The Guildhall is close by—a modern Gothic building. The exchange (used as a corn-market) is a noteworthy building by the famous architect of Bath, John Wood (1743). Edward Colston, a revered citizen and benefactor of the city (d. 1721), is commemorated by name in several buildings and institutions, notably in Colston Hall, which is used for concerts and meetings. A bank close by St Stephen's church claims to have originated in the first savings-bank established in England (1812). Similarly, the city free library (1613) is considered to be the original of its kind. The Bristol museum and reference library were transferred to the corporation in 1893. Vincent Stuckey Lean (d. 1899) bequeathed to the corporation of Bristol the sum of £50,000 for the further development of the free libraries of the city, and with especial regard to the formation and sustenance of a general reference library of a standard and scientific character. The central library was opened in 1906. An art gallery, presented by Sir William Henry Wills, was opened in 1905.

Among educational establishments, the technical college of the Company of Merchant Venturers (1885) supplies scientific, technical and commercial education. The extensive buildings of this institution were destroyed by fire in 1906. University College (1876) forms the nucleus of the university of Bristol (chartered 1909). Clifton College, opened in 1862 and incorporated in 1877, includes a physical science school, with laboratories, a museum and observatory. Colston's girls' day school (1891) includes domestic economy and calisthenics. Among the many charitable institutions are the general hospital, opened in 1858, and since repeatedly enlarged; royal hospital for sick children and women, Royal Victoria home, and the Queen Victoria jubilee convalescent home.

Of the open spaces in and near Bristol the most extensive are those bordering the river in the neighbourhood of the gorge, Durdham and Clifton Downs, on the Gloucestershire side (see CLIFTON). Others are Victoria Park, south of the river, near the Bedminster station, Eastville Park by the Frome, on the north-east of the city beyond Stapleton Road station, St Andrew's Park near Montpelier station to the north, and Brandon Hill, west of the cathedral, an abrupt eminence commanding a fine view over the city, and crowned with a modern tower commemorating the "fourth centenary of the discovery of America by John Cabot, and sons Lewis, Sebastian and Sanctus." Other memorials in the city are the High Cross on College Green (1850), and statues of Queen Victoria (1888), Samuel Morley (1888), Edmund Burke (1894), and Edward Colston (1895), in whose memory are held annual Colston banquets.

Harbour and Trade.—Bristol harbour was formed in 1809 by the conversion of the Avon and a branch of the Frome into "the Float," by the cutting of a new channel for the Avon and the formation of two basins. Altogether the water area, at fixed level, is about 85 acres. Four dry docks open into the floating harbour. In 1884 the Avonmouth and Portishead docks at the river entrance were bought up by the city; and the port extends from Hanham Mills on the Avon to the mouth of the river, and for some distance down the estuary of the Severn. The city docks have a depth of 22 ft., while those at Avonmouth are accessible to the largest vessels. In 1902 the construction of the extensive Royal Edward dock at Avonmouth was put in hand by the corporation, and the dock was opened by King Edward VII. in 1908. It is entered by a lock 875 ft. long and 100 ft. wide, with a depth of water on the sill of 46 ft. at ordinary spring, and 36 ft. at ordinary neap tides. The dock itself has a mean length of 1120 ft. and a breadth of 1000 ft., and there is a branch and passage connecting with the old dock. The water area is about 30 acres, and the dock is so constructed as to be easily capable of extension. Portishead dock, on the Somerset shore, has an area of 12 acres. The port has a large trade with America, the West Indies and elsewhere, the principal imports being grain, fruit, oils, ore, timber, hides, cattle and general merchandise; while the exports include machinery, manufactured oils, cotton goods, tin and salt. The Elder Dempster, Dominion and other large steamship companies trade at the port.

The principal industries are shipbuilding, ropewalks, chocolate factories, sugar refineries, tobacco mills and pipe-making, glass works, potteries, soaperies, shoe factories, leather works and tanneries, chemical works, saw mills, breweries, copper, lead and shot works, iron works, machine works, stained-paper works, anchors, chain cables, sail-cloth, buttons. A coalfield extending 16 m. south-east to Radstock avails much for Bristol manufactures.

The parliamentary borough is divided into four divisions, each returning one member. The government of the city is in the hands of a lord mayor, 22 aldermen and 66 councillors. The area in 1901 was 11,705 acres; but in 1904 it was increased to 17,004 acres.

History.—Bristol (Brigstow, Bristou, Bristow, Bristole) is one of the best examples of a town that has owed its greatness entirely to trade. It was never a shire town or the site of a great religious house, and it owed little to its position as the head of a feudal lordship, or as a military post. Though it is near both British and Roman camps, there is no evidence of a British or Roman settlement. It was the western limit of the Saxon invasion of Britain, and about the year 1000 a

[v.04 p.0581]

Saxon settlement began to grow up at the junction of the rivers Frome and Avon, the natural advantages of the situation favouring the growth of the township. Bristol owed much to Danish rule, and during the reign of Canute, when the wool trade with Ireland began, it became the market for English slaves. In the reign of Edward the Confessor the town was included in the earldom of Sweyn Godwinsson, and at the date of the Domesday survey it was already a royal borough governed by a reeve appointed by the king as overlord, the king's geld being assessed at 110 marks. There was a mint at the time of the Conquest, which proves that Bristol must have been already a place of some size, though the fact that the town was a member of the royal manor of Baston shows that its importance was still of recent growth. One-third of the geld was paid to Geoffrey de Coutances, bishop of Exeter, who threw up the earthworks of the castle. He joined in a rebellion against William II., and after his death the king granted the town and castle, as part of the honour of Gloucester, to Robert FitzHamon, whose daughter Mabel, marrying Earl Robert of Gloucester in 1119, brought him Bristol as her dowry. Earl Robert still further strengthened the castle, probably with masonry, and involved Bristol in the rebellion against Stephen. From the castle he harried the whole neighbourhood, threatened Bath, and sold his prisoners as slaves to Ireland. A contemporary chronicler describes Bristol castle as "seated on a mighty mound, and garrisoned with knights and foot soldiers or rather robbers and raiders," and he calls Bristol the stepmother of England.

The history of the charters granted to Bristol begins about this time. A charter granted by Henry II. in 1172 exempted the burgesses of Bristol from certain tolls throughout the kingdom, and confirmed existing liberties. Another charter of the same year granted the city of Dublin to the men of Bristol as a colony with the same liberties as their own town.

As a result probably of the close connexion between Bristol and Ireland the growth of the wool trade was maintained. Many Bristol men settled in Dublin, which for a long time was a Bristol beyond the seas, its charters being almost duplicates of those granted to Bristol. About this time Bristol began to export wool to the Baltic, and had developed a wine trade with the south of France, while soap-making and tanning were flourishing industries. Bristol was still organized manorially rather than municipally. Its chief courts were the weekly hundred court and the court leet held three times a year, and presided over by the reeve appointed by the earl of Gloucester. By the marriage of Earl John with the heiress of Earl William of Gloucester, Bristol became part of the royal demesne, the rent payable to the king being fixed, and the town shook off the feudal yoke. The charter granted by John in 1190 was an epoch in the history of the borough. It provided that no burgess should be impleaded without the walls, that no non-burgess should sell wine, cloth, wool, leather or corn in Bristol, that all should hold by burgage tenure, that corn need not be ground at the lord's mill, and that the burgesses should have all their reasonable gilds. At some uncertain date soon after this a commune was established in Bristol on the French model, Robert FitzNichol, the first mayor of Bristol, taking the oath in 1200. The mayor was chosen, not, like the reeve whom he had displaced, by the overlord, but by the merchants of Bristol who were members of the merchant gild. The first documentary evidence of the existence of the merchant gild appears in 1242. In addition, there were many craft gilds (later at least twenty-six were known to exist), the most important being the gilds of the weavers, tuckers and fullers, and the Gild of the Kalendars of Bristol, which devoted itself to religious, educational and social work. The mayor of Bristol was helped by two assistants, who were called provosts until 1267, and from 1267 to 1311 were known as stewards, and after that date as bailiffs. Before this time many religious houses had been founded. Earl Robert of Gloucester established the Benedictine priory of St James; there were Dominican and Franciscan priories, a monastery of Carmelites, and an abbey of St Augustine founded by Robert FitzHardinge.

In the reign of John, Bristol began the struggle to absorb the neighbouring manor of Bedminster, the eastern half of which was held by the Templars by gift of Earl Robert of Gloucester, and the western half, known as Redcliffe, was sold by the same earl to Robert FitzHardinge, afterwards Lord Berkeley. The Templars acquiesced without much difficulty, but the wealthy owners of the manor of Redcliffe, who had their own manorial courts, market, fair and quay, resisted the union for nearly one hundred years. In 1247 a new course was cut for the river Frome which vastly improved the harbour, and in the same year a stone bridge was built over the Avon, bringing Temple and Redcliffe into closer touch with the city. The charter granted by Henry III. in 1256 was important. It gave the burgesses the right to choose coroners, and as they already farmed the geld payable to the king, Bristol must have been practically independent of the king. The growing exclusiveness of the merchant gild led to the great insurrection of 1312. The oligarchical party was supported by the Berkeleys, but the opposition continued their rebellion until 1313, when the town was besieged and taken by the royal forces. During the reign of Edward III. cloth manufacture developed in Bristol. Thomas Blanket set up looms in 1337, employing many foreign workmen, and in 1353 Bristol was made one of the Staple towns, the office of mayor of the staple being held by the mayor of the town.

The charter of 1373 extended the boundaries of the town to include Redcliffe (thus settling the long-standing dispute) and the waters of the Avon and Severn up to the Steep and Flat Holmes; and made Bristol a county in itself, independent of the county courts, with an elected sheriff, and a council of forty to be chosen by the mayor and sheriff. The town was divided into five wards, each represented by an alderman, the aldermen alone being eligible for the mayoralty. This charter (confirmed in 1377 and 1488) was followed by the period of Bristol's greatest prosperity, the era of William Canyng, of the foundation of the Society of Merchant Venturers, and of the voyages of John and Sebastian Cabot. William Canyng (1399-1474) was five times mayor and twice represented Bristol in parliament; he carried on a huge cloth trade with the Baltic and

rebuilt St Mary Redcliffe. At the same time cloth was exported by Bristol merchants to France, Spain and the Levant. The records of the Society of Merchant Venturers began in 1467, and the society increased in influence so rapidly that in 1500 it directed all the foreign trade of the city and had a lease of the port dues. It was incorporated in 1552, and received other charters in 1638 and 1662. Henry VII. granted Bristol a charter in 1499 (confirmed in 1510) which removed the theoretically popular basis of the corporation by the provision that the aldermen were to be elected by the mayor and council. At the dissolution of the monasteries the diocese of Bristol was founded, which included the counties of Bristol and Dorset. The voyages of discovery in which Bristol had played a conspicuous part led to a further trade development. In the 16th century Bristol traded with Spain, the Canaries and the Spanish colonies in America, shared in the attempt to colonize Newfoundland, and began the trade in African slaves which flourished during the 17th century. Bristol took a great share in the Civil War and was three times besieged. Charles II. granted a formal charter of incorporation in 1664, the governing body being the mayor, 12 aldermen, 30 common councilmen, 2 sheriffs, 2 coroners, a town clerk, clerk of the peace and 39 minor officials, the governing body itself filling up all vacancies in its number. In the 18th century the cloth trade declined owing to the competition of Ireland and to the general migration of manufactures to the northern coalfields, but the prosperity of the city was maintained by the introduction of manufactures of iron, brass, tin and copper, and by the flourishing West Indian trade, sugar being taken in exchange for African slaves.

The hot wells became fashionable in the reign of Anne (who granted a charter in 1710), and a little later Bristol was the centre of the Methodist revival of Whitefield and Wesley. The city was small, densely populated and dirty, with dark, narrow streets, and the mob gained an unenviable notoriety for violence in the riots of 1708, 1753, 1767 and 1831. At the beginning of the 19th century it was obvious that the prosperity of Bristol was diminishing, comparatively if not actually, owing to (1) the rise of Liverpool, which had more natural facilities as a port than Bristol
[v.04 p.0582] could offer, (2) the abolition of the slave trade, which ruined the West Indian sugar trade, and (3) the extortionate rates levied by the Bristol Dock Company, incorporated in 1803. These rates made competition with Liverpool and London impossible, while other tolls were levied by the Merchant Venturers and the corporation. The decline was checked by the efforts of the Bristol chamber of commerce (founded in 1823) and by the Municipal Reform Act of 1835. The new corporation, consisting of 48 councillors and 16 aldermen who elected the mayor, being themselves chosen by the burgesses of each ward, bought the docks in 1848 and reduced the fees. In 1877-1880 the docks at the mouth of the river at Avonmouth and Portishead were made, and these were bought by the corporation in 1884. A revival of trade, rapid increase of population and enlargement of the boundaries of the city followed. The chief magistrate became a lord mayor in 1899.

See J. Corry, *History of Bristol* (Bristol, 1816); J. Wallaway, *Antiquities* (1834); J. Evans, *Chronological History of Bristol* (1824); Bristol vol. of *Brit. Archaeol. Inst.*; J.F. Nicholl and J. Taylor, *Bristol Past and Present* (Bristol and London, 1882); W. Hunt, *Bristol*, in "Historic Towns" series (London, 1887); J. Latimer, *Annals of Bristol* (various periods); G.E. Weare, *Collectanea relating to the Bristol Friars* (Bristol, 1893); Samuel Seyer, *History of Bristol and Bristol Charters* (1812); *The Little Red Book of Bristol* (1900); *The Maior's Kalendar* (Camden Soc., 1872); *Victoria County History, Gloucester*.

BRISTOL, a borough of Bucks county, Pennsylvania, U.S.A., on the Delaware river, opposite Burlington, New Jersey, 20 m. N.E. of Philadelphia. Pop. (1890) 6553; (1900) 7104 (1134 foreign-born); (1910) 9256. It is served by the Pennsylvania railway. The borough is built on level ground elevated several feet above the river, and in the midst of an attractive farming country. The principal business houses are on Mill Street; while Radcliffe Street extends along the river. Among Bristol's manufacturing establishments are machine shops, rolling mills, a planing mill, yarn, hosiery and worsted mills, and factories for making carpets, wall paper and patent leather. Bath Springs are located just outside the borough limits; though not so famous as they were early in the 18th century, these springs are still well known for the medicinal properties of their chalybeate waters. Bristol was one of the first places to be settled in Pennsylvania after William Penn received his charter for the province in 1681, and from its settlement until 1725 it was the seat of government of the county. It was laid out in 1697 and was incorporated as a borough in 1720; the present charter, however, dates only from 1851.

BRISTOL, the shire-township of Bristol county, Rhode Island, U.S.A., about 15 m. S.S.E. of Providence, between Narragansett Bay on the W. and Mount Hope Bay on the E., thus being a peninsula. Pop. (1900) 6901, of whom 1923 were foreign-born; (1905; state census) 7512; (1910) 8565; area 12 sq. m. It is served by the New York, New Haven & Hartford, and the Rhode Island Suburban railways, and is connected with the island of Rhode Island by ferry. Mount Hope (216 ft.), on the eastern side, commands delightful views of landscape, bay and river scenery. Elsewhere in the township the surface is gently undulating and generally well adapted to agriculture, especially to the growing of onions. A small island, Hog Island, is included in the township. The principal village, also known as Bristol, is a port of entry with a capacious and deep harbour, has manufactories of rubber and woollen goods, and is well known as a yacht-building centre, several defenders of the America's Cup, including the "Columbia" and the "Reliance," having been built in the Herreshoff yards here. At the close of King Philip's War in 1676, Mount Hope Neck (which had been the seat of the vanquished sachem), with most of what is now the township of Bristol, was awarded to Plymouth Colony. In 1680, immediately after Plymouth had conveyed the "Neck" to a company of four, the village was laid out; the following year, in anticipation of future commercial importance, the township and the village were named

Bristol, from the town in England. The township became the shire-township in 1685, passed under the jurisdiction of Massachusetts in 1692, and in 1747 was annexed to Rhode Island. During the War of Independence the village was bombarded by the British on the 7th of October 1775, but suffered little damage; on the 25th of May 1778 it was visited and partially destroyed by a British force.

BRISTOL, a city of Sullivan county, Tennessee, and Washington county, Virginia, U.S.A., 130 m. N.E. of Knoxville, Tennessee, at an altitude of about 1700 ft. Pop. (1880) 3209; (1890) 6226; (1900) 9850 (including 1981 negroes); (1910) 13,395, of whom 7148 were in Tennessee and 6247 were in Virginia. Bristol is served by the Holston Valley, the Southern, the Virginia & South-Western, and the Norfolk & Western railways, and is a railway centre of some importance. It is near the great mineral deposits of Virginia, Tennessee, West Virginia, Kentucky and North Carolina; an important distributing point for iron, coal and coke; and has tanneries and lumber mills, iron furnaces, tobacco factories, furniture factories and packing houses. It is the seat of Sullins College (Methodist Episcopal, South; 1870) for women, and of the Virginia Institute for Women (Baptist, 1884), both in the state of Virginia, and of a normal college for negroes, on the Tennessee side of the state line. The Tennessee-Virginia boundary line runs through the principal street, dividing the place into two separate corporations, the Virginia part, which before 1890 (when it was chartered as a city) was known as Goodson, being administratively independent of the county in which it is situated. Bristol was settled about 1835, and the town of Bristol, Tennessee, was first incorporated in 1856.

BRISTOW, BENJAMIN HELM (1832-1896), American lawyer and politician, was born in Elkton, Kentucky, on the 20th of June 1832, the son of Francis Marion Bristow (1804-1864), a Whig member of Congress in 1854-1855 and 1859-1861. He graduated at Jefferson College, Canonsburg, Pennsylvania, in 1851, studied law under his father, and was admitted to the Kentucky bar in 1853. At the beginning of the Civil War he became lieutenant-colonel of the 25th Kentucky Infantry; was severely wounded at Shiloh; helped to recruit the 8th Kentucky Cavalry, of which he was lieutenant-colonel and later colonel; and assisted at the capture of John H. Morgan in July 1863. In 1863-1865 he was state senator; in 1865-1866 assistant United States district-attorney, and in 1866-1870 district-attorney for the Louisville district; and in 1870-1872, after a few months' practice of law with John M. Harlan, was the (first appointed) solicitor-general of the United States. In 1873 President Grant nominated him attorney-general of the United States in case George H. Williams were confirmed as chief justice of the United States,—a contingency which did not arise. As secretary of the treasury (1874-1876) he prosecuted with vigour the so-called "Whisky Ring," the headquarters of which was at St Louis, and which, beginning in 1870 or 1871, had defrauded the Federal government out of a large part of its rightful revenue from the distillation of whisky. Distillers and revenue officers in St Louis, Milwaukee, Cincinnati and other cities were implicated, and the illicit gains—which in St Louis alone probably amounted to more than $2,500,000 in the six years 1870-1876—were divided between the distillers and the revenue officers, who levied assessments on distillers ostensibly for a Republican campaign fund to be used in furthering Grant's re-election. Prominent among the ring's alleged accomplices at Washington was Orville E. Babcock, private secretary to President Grant, whose personal friendship for Babcock led him to indiscreet interference in the prosecution. Through Bristow's efforts more than 200 men were indicted, a number of whom were convicted, but after some months' imprisonment were pardoned. Largely owing to friction between himself and the president, Bristow resigned his portfolio in June 1876; as secretary of the treasury he advocated the resumption of specie payments and at least a partial retirement of "greenbacks"; and he was also an advocate of civil service reform. He was a prominent candidate for the Republican presidential nomination in 1876. After 1878 he practised law in New York City, where he died on the 22nd of June 1896.

See *Memorial of Benjamin Helm Bristow*, largely prepared by David Willcox (Cambridge, Mass., privately printed, 1897); *Whiskey Frauds*, 44th Cong., 1st Sess., Mis. Doc. No. 186; *Secrets of the Great Whiskey Ring* (Chicago, 1880), by John McDonald, who for nearly six years had been supervisor of internal revenue at St Louis,—a book by one concerned and to be considered in that light.

[v.04 p.0583] **BRISTOW, HENRY WILLIAM** (1817-1889), English geologist, son of Major-General H. Bristow, who served in the Peninsular War, was born on the 17th of May 1817. He was educated at King's College, London, under John Phillips, then professor of geology. In 1842 he was appointed assistant geologist on the Geological Survey, and in that service he remained for forty-six years, becoming director for England and Wales in 1872, and retiring in 1888. He was elected F.R.S. in 1862. He died in London on the 14th of June 1889. His publications (see *Geol. Mag.*, 1889, p. 384) include *A Glossary of Mineralogy* (1861) and *The Geology of the Isle of Wight* (1862).

BRITAIN (Gr. Πρετανικαὶ νῆσοι, Βρεττανία; Lat. *Britannia*, rarely *Brittania*), the anglicized form of the classical name of England, Wales and Scotland, sometimes extended to the British Isles as a whole (*Britannicae Insulae*). The Greek and Roman forms are doubtless attempts to reproduce a Celtic original, the exact form of which is still matter of dispute. Brittany (Fr. *Bretagne*) in western France derived its name from Britain owing to migrations in the 5th and 6th century A.D. The personification of Britannia as a female figure may be traced back as far as the coins of Hadrian and Antoninus Pius (early 2nd century A.D.); its first appearance on modern coins is on the copper of Charles II. (see NUMISMATICS).

In what follows, the archaeological interest of early Britain is dealt with, in connexion with the history of Britain in Pre-Roman, Roman, and Anglo-Saxon days; this account being supplementary

to the articles ENGLAND; ENGLISH HISTORY; SCOTLAND, &c.

PRE-ROMAN BRITAIN

Geologists are not yet agreed when and by whom Britain was first peopled. Probably the island was invaded by a succession of races. The first, the Paleolithic men, may have died out or retired before successors arrived. During the Neolithic and Bronze Ages we can dimly trace further immigrations. Real knowledge begins with two Celtic invasions, that of the Goidels in the later part of the Bronze Age, and that of the Brythons and Belgae in the Iron Age. These invaders brought Celtic civilization and dialects. It is uncertain how far they were themselves Celtic in blood and how far they were numerous enough to absorb or obliterate the races which they found in Britain. But it is not unreasonable to think that they were no mere conquering caste, and that they were of the same race as the Celtic-speaking peoples of the western continent. By the age of Julius Caesar all the inhabitants of Britain, except perhaps some tribes of the far north, were Celts in speech and customs. Politically they were divided into separate and generally warring tribes, each under its own princes. They dwelt in hill forts with walls of earth or rude stone, or in villages of round huts sunk into the ground and resembling those found in parts of northern Gaul, or in subterranean chambered houses, or in hamlets of pile-dwellings constructed among the marshes. But, at least in the south, market centres had sprung up, town life was beginning, houses of a better type were perhaps coming into use, and the southern tribes employed a gold coinage and also a currency of iron bars or ingots, attested by Caesar and by surviving examples, which weigh roughly, some two-thirds of a pound, some 2⅔ lb, but mostly 1⅓ lb. In religion, the chief feature was the priesthood of Druids, who here, as in Gaul, practised magical arts and barbarous rites of human sacrifice, taught a secret lore, wielded great influence, but, at least as Druids, took ordinarily no part in politics. In art, these tribes possessed a native Late Celtic fashion, descended from far-off Mediterranean antecedents and more directly connected with the La-Tène culture of the continental Celts. Its characteristics were a flamboyant and fantastic treatment of plant and animal (though not of human) forms, a free use of the geometrical device called the "returning spiral," and much skill in enamelling. Its finest products were in bronze, but the artistic impulse spread to humbler work in wood and pottery. The late Celtic age was one which genuinely delighted in beauty of form and detail. In this it resembled the middle ages rather than the Roman empire or the present day, and it resembled them all the more in that its love of beauty, like theirs, was mixed with a feeling for the fantastic and the grotesque. The Roman conquest of northern Gaul (57-50 B.C.) brought Britain into definite relation with the Mediterranean. It was already closely connected with Gaul, and when Roman civilization and its products invaded Gallia Belgica, they passed on easily to Britain. The British coinage now begins to bear Roman legends, and after Caesar's two raids (55, 54 B.C.) the southern tribes were regarded at Rome, though they do not seem to have regarded themselves, as vassals. Actual conquest was, however, delayed. Augustus planned it. But both he and his successor Tiberius realized that the greater need was to consolidate the existing empire, and absorb the vast additions recently made to it by Pompey, Caesar and Augustus.

ROMAN BRITAIN

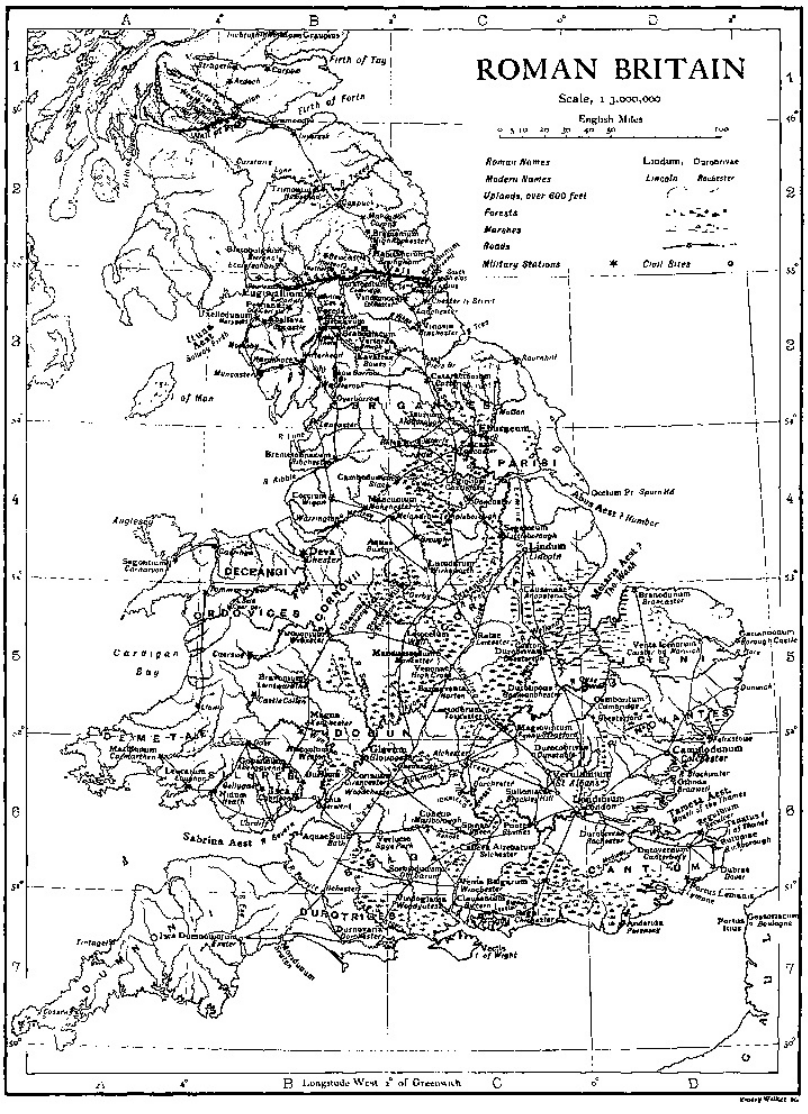
I. *The Roman Conquest.*—The conquest of Britain was undertaken by Claudius in A.D. 43. Two causes coincided to produce the step. On the one hand a forward policy then ruled at Rome, leading to annexations in various lands. On the other hand, a probably philo-Roman prince, Cunobelin (known to literature as Cymbeline), had just been succeeded by two sons, Caractacus (*q.v.*) and Togodumnus, who were hostile to Rome. Caligula, the half-insane predecessor of Claudius, had made in respect to this event some blunder which we know only through a sensational exaggeration, but which doubtless had to be made good. An immediate reason for action was the appeal of a fugitive British prince, presumably a Roman partisan and victim of Cunobelin's sons. So Aulus Plautius with a singularly well equipped army of some 40,000 men landed in Kent and advanced on London. Here Claudius himself appeared—the one reigning emperor of the 1st century who crossed the waves of ocean,—and the army, crossing the Thames, moved forward through Essex and captured the native capital, Camulodūnum, now Colchester. From the base of London and Colchester three corps continued the conquest. The left wing, the Second Legion (under Vespasian, afterwards emperor), subdued the south; the centre, the Fourteenth and Twentieth Legions, subdued the midlands, while the right wing, the Ninth Legion, advanced through the eastern part of the island. This strategy was at first triumphant. The lowlands of Britain, with their partly Romanized and partly scanty population and their easy physical features, presented no obstacle. Within three or four years everything south of the Humber and east of the Severn had been either directly annexed or entrusted, as protectorates, to native client-princes.

A more difficult task remained. The wild hills and wilder tribes of Wales and Yorkshire offered far fiercer resistance. There followed thirty years of intermittent hill fighting (A.D. 47-79). The precise steps of the conquest are not known. Legionary fortresses were established at Wroxeter (for a time only), Chester and Caerleon, facing the Welsh hills, and at Lincoln in the northeast. Monmouthshire, and Flintshire with its lead mines, were early overrun; in 60 Suetonius Paulinus reached Anglesea. The method of conquest was the establishment of small detached forts in strategic positions, each garrisoned by 500 or 1000 men, and it was accompanied by a full share of those disasters which vigorous barbarians always inflict on civilized invaders. Progress was delayed too by the great revolt of Boadicea (*q.v.*) and a large part of the nominally conquered

Lowlands. Her rising was soon crushed, but the government was obviously afraid for a while to move its garrisons forward. Indeed, other needs of the empire caused the withdrawal of the Fourteenth Legion about 67. But the decade A.D. 70-80 was decisive. A series of three able generals commanded an army restored to its proper strength by the addition of Legio II. Adiutrix, and achieved the final subjugation of Wales and the first conquest of Yorkshire, where a legionary fortress at York was substituted for that at Lincoln.

The third and best-known, if not the ablest, of these generals, Julius Agricola, moved on in A.D. 80 to the conquest of the farther north. He established between the Clyde and Forth a frontier [v.04 p.0584] meant to be permanent, guarded by a line of forts, two of which are still traceable at Camelon near Falkirk, and at Bar Hill. He then advanced into Caledonia and won a "famous victory" at Mons Graupius (sometimes, but incorrectly, spelt Grampius), probably near the confluence of the Tay and the Isla, where a Roman encampment of his date, Inchtuthill, has been partly examined (see GALGACUS). He dreamt even of invading Ireland, and thought it an easy task. The home government judged otherwise. Jealous possibly of a too brilliant general, certainly averse from costly and fruitless campaigns and needing the Legio II. Adiutrix for work elsewhere, it recalled both governor and legion, and gave up the more northerly of his nominal conquests. The most solid result of his campaigns is that his battlefield, misspelt Grampius, has provided to antiquaries, and through them to the world, the modern name of the Grampian Hills.

What frontier was adopted after Agricola's departure, whether Tweed or Cheviot or other, is unknown. For thirty years (A.D. 85-115) the military history of Britain is a blank. When we recover knowledge we are in an altered world. About 115 or 120 the northern Britons rose in revolt and destroyed the Ninth Legion, posted at York, which would bear the brunt of any northern trouble. In 122 the second reigning emperor who crossed the ocean, Hadrian, came himself to Britain, brought the Sixth Legion to replace the Ninth, and introduced the frontier policy of his age. For over 70 m. from Tyne to Solway, more exactly from Wallsend to Bowness, he built a continuous rampart, more probably of turf than of stone, with a ditch in front of it, a number of small forts along it, one or two outposts a few miles to the north of it, and some detached forts (the best-known is on the hill above Maryport) guarding the Cumberland coast beyond its western end. The details of his work are imperfectly known, for though many remains survive, it is hard to separate those of Hadrian's date from others that are later. But that Hadrian built a wall here is proved alike by literature and by inscriptions. The meaning of the scheme is equally certain. It was to be, as it were, a Chinese wall, marking the definite limit of the Roman world. It was now declared, not by the secret resolutions of cabinets, but by the work of the spade marking the solid earth for ever, that the era of conquest was ended.



But empires move, though rulers bid them stand still. Whether the land beyond Hadrian's wall became temptingly peaceful or remained in vexing disorder, our authorities do not say. We know only that about 142 Hadrian's successor, Antoninus Pius, acting through his general Lollius Urbicus, advanced from the Tyne and Solway frontier to the narrower isthmus between Forth and Clyde, 36 m. across, which Agricola had fortified before him. Here he reared a continuous rampart with a ditch in front of it, fair-sized forts, probably a dozen in number, built either close behind it or actually abutting on it, and a connecting road running from end to end. An ancient writer states that the rampart was built of regularly laid sods (the same method which had probably been employed by Hadrian), and excavations in 1891-1893 have verified the statement. The work still survives visibly, though in varying preservation, except in the agricultural districts near its two ends. Occasionally, as on Croyhill (near Kilsyth), at Westerwood, and in the covers of Bonnyside (3 m.

west of Falkirk), wall and ditch and even road can be distinctly traced, and the sites of many of the forts are plain to practised eyes. Three of these forts have been excavated. All three show the ordinary features of Roman *castella*, though they differ more than one would expect in forts built at one time by one general. Bar Hill, the most completely explored, covers three acres—nearly five times as much as the earlier fort of Agricola on the same site. It had ramparts of turf, barrack-rooms of wood, and a headquarters building, storehouse and bath in stone: it stands a few yards back from the wall. Castle Cary covers nearly four acres: its ramparts contain massive and well-dressed masonry; its interior buildings, though they agree in material, do not altogether agree in plan with those of Bar Hill, and its north face falls in line with the frontier wall. Rough Castle, near Falkirk, is very much smaller; it is remarkable for the astonishing strength of its turf-built and earthen ramparts and ravelins, and for a remarkable series of defensive pits, reminiscent of Caesar's *lilia* at Alesia, plainly intended to break an enemy's charge, and either provided with stakes to impale the assailant or covered over with hurdles or the like to deceive him. Besides the dozen forts on the wall, one or two outposts may have been held at Ardoch and Abernethy along the natural route which runs by Stirling and Perth to the lowlands of the east coast. This frontier was reached from the south by two roads. One, known in medieval times as Dere Street and misnamed Watling Street by modern antiquaries, ran from Corbridge on the Tyne past Otterburn, crossed Cheviot near Makendon Camps, and passed by an important fort at Newstead near Melrose, and another at Inveresk (outside of Edinburgh), to the eastern end of the wall. The other, starting from Carlisle, ran to Birrens, a Roman fort near Ecclefechan, and thence, by a line not yet explored and indeed not at all certain, to Carstairs and the west end of the wall. This wall was in addition to, and not instead of, the wall of Hadrian. Both barriers were held together, and the district between them was regarded as a military area, outside the range of civilization.

The work of Pius brought no long peace. Sixteen years later disorder broke out in north Britain, apparently in the district between the Cheviots and the Derbyshire hills, and was repressed with difficulty after four or five years' fighting. Eighteen or twenty years later (180-185) a new war broke out with a different issue. The Romans lost everything beyond Cheviot, and perhaps even more. The government of Commodus, feeble in itself and vexed by many troubles, could not repair the loss, and the civil wars which soon raged in Europe (193-197) gave the Caledonians further chance. It was not till 208 that Septimius Severus, the ablest emperor of his age, could turn his attention to the island. He came thither in person, invaded Caledonia, commenced the reconstruction of the wall of Hadrian, rebuilding it from end to end in stone, and then in the fourth year of his operations died at York. Amid much that is uncertain and even legendary about his work in Britain, this is plain, that he fixed on the line of Hadrian's wall as his substantive frontier. His successors, Caracalla and Severus Alexander (211-235), accepted the position, and many inscriptions refer to building or rebuilding executed by them for the greater efficiency of the frontier defences. The conquest of Britain was at last over. The wall of Hadrian remained for nearly two hundred years more the northern limit of Roman power in the extreme west.

II. *The Province of Britain and its Military System.*—Geographically, Britain consists of two parts: (1) the comparatively flat lowlands of the south, east and midlands, suitable to agriculture and open to easy intercourse with the continent, i.e. with the rest of the Roman empire; (2) the district consisting of the hills of Devon and Cornwall, of Wales and of northern England, regions lying more, and often very much more, than 600 ft. above the sea, scarred with gorges and deep valleys, mountainous in character, difficult for armies to traverse, ill fitted to the peaceful pursuits in agriculture. These two parts of the province differ also in their history. The lowlands, as we have seen, were conquered easily and quickly. The uplands were hardly subdued completely till the end of the 2nd century. They differ, thirdly, in the character of their Roman occupation. The lowlands were the scene of civil life. Towns, villages and country houses were their prominent features; troops were hardly seen in them save in some fortresses on the edge of the hills and in a chain of forts built in the 4th century to defend the south-east coast, the so-called Saxon Shore. The uplands of Wales and the north presented another spectacle. Here civil life was almost wholly absent. No country town or country house has been found more than 20 m. north of York or west of Monmouthshire. The hills were one extensive military frontier, covered with forts and strategic roads connecting them, and devoid of town life, country houses, farms or peaceful civilized industry. This geographical division was not reproduced by Rome in any administrative partitions of the province. At first the whole was governed by one *legatus Augusti* of consular standing. Septimius Severus made it two provinces, Superior and Inferior, with a boundary which probably ran from Humber to Mersey, but we do not know how long this arrangement lasted. In the 5th century there were five provinces, Britannia Prima and Secunda, Flavia and Maxima Caesariensis and (for a while) Valentia, ruled by *praesides* and *consulares* under a *vicartus*, but the only thing known of them is that Britannia Prima included Cirencester.

The army which guarded or coerced the province consisted, from the time of Hadrian onwards, of (1) three legions, the Second at Isca Silurum (Caerleon-on-Usk, *q.v.*), the Ninth at Eburācum (*q.v.*; now York), the Twentieth at Deva (*q.v.*; now Chester), a total of some 15,000 heavy infantry; and (2) a large but uncertain number of auxiliaries, troops of the second grade, organized in infantry cohorts or cavalry *alae*, each 500 or 1000 strong, and posted in *castella* nearer the frontiers than the legions. The legionary fortresses were large rectangular enclosures of 50 or 60 acres, surrounded by strong walls of which traces can still be seen in the lower courses of the north and east town-walls of Chester, in the abbey gardens at York, and on the south side of Caerleon. The auxiliary *castella* were hardly a tenth of the size, varying generally from three to six acres according to the size of the regiment and the need for stabling. Of these upwards of 70 are known in England and some 20 more in Scotland. Of the English examples a few have been

carefully excavated, notably Gellygaer between Cardiff and Brecon, one of the most perfect specimens to be found anywhere in the Roman empire of a Roman fort dating from the end of the 1st century A.D.; Hardknott, on a Cumberland moor overhanging Upper Eskdale; and Housesteads on Hadrian's wall. In Scotland excavation has been more active, in particular at the forts of Birrens, Newstead near Melrose, Lyne near Peebles, Ardoch between Stirling and Perth, and Castle Cary, Rough Castle and Bar Hill on the wall of Pius. The internal arrangements of all these forts follow one general plan. But in some of them the internal buildings are all of stone, while in others, principally (it seems) forts built before 150, wood is used freely and only the few principal buildings seem to have been constructed throughout of stone.

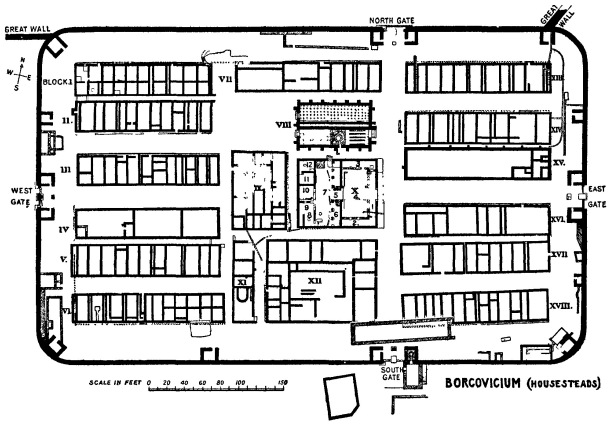


FIG. 1.—Plan of Housesteads (Borcovicium) on Hadrian's Wall.

We may illustrate their character from Housesteads, which, in the form in which we know it, perhaps dates from Septimius Severus. This fort measures about 360 by 600 ft. and covers a trifle less than 5 acres. Its ramparts are of stone, and its north rampart coincides with the great wall of Hadrian. Its interior is filled with stone buildings. Chief among these (see fig. 1), and in the centre of the whole fort, is the Headquarters, in Lat. *Principia* or, as it is often (though perhaps less correctly) styled by moderns, *Praetorium*. This is a rectangular structure with only one entrance which gives access, first, to a small cloistered court (x. 4), then to a second open court (x. 7), and finally to a row of five rooms (x. 8-12) containing the shrine for official worship, the treasury and other offices. Close by were officers' quarters, generally built round a tiny cloistered court (ix., xi., xii.), and substantially built storehouses with buttresses and dry basements (viii.). These filled the middle third of the fort. At the two ends were barracks for the soldiers (i.-vi., xiii.-xviii.). No space was allotted to private religion or domestic life. The shrines which voluntary worshippers might visit, the public bath-house, and the cottages of the soldiers' wives, camp followers, &c., lay outside the walls. Such were nearly all the Roman forts in Britain. They differ somewhat from Roman forts in Germany or other provinces, though most of the differences arise from the different usage of wood and of stone in various places.

Forts of this kind were dotted all along the military roads of the Welsh and northern hill-districts. In Wales a road ran from Chester past a fort at Caer-hyn (near Conway) to a fort at Carnarvon (Segontium). A similar road ran along the south coast from Caerleon-on-Usk past a fort at Cardiff and perhaps others, to Carmarthen. A third, roughly parallel to the shore of Cardigan Bay, with forts at Llanio and Tommen-y-mur (near Festiniog), connected the northern and southern roads, [v.04 p.0586] while the interior was held by a system of roads and forts not yet well understood but discernible at such points as Caer-gai on Bala Lake, Castle Collen near Llandrindod Wells, the Gaer near Brecon, Merthyr and Gellygaer. In the north of Britain we find three principal roads. One led due north from York past forts at Catterick Bridge, Piers Bridge, Binchester, Lanchester, Ebchester to the wall and to Scotland, while branches through Chester-le-Street reached the Tyne Bridge (Pons Aelius) at Newcastle and the Tyne mouth at South Shields. A second road, turning north-west from Catterick Bridge, mounted the Pennine Chain by way of forts at Rokeby, Bowes and Brough-under-Stainmoor, descended into the Eden valley, reached Hadrian's wall near Carlisle (Luguvallium), and passed on to Birrens. The third route, starting from Chester and passing up the western coast, is more complex, and exists in duplicate, the result perhaps of two different schemes of road-making. Forts in plenty can be detected along it, notably Manchester (Mancunium or Mamucium), Ribchester (Bremetennacum), Brougham Castle (Brocavum), Old Penrith (Voreda), and on a western branch, Watercrook near Kendal, Waterhead near the hotel of that name on Ambleside, Hardknott above Eskdale, Maryport (Uxellodūnum), and Old Carlisle (possibly Petriana). In addition, two or three cross roads, not yet sufficiently explored, maintained communication between the troops in Yorkshire and those in Cheshire and Lancashire. This road system bears plain marks of having been made at different times, and with different objectives, but we have no evidence that any one part was abandoned when any other was built. There are signs, however, that various forts were dismantled as the country grew quieter. Thus, Gellygaer in South Wales and Hardknott in Cumberland have yielded nothing later than the opening of the 2nd century.

Besides these detached forts and their connecting roads, the north of Britain was defended by Hadrian's wall (figs. 2 and 3). The history of this wall has been given above. The actual works are threefold. First, there is that which to-day forms the most striking feature in the whole, the wall of stone 6-8 ft. thick, and originally perhaps 14 ft. high, with a deep ditch in front, and forts and "mile castles" and turrets and a connecting road behind it. On the high moors between Chollerford and Gilsland its traces are still plain, as it climbs from hill to hill and winds along perilous precipices. Secondly, there is the so-called "Vallum," in reality no *vallum* at all, but a broad flat-bottomed ditch out of which the earth has been cast up on either side into regular and continuous mounds that resemble ramparts. Thirdly, nowhere very clear on the surface and as yet detected only at a few points, there are the remains of the "turf wall," constructed of sods laid in regular courses, with a ditch in front. This turf wall is certainly older than the stone wall, and, as our ancient writers mention two wall-builders, Hadrian and Septimius Severus, the natural

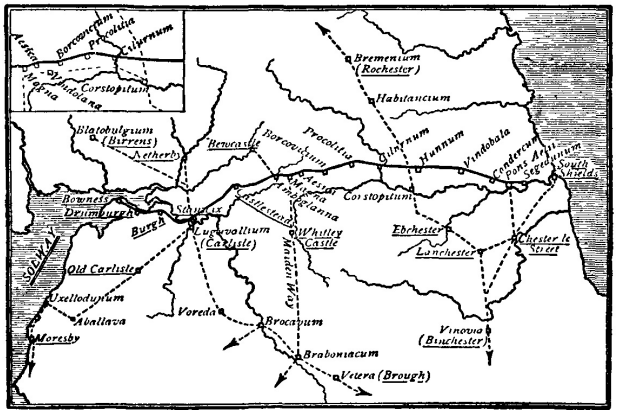


FIG. 2.—Hadrian's Wall.
From *Social England*, by permission of Cassell & Co., Ltd.

inference is that Hadrian built his wall of turf and Severus reconstructed it in stone. The reconstruction probably followed in general the line of Hadrian's wall in order to utilize the existing ditch, and this explains why the turf wall itself survives only at special points. In general it was destroyed to make way for the new wall in stone. Occasionally (as at Birdoswald) there was a deviation, and the older work survived. This conversion of earthwork into stone in the age of Severus can be paralleled from other parts of the Roman empire.

The meaning of the *vallum* is much more doubtful. John Hodgson and Bruce, the local authorities of the 19th century, supposed that it was erected to defend the wall from southern insurgents. Others have ascribed it to Agricola, or have thought it to be the wall of Hadrian, or even assigned it to pre-Roman natives. The two facts that are clear about it are, that it is a Roman work, no older than Hadrian (if so old), and that it was not intended, like the wall, for military defence. Probably it is contemporaneous with either the turf wall or the stone wall, and marked some limit of the civil province of Britain. Beyond this we cannot at present go.

FIG. 3.—Section of Hadrian's Wall.

III. *The Civilization of Roman Britain.*—Behind these formidable garrisons, sheltered from barbarians and in easy contact with the Roman empire, stretched the lowlands of southern and eastern Britain. Here a civilized life grew up, and Roman culture spread. This part of Britain became Romanized. In the lands looking on to the Thames estuary (Kent, Essex, Middlesex) the process had perhaps begun before the Roman conquest. It was continued after that event, and in two ways. To some extent it was definitely encouraged by the Roman government, which here, as elsewhere, founded towns peopled with Roman citizens—generally discharged legionaries—and endowed them with franchise and constitution like those of the Italian municipalities. It developed still more by its own automatic growth. The coherent civilization of the Romans was accepted by the Britons, as it was by the Gauls, with something like enthusiasm. Encouraged perhaps by sympathetic Romans, spurred on still more by their own instincts, and led no doubt by their nobles, they began to speak Latin, to use the material resources of Roman civilized life, and in time to consider themselves not the unwilling subjects of a foreign empire, but the British members of the Roman state. The steps by which these results were reached can to some extent be dated. Within a few years of the Claudian invasion a *colonia*, or municipality of time-expired soldiers, had been planted in the old native capital of Colchester (Camulodūnum), and though it served at first mainly as a fortress and thus provoked British hatred, it came soon to exercise a civilizing influence. At the same time the British town of Verulamium (St Albans) was thought sufficiently Romanized to deserve the municipal status of a *municipium*, which at this period differed little from that of a *colonia*. Romanized Britons must now have begun to be numerous. In the great revolt of Boadicea (60) the nationalist party seem to have massacred many thousands of them along with actual Romans. Fifteen or twenty years later, the movement increases. Towns spring up, such as Silchester, laid out in Roman fashion, furnished with public buildings of Roman type, and filled with houses which are Roman in fittings if not in plan. The baths of Bath (Aquae Sulis) are exploited. Another *colonia* is planted at Lincoln (Lindum), and a third at Gloucester (Glevum) in 96. A new "chief judge" is appointed for increasing civil business. The tax-gatherer and recruiting officer begin to make their way into the hills. During the 2nd century progress was perhaps slower, hindered doubtless by the repeated risings in the north. It was not till the 3rd century that country houses and farms became common in most parts of the civilized area. In the beginning of the 4th century the skilled artisans and builders, and the cloth and corn of Britain were equally famous on the continent. This probably was the age when the prosperity and Romanization of the province reached its height. By this time the town populations and the educated among the country-folk spoke Latin, and Britain regarded itself as a Roman land, inhabited by Romans and distinct from outer barbarians.

[v.04 p.0587]

The civilization which had thus spread over half the island was genuinely Roman, identical in kind with that of the other western provinces of the empire, and in particular with that of northern Gaul. But it was defective in quantity. The elements which compose it are marked by smaller size, less wealth and less splendour than the same elements elsewhere. It was also uneven in its distribution. Large tracts, in particular Warwickshire and the adjoining midlands, were very thinly inhabited. Even densely peopled areas like north Kent, the Sussex coast, west Gloucestershire and east Somerset, immediately adjoin areas like the Weald of Kent and Sussex where Romano-British remains hardly occur.

The administration of the civilized part of the province, while subject to the governor of all Britain, was practically entrusted to local authorities. Each Roman municipality ruled itself and a territory perhaps as large as a small county which belonged to it. Some districts belonged to the Imperial Domains, and were administered by agents of the emperor. The rest, by far the larger

part of the country, was divided up among the old native tribes or cantons, some ten or twelve in number, each grouped round some country town where its council (*ordo*) met for cantonal business. This cantonal system closely resembles that which we find in Gaul. It is an old native element recast in Roman form, and well illustrates the Roman principle of local government by devolution.

In the general framework of Romano-British life the two chief features were the town, and the *villa*. The towns of the province, as we have already implied, fall into two classes. Five modern cities, Colchester, Lincoln, York, Gloucester and St Albans, stand on the sites, and in some fragmentary fashion bear the names of five Roman municipalities, founded by the Roman government with special charters and constitutions. All of these reached a considerable measure of prosperity. None of them rivals the greater municipalities of other provinces. Besides them we trace a larger number of country towns, varying much in size, but all possessing in some degree the characteristics of a town. The chief of these seem to be cantonal capitals, probably developed out of the market centres or capitals of the Celtic tribes before the Roman conquest. Such are Isurium Brigantum, capital of the Brigantes, 12 m. north-west of York and the most northerly Romano-British town; Ratae, now Leicester, capital of the Coritani; Viroconium, now Wroxeter, near Shrewsbury, capital of the Cornovii; Venta Silurum, now Caerwent, near Chepstow; Corinium, now Cirencester, capital of the Dobuni; Isca Dumnoniorum, now Exeter, the most westerly of these towns; Durnovaria, now Dorchester, in Dorset, capital of the Durotriges; Venta Belgarum, now Winchester; Calleva Atrebatum, now Silchester, 10 m. south of Reading; Durovernum Cantiacorum, now Canterbury; and Venta Icenorum, now Caistor-by-Norwich. Besides these country towns, Londinium (London) was a rich and important trading town, centre of the road system, and the seat of the finance officials of the province, as the remarkable objects discovered in it abundantly prove, while Aquae Sulis (Bath) was a spa provided with splendid baths, and a richly adorned temple of the native patron deity, Sul or Sulis, whom the Romans called Minerva. Many smaller places, too, for example, Magna or Kenchester near Hereford, Durobrivae or Rochester in Kent, another Durobrivae near Peterborough, a site of uncertain name near Cambridge, another of uncertain name near Chesterford, exhibited some measure of town life.

As a specimen we may take Silchester, remarkable as the one town in the whole Roman empire which has been completely and systematically uncovered. As we see it to-day, it is an open space of 100 acres, set on a hill with a wide prospect east and south and west, in shape an irregular hexagon, enclosed in a circuit of a mile and a half by the massive ruins of a city wall which still stands here and there some 20 ft. high (fig. 4). Outside, on the north-east, is the grassy hollow of a tiny amphitheatre; on the west a line of earthworks runs in wider circuit than the walls. The area within the walls is a vast expanse of cultivated land, unbroken by any vestige of antiquity; yet the soil is thick with tile and potsherd, and in hot summers the unevenly growing corn reveals the remains of streets beneath the surface. Casual excavations were made here in 1744 and 1833; more systematic ones intermittently between 1864 and 1884 by the Rev. J.G. Joyce and others; finally, in May 1890, the complete uncovering of the whole site was begun by Mr G.E. Fox and others. The work was carried on with splendid perseverance, and the uncovering of the interior was completed in 1908.

The chief results concern the buildings. Though these have vanished wholly from the surface, the foundations and lowest courses of their walls survive fairly perfect below ground: thus the plan of the town can be minutely recovered, and both the character of the buildings which make up a place like Calleva, and the character of Romano-British buildings generally, become plainer. Of the buildings the chief are:—

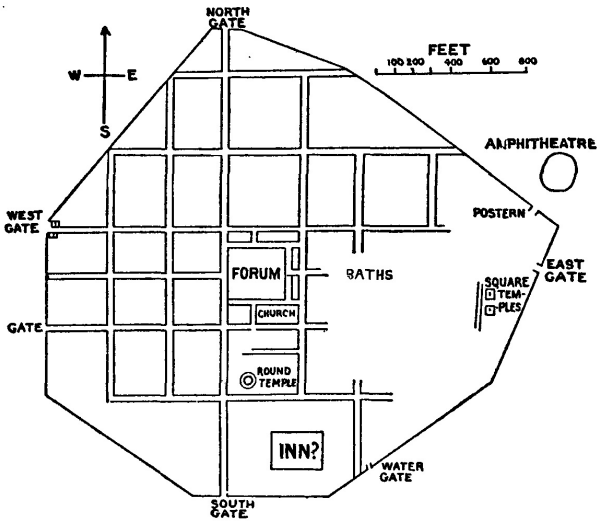


FIG. 4.—General Plan of Silchester (Calleva Atrebatum).

1. *Forum.*—Near the middle of the town was a rectangular block covering two acres. It comprised a central open court, 132 ft. by 140 ft. in size, surrounded on three sides by a corridor or cloister, with rooms opening on the cloister (fig. 5). On the fourth side was a great hall, with rooms opening into it from behind. This hall was 270 ft. long and 58 ft. wide; two rows of Corinthian columns ran down the middle, and the clerestory roof may have stood 50 ft. above the floor; the walls were frescoed or lined with marble, and for ornament there were probably statues. Finally, a corridor ran round outside the whole block. Here the local authorities had their offices, justice was administered, traders trafficked, citizens and idlers gathered. Though we cannot apportion the rooms to their precise uses, the great hall was plainly the basilica, for meetings and business; the rooms behind it were perhaps law courts, and some of the rooms on the other three sides of the quadrangle may have been shops. Similar municipal buildings existed in most towns of the western Empire, whether they were full municipalities or (as probably Calleva was) of lower rank. The Callevan Forum seems in general simpler than others, but its basilica is remarkably large. Probably the British climate compelled more indoor life than the sunnier south.

2. *Temples.*—Two small square temples, of a common western-provincial type, were in the east of the town; the *cella* of the larger measured 42 ft. sq., and was lined with Purbeck marble. A third, circular temple stood between the forum and the south gate. A fourth, a smaller square shrine found in 1907 a little east of the forum, yielded some interesting inscriptions which relate to a gild (*collegium*) and incidentally confirm the name Calleva.

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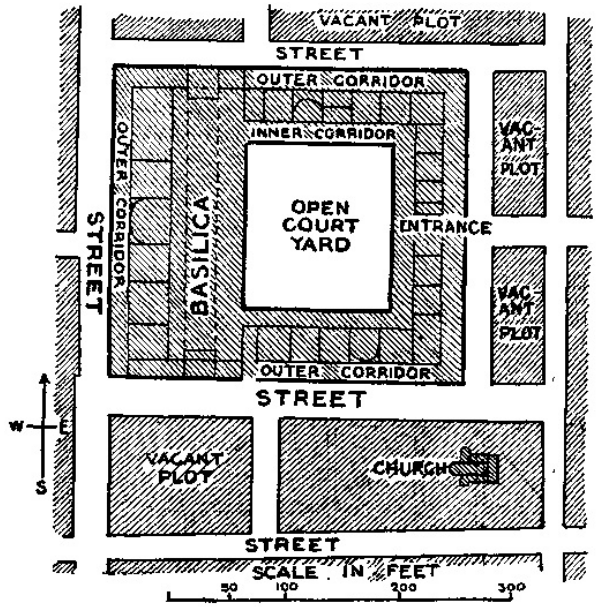

FIG. 5.—Plan of Forum, Basilica and surroundings, Silchester.

3. *Christian Church.*—Close outside the south-east angle of the forum was a small edifice, 42 ft. by 27 ft., consisting of a nave and two aisles which ended at the east in a porch as wide as the building, and at the west in an apse and two flanking chambers. The nave and porch were floored with plain red tesserae: in the apse was a simple mosaic panel in red, black and white. Round the building was a yard, fenced with wooden palings; in it were a well near the apse, and a small structure of tile with a pit near the east end. No direct proof of date or use was discovered. But the ground plan is that of an early Christian church of the "basilican" type. This type comprised nave and aisles, ending at one end in an apse and two chambers resembling rudimentary transepts, and at the other end in a porch (*narthex*). Previous to about A.D. 420 the porch was often at the east end and the apse at the west, and the altar, often movable, stood in the apse—as at Silchester, perhaps, on the mosaic panel. A court enclosed the whole; near the porch was a laver for the ablutions of intending worshippers. Many such churches have been found in other countries, especially in Roman Africa; no other satisfactory instance is known in Britain.

4. *Town Baths.*—A suite of public baths stood a little east of the forum. At the entrance were a peristyle court for loungers and a latrine: hence the bather passed into the Apodyterium (dressing-room), the Frigidarium (cold room) fitted with a cold bath for use at the end of the bathing ceremony, and a series of hot rooms—the whole resembling many modern Turkish baths. In their first form the baths of Silchester were about 160 ft. by 80 ft., but they were later considerably extended.

5. *Private Houses.*—The private houses of Silchester are of two types. They consist either of a row of rooms, with a corridor along them, and perhaps one or two additional rooms at one or both ends, or of three such corridors and rows of rooms, forming three sides of a large square open yard. They are detached houses, standing each in its own garden, and not forming terraces or rows. The country houses of Roman Britain have long been recognized as embodying these (or allied) types; now it becomes plain that they were the normal types throughout Britain. They differ widely from the town houses of Rome and Pompeii: they are less unlike some of the country houses of Italy and Roman Africa; but their real parallels occur in Gaul, and they may be Celtic types modified to Roman use—like Indian bungalows. Their internal fittings—hypocausts, frescoes, mosaics—are everywhere Roman; those at Silchester are average specimens, and, except for one mosaic, not individually striking. The largest Silchester house, with a special annexe for baths, is usually taken to be a guest-house or inn for travellers between London and the west (fig. 6). Altogether, the town probably did not contain more than seventy or eighty houses of any size, and large spaces were not built over at all. This fact and the peculiar character of the houses must have given to Silchester rather the appearance of a village with scattered cottages, each in its own plot facing its own way, than a town with regular and continuous streets.

6. *Industries.*—Shops are conjectured in the forum and elsewhere, but were not numerous. Many dyers' furnaces, a little silver refinery, and perhaps a bakery have also been noticed.

7. *Streets, Roads, &c.*—The streets were paved with gravel: they varied in width up to 28½ ft. They intersect regularly at right angles, dividing the town into square blocks, like modern Mannheim or Turin, according to a Roman system usual in both Italy and the provinces: plainly they were laid out all at once, possibly by Agricola (Tac. *Agr.* 21) and most probably about his time. There were four chief gates, not quite symmetrically placed. The town-walls are built of flint and concrete bonded with ironstone, and are backed with earth. In the plans, though not in the reports, of the excavations, they are shown as built later than the streets. No traces of meat-market, theatre or aqueduct have come to light: water was got from wells lined with wooden tubs, and must have been scanty in dry summers. Smaller objects abound—coins, pottery, window and bottle and cup glass, bronze ornaments, iron tools, &c.—and many belong to the beginnings of Calleva, but few pieces are individually notable. Traces of late Celtic art are singularly absent; Roman fashions rule supreme, and inscriptions show that even the lower classes here spoke and wrote Latin. Outside the walls were the cemeteries, not yet explored. Of suburbs we have as yet no hint. Nor indeed is the neighbourhood of Calleva at all rich in Roman

remains. In fact, as well as in Celtic etymology, it was "the town in the forest." A similar absence of remains may be noticed outside other Romano-British towns, and is significant of their economic position. Such doubtless were most of the towns of Roman Britain—thoroughly Romanized, peopled with Roman-speaking citizens, furnished with Roman appurtenances, living in Roman ways, but not very large, not very rich, a humble witness to the assimilating power of the Roman civilization in Britain.

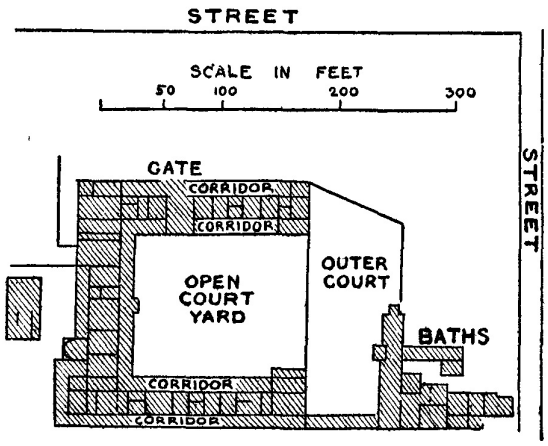

FIG. 6.—Plan of supposed Inn and Baths at Silchester.

The country, as opposed to the towns, of Roman Britain seems to have been divided into estates, commonly (though perhaps incorrectly) known as "villas." Many examples survive, some of them large and luxurious country-houses, some mere farms, constructed usually on one of the two patterns described in the account of Silchester above. The inhabitants were plainly as various—a few of them great nobles and wealthy landowners, others small farmers or possibly bailiffs. Some of these estates were worked on the true "villa" system, by which the lord occupied the "great house," and cultivated the land close round it by slaves, while he let the rest to half-free *coloni*. But other systems may have prevailed as well. Among the most important country-houses are those of Bignor in west Sussex, and Woodchester and Chedworth in Gloucestershire.

The wealth of the country was principally agrarian. Wheat and wool were exported in the 4th century, when, as we have said, Britain was especially prosperous. But the details of the trade are unrecorded. More is known of the lead and iron mines which, at least in the first two centuries, were worked in many districts—lead in Somerset, Shropshire, Flintshire and Derbyshire; iron in the west Sussex Weald, the Forest of Dean, and (to a slight extent) elsewhere. Other minerals were less notable. The gold mentioned by Tacitus proved scanty. The Cornish tin, according to present evidence, was worked comparatively little, and perhaps most in the later Empire.

Lastly, the roads. Here we must put aside all idea of "Four Great Roads." That category is probably the invention of antiquaries, and certainly unconnected with Roman Britain (see ERMINE STREET). Instead, we may distinguish four main groups of roads radiating from London, and a fifth which runs obliquely. One road ran south-east to Canterbury and the Kentish ports, of which Richborough (Rutupiae) was the most frequented. A second ran west to Silchester, and thence by various branches to Winchester, Exeter, Bath, Gloucester and South Wales. A third, known afterwards to the English as Watling Street, ran by St Albans Wall near Lichfield (Letocetum), to Wroxeter and Chester. It also gave access by a branch to Leicester and Lincoln. A fourth served Colchester, the eastern counties, Lincoln and York. The fifth is that known to the English as the Fosse, which joins Lincoln and Leicester with Cirencester, Bath and Exeter. Besides these five groups, an obscure road, called by the Saxons Akeman Street, gave alternative access from London through Alchester (outside of Bicester) to Bath, while another obscure road winds south from near Sheffield, past Derby and Birmingham, and connects the lower Severn with the Humber. By these roads and their various branches the Romans provided adequate communications throughout the lowlands of Britain.

[v.04 p.0589]

IV. *The End of Roman Britain.*—Early in the 4th century it was necessary to establish a special coast defence, reaching from the Wash to Spithead, against Saxon pirates: there were forts at Brancaster, Borough Castle (near Yarmouth), Bradwell (at the mouth of the Colne and Blackwater), Reculver, Richborough, Dover and Lymme (all in Kent), Pevensey in Sussex, Porchester near Portsmouth, and perhaps also at Felixstowe in Suffolk. After about 350, barbarian assaults, not only of Saxons but also of Irish (Scoti) and Picts, became commoner and more terrible. At the end of the century Magnus Maximus, claiming to be emperor, withdrew many troops from Britain and a later pretender did the same. Early in the 5th century the Teutonic conquest of Gaul cut the island off from Rome. This does not mean that there was any great "departure of Romans." The central government simply ceased to send the usual governors and high officers. The Romano-British were left to themselves. Their position was weak. Their fortresses lay in the north and west, while the Saxons attacked the east and south. Their trained troops, and even their own numbers, must have been few. It is intelligible that they followed a precedent set by Rome in that age, and hired Saxons to repel Saxons. But they could not command the fidelity of their mercenaries, and the Saxon peril only grew greater. It would seem as if the Romano-Britons were speedily driven from the east of the island. Even Wroxeter on the Welsh border may have been finally destroyed before the end of the 5th century. It seems that the Saxons though apparently unable to maintain their hold so far to the west, were able to prevent the natives from recovering the lowlands. Thus driven from the centres of Romanized life, from the region of walled cities and civilized houses, into the hills of Wales and the north-west, the provincials underwent an intelligible change. The Celtic element, never quite extinct in those hills and, like most forms of barbarism, reasserting itself in this wild age—not without reinforcement from Ireland—challenged the remnants of Roman civilization and in the end absorbed them. The Celtic language reappeared; the Celtic art emerged from its shelters in the west to develop in new and medieval fashions.

AUTHORITIES.—The principal references to early Britain in classical writers occur in Strabo, Diodorus, Julius Caesar, the elder Pliny, Tacitus, Ptolemy and Cassius Dio, and in the lists of the Antonine Itinerary (probably about A.D. 210-230; ed. Parthey, 1848), the *Notitia Dignitatum* (about A.D. 400; ed. Seeck, 1876), and the Ravennas (7th-century *rechauffé*; ed. Parthey 1860). The chief passages are collected in Petrie's *Monumenta Hist. Britann.* (1848), and (alphabetically) in Holder's *Altkeltische Sprachschatz* (1896-1908). The Roman inscriptions have been collected by Hübner, *Corpus Inscriptionum Latin.* vii. (1873), and in supplements by Hübner and Haverfield in the periodical *Ephemeris epigraphica*; see also Hübner, *Inscript. Britann. Christianae* (1876, now out of date), and J. Rhys on Pictish, &c., inscriptions, *Proceedings Soc. Antiq. Scotland*, xxvi., xxxii.

Of modern works the best summary for Roman Britain and for Caesar's invasions is T.R. Holmes, *Ancient Britain* (1907), who cites numerous authorities. See also Sir John Evans, *Stone Implements, Bronze Implements*, and *Ancient British Coins* (with suppl.); Boyd Dawkins, *Early Man in Britain* (1880); J. Rhys, *Celtic Britain* (3rd ed., 1904). For late Celtic art see J.M. Kemble and A.W. Franks' *Horae Ferales* (1863), and Arthur J. Evans in *Archaeologia*, vols. lii.-lv. Celtic ethnology and philology (see CELT) are still in the "age of discussion." For ancient earthworks see A. Hadrian Allcroft, *Earthwork of England* (1909).

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(F. J. H.)

ANGLO-SAXON BRITAIN

1. *History.*—The history of Britain after the withdrawal of the Roman troops is extremely obscure, but there can be little doubt that for many years the inhabitants of the provinces were exposed to devastating raids by the Picts and Scots. According to Gildas it was for protection against these incursions that the Britons decided to call in the Saxons. Their allies soon obtained a decisive victory; but subsequently they turned their arms against the Britons themselves, alleging that they had not received sufficient payment for their services. A somewhat different account, probably of English origin, may be traced in the *Historia Brittonum*, according to which the first leaders of the Saxons, Hengest and Horsa, came as exiles, seeking the protection of the British king, Vortigern. Having embraced his service they quickly succeeded in expelling the northern invaders. Eventually, however, they overcame the Britons through treachery, by inducing the king to allow them to send for large bodies of their own countrymen. It was to these adventurers, according to tradition, that the kingdom of Kent owed its origin. The story is in itself by no means improbable, while the dates assigned to the first invasion by various Welsh, Gaulish and English authorities, with one exception all fall within about a quarter of a century, viz. between the year 428 and the joint reign of Martian and Valentinian III. (450-455).

For the subsequent course of the invasion our information is of the most meagre and unsatisfactory character. According to the Anglo-Saxon Chronicle the kingdom of Sussex was founded by a certain Ella or Ælle, who landed in 477, while Wessex owed its origin to Cerdic, who arrived some eighteen years later. No value, however, can be attached to these dates; indeed, in the latter case the story itself is open to suspicion on several grounds (see WESSEX). For the movements which led to the foundation of the more northern kingdoms we have no evidence worth consideration, nor do we know even approximately when they took place. But the view that the invasion was effected throughout by small bodies of adventurers acting independently of one another, and that each of the various kingdoms owes its origin to a separate enterprise, has little probability in its favour. Bede states that the invaders belonged to three different nations, Kent and southern Hampshire being occupied by Jutes (*q.v.*), while Essex, Sussex and Wessex were founded by the Saxons, and the remaining kingdoms by the Angli (*q.v.*). The peculiarities of social organization in Kent certainly tend to show that this kingdom had a different origin from the rest; but the evidence for the distinction between the Saxons and the Angli is of a much less satisfactory character (see ANGLO-SAXONS). The royal family of Essex may really have been of Saxon origin (see ESSEX), but on the other hand the West Saxon royal family claimed to be of the same stock as that of Bernicia, and their connexions in the past seem to have lain with the Angli.

We need not doubt that the first invasion was followed by a long period of warfare between the

natives and the invaders, in which the latter gradually strengthened their hold on the conquered territories. It is very probable that by the end of the 5th century all the eastern part of Britain, at least as far as the Humber, was in their hands. The first important check was received at the siege of "Mons Badonicus" in the year 517 (*Ann. Cambr.*), or perhaps rather some fifteen or twenty years earlier. According to Gildas this event was followed by a period of peace for at least forty-four years. In the latter part of the 6th century, however, the territories occupied by the invaders seem to have been greatly extended. In the south the West Saxons are said to have conquered first Wiltshire and then all the upper part of the Thames valley, together with the country beyond as far as the Severn. The northern frontier also seems to have been pushed considerably farther forward, perhaps into what is now Scotland, and it is very probable that the basin of the Trent, together with the central districts between the Trent and the Thames, was conquered about the same time, though of this we have no record. Again, the destruction of Chester about 615 was soon followed by the overthrow of the British kingdom of Elmet in south-west Yorkshire, and the occupation of Shropshire and the Lothians took place perhaps about the same period, that of Herefordshire probably somewhat later. In the south, Somerset is said to have been conquered by the West Saxons shortly after the middle of the 7th century. Dorset had probably been acquired by them before this time, while part of Devon seems to have come into their hands soon afterwards.

The area thus conquered was occupied by a number of separate kingdoms, each with a royal family of its own. The districts north of the Humber contained two kingdoms, Bernicia (*q.v.*) and Deira (*q.v.*), which were eventually united in Northumbria. South of the Humber, Lindsey seems to have had a dynasty of its own, though in historical times it was apparently always subject to the kings of Northumbria or Mercia. The upper basin of the Trent formed the nucleus of the kingdom of Mercia (*q.v.*), while farther down the east coast was the kingdom of East Anglia (*q.v.*). Between these two lay a territory called Middle Anglia, which is sometimes described as a kingdom, though we do not know whether it ever had a separate dynasty. Essex, Kent and Sussex (see articles on these kingdoms) preserve the names of ancient kingdoms, while the old diocese of Worcester grew out of the kingdom of the Hwicce (*q.v.*), with which it probably coincided in area. The south of England, between Sussex and "West Wales" (eventually reduced to Cornwall), was occupied by Wessex, which originally also possessed some territory to the north of the Thames. Lastly, even the Isle of Wight appears to have had a dynasty of its own. But it must not be supposed that all these kingdoms were always, or even normally, independent. When history begins, Æthelberht, king of Kent, was supreme over all the kings south of the Humber. He was followed by the East Anglian king Raedwald, and the latter again by a series of Northumbrian kings with an even wider supremacy. Before Æthelberht a similar position had been held by the West Saxon king Ceawlin, and at a much earlier period, according to tradition, by Ella or Ælle, the first king of Sussex. The nature of this supremacy has been much discussed, but the true explanation seems to be furnished by that principle of personal allegiance which formed such an important element in Anglo-Saxon society.

2. *Government.*—Internally the various states seem to have been organized on very similar lines. In every case we find kingly government from the time of our earliest records, and there is no doubt that the institution goes back to a date anterior to the invasion of Britain (see Offa; Wermund). The royal title, however, was frequently borne by more than one person. Sometimes we find one supreme king together with a number of under-kings (*subreguli*); sometimes again, especially in the smaller kingdoms, Essex, Sussex and Hwicce, we meet with two or more kings, generally brothers, reigning together apparently on equal terms. During the greater part of the 8th century Kent seems to have been divided into two kingdoms; but as a rule such divisions did not last beyond the lifetime of the kings between whom the arrangement had been made. The kings were, with very rare exceptions, chosen from one particular family in each state, the ancestry of which was traced back not only to the founder of the kingdom but also, in a remoter degree, to a god. The members of such families were entitled to special wergilds, apparently six times as great as those of the higher class of nobles (see below).

The only other central authority in the state was the king's council or court (*þeod*, *witan*, *plebs*, *concilium*). This body consisted partly of young warriors in constant attendance on the king, and partly of senior officials whom he called together from time to time. The terms used for the two classes by Bede are *milites* (*ministri*) and *comites*, for which the Anglo-Saxon version has *þegnas* and *gesiðas* respectively. Both classes alike consisted in part of members of the royal family. But they were by no means confined to such persons or even to born subjects of the king. Indeed, we are told that popular kings like Oswine attracted young nobles to their service from all quarters. The functions of the council have been much discussed, and it has been claimed that they had the right of electing and deposing kings. This view, however, seems to involve the existence of a greater feeling for constitutionalism than is warranted by the information at our disposal. The incidents which have been brought forward as evidence to this effect may with at least equal probability be interpreted as cases of profession or transference of personal allegiance. In other respects the functions of the council seem to have been of a deliberative character. It was certainly customary for the king to seek their advice and moral support on important questions, but there is nothing to show that he had to abide by the opinion of the majority.

For administrative purposes each of the various kingdoms was divided into a number of districts under the charge of royal reeves (*cyninges gerefa*, *praefectus*, *praepositus*). These officials seem to have been located in royal villages (*cyninges tun*, *villa regalis*) or fortresses (*cyninges burg*, *urbs regis*), which served as centres and meeting-places (markets, &c.) for the inhabitants of the district, and to which their dues, both in payments and services had to be rendered. The usual

size of such districts in early times seems to have been 300, 600 or 1200 hides.[1] In addition to these districts we find mention also of much larger divisions containing 2000, 3000, 5000 or 7000 hides. To this category belong the shires of Wessex (Hampshire, Wiltshire, Berkshire, &c.), each of which had an earl (*aldormon*, *princeps*, *dux*) of its own, at all events from the 8th century onwards. Many, if not all, of these persons were members of the royal family, and it is not unlikely that they originally bore the kingly title. At all events they are sometimes described as *subreguli*.

3. *Social Organization.*—The officials mentioned above, whether of royal birth or not, were probably drawn from the king's personal retinue. In Anglo-Saxon society, as in that of all Teutonic nations in early times, the two most important principles were those of kinship and personal allegiance. If a man suffered injury it was to his relatives and his lord, rather than to any public official, that he applied first for protection and redress. If he was slain, a fixed sum (*wergild*), varying according to his station, had to be paid to his relatives, while a further but smaller sum (*manbot*) was due to his lord. These principles applied to all classes of society alike, and though strife within the family was by no means unknown, at all events in royal families, the actual slaying of a kinsman was regarded as the most heinous of all offences. Much the same feeling applied to the slaying of a lord—an offence for which no compensation could be rendered. [v.04 p.0591] How far the armed followers of a lord were entitled to compensation when the latter was slain is uncertain, but in the case of a king they received an amount equal to the wergild. Another important development of the principle of allegiance is to be found in the custom of heriots. In later times this custom amounted practically to a system of death-duties, payable in horses and arms or in money to the lord of the deceased. There can be little doubt, however, that originally it was a restoration to the lord of the military outfit with which he had presented his man when he entered his service. The institution of thegnhood, *i.e.* membership of the *comitatus* or retinue of a prince, offered the only opening by which public life could be entered. Hence it was probably adopted almost universally by young men of the highest classes. The thegn was expected to fight for his lord, and generally to place his services at his disposal in both war and peace. The lord, on the other hand, had to keep his thegns and reward them from time to time with arms and treasure. When they were of an age to marry he was expected to provide them with the means of doing so. If the lord was a king this provision took the form of a grant, perhaps normally ten hides, from the royal lands. Such estates were not strictly hereditary, though as a mark of favour they were not unfrequently re-granted to the sons of deceased holders.

The structure of society in England was of a somewhat peculiar type. In addition to slaves, who in early times seem to have been numerous, we find in Wessex and apparently also in Mercia three classes, described as *twelfhynde*, *sixhynde* and *twihynde* from the amount of their wergilds, viz. 1200, 600 and 200 shillings respectively. It is probable that similar classes existed also in Northumbria, though not under the same names. Besides these terms there were others which were probably in use everywhere, viz. *gesiðcund* for the two higher classes and *ceorlisc* for the lowest. Indeed, we find these terms even in Kent, though the social system of that kingdom seems to have been of an essentially different character. Here the wergild of the *ceorlisc* class amounted to 100 shillings, each containing twenty silver coins (*sceattas*), as against 200 shillings of four (in Wessex five) silver coins, and was thus very much greater than the latter. Again, there was apparently but one *gestiðcund* class in Kent, with a wergild of 300 shillings, while, on the other hand, below the *ceorlisc* class we find three classes of persons described as *laetas*, who corresponded in all probability to the *liti* or freedmen of the continental laws, and who possessed wergilds of 80, 60 and 40 shillings respectively. To these we find nothing analogous in the other kingdoms, though the poorer classes of Welsh freemen had wergilds varying from 120 to 60 shillings. It should be added that the differential treatment of the various classes was by no means confined to the case of wergilds. We find it also in the compensations to which they were entitled for various injuries, in the fines to which they were liable, and in the value attached to their oaths. Generally, though not always, the proportions observed were the same as in the wergilds.

The nature of the distinction between the *gesiðcund* and *ceorlisc* classes is nowhere clearly explained; but it was certainly hereditary and probably of considerable antiquity. In general we may perhaps define them as nobles and commons, though in view of the numbers of the higher classes it would probably be more correct to speak of gentry and peasants. The distinction between the *twelfhynde* and *sixhynde* classes was also in part at least hereditary, but there is good reason for believing that it arose out of the possession of land. The former consisted of persons who possessed, whether as individuals or families, at least five hides of land—which practically means a village—while the latter were landless, *i.e.* probably without this amount of land. Within the *ceorlisc* class we find similar subdivisions, though they were not marked by a difference in wergild. The *gafolgelda* or *tributarius* (tribute-payer) seems to have been a ceorl who possessed at least a hide, while the *gebur* was without land of his own, and received his outfit as a loan from his lord.

4. *Payments and Services.*—We have already had occasion to refer to the dues which were rendered by different classes of the population, and which the reeves in royal villages had to collect and superintend. The payments seem to have varied greatly according to the class from which they were due. Those rendered by landowners seem to have been known as *feorm* or *fostor*, and consisted of a fixed quantity of articles paid in kind. In Ine's Laws (cap. 70) we find a list of payments specified for a unit of ten hides, perhaps the normal holding of a *twelfhynde* man —though on the other hand it may be nothing more than a mere fiscal unit in an aggregate of estates. The list consists of oxen, sheep, geese, hens, honey, ale, loaves, cheese, butter, fodder,

salmon and eels. Very similar specifications are found elsewhere. The payments rendered by the *gafolgelda* (*tributarius*) were known as *gafol* (*tributuni*), as his name implies. In Ine's Laws we hear only of the *hwitel* or white cloak, which was to be of the value of six pence per household (hide), and of barley, which was to be six pounds in weight for each worker. In later times we meet with many other payments both in money and in kind, some of which were doubtless in accordance with ancient custom. On the other hand the *gebur* seems not to have been liable to payments of this kind, presumably because the land which he cultivated formed part of the demesne (*inland*) of his lord. The term *gafol*, however, may have been applied to the payments which he rendered to the latter.

The services required of landowners were very manifold in character. Probably the most important were military service (*fird*, *expeditio*) and the repairing of fortifications and bridges—the *trinoda necessitas* of later times. Besides these we find reference in charters of the 9th century to the keeping of the king's hunters, horses, dogs and hawks, and the entertaining of messengers and other persons in the king's service. The duties of men of the *sixhynde* class, if they are to be identified with the *radcnihtas* (*radmanni*) of later times, probably consisted chiefly in riding on the king's (or their lord's) business. The services of the peasantry can only be conjectured from what we find in later times. Presumably their chief duty was to undertake a share in the cultivation of the demesne land. We need scarcely doubt also that the labour of repairing fortifications and bridges, though it is charged against the landowners, was in reality delegated by them to their dependents.

5. *Warfare.*—All classes are said to have been liable to the duty of military service. Hence, since the ceorls doubtless formed the bulk of the population, it has been thought that the Anglo-Saxon armies of early times were essentially peasant forces. The evidence at our disposal, however, gives little justification for such a view. The regulation that every five or six hides should supply a warrior was not a product of the Danish invasions, as is sometimes stated, but goes back at least to the beginning of the 9th century. Had the fighting material been drawn from the *ceorlisc* class a warrior would surely have been required from each hide, but for military service no such regulation is found. Again, the fird (*fyrd*) was composed of mounted warriors during the 9th century, though apparently they fought on foot, and there are indications that such was the case also in the 7th century. No doubt ceorls took part in military expeditions, but they may have gone as attendants and camp-followers rather than as warriors, their chief business being to make stockades and bridges, and especially to carry provisions. The serious fighting, however, was probably left to the *gesiðcund* classes, who possessed horses and more or less effective weapons. Indeed, there is good reason for regarding these classes as essentially military.

The chief weapons were the sword and spear. The former were two-edged and on the average about 3 ft. long. The hilts were often elaborately ornamented and sometimes these weapons were of considerable value. No definite line can be drawn between the spear proper and the javelin. The spear-heads which have been found in graves vary considerably in both form and size. They were fitted on to the shaft, by a socket which was open on one side. Other weapons appear to have been quite rare. Bows and arrows were certainly in use for sporting purposes, but there is no reason for believing that they were much used in warfare before the Danish invasions. They are very seldom met with in graves. The most common article of defensive armour was the shield, which was small and circular and apparently of quite thin lime-wood, the edge being formed
[v.04 p.0592]
probably by a thin band of iron. In the centre of the shield, in order to protect the hand which held it, was a strong iron boss, some 7 in. in diameter and projecting about 3 in. It is clear from literary evidence that the helmet (*helm*) and coat of chain mail (*byrne*) were also in common use. They are seldom found in graves, however, whether owing to the custom of heriots or to the fact that, on account of their relatively high value, they were frequently handed on from generation to generation as heirlooms. Greaves are not often mentioned. It is worth noting that in later times the heriot of an "ordinary thegn" (*medema þegn*)—by which is meant apparently not a king's thegn but a man of the *twelfhynde* class—consisted of his horse with its saddle, &c. and his arms, or two pounds of silver as an equivalent of the whole. The arms required were probably a sword, helmet, coat of mail and one or two spears and shields. There are distinct indications that a similar outfit was fairly common in Ine's time, and that its value was much the same. One would scarcely be justified, however, in supposing that it was anything like universal; for the purchasing power of such a sum was at that time considerable, representing as it did about 16-20 oxen or 100-120 sheep. It would hardly be safe to credit men of the *sixhynde* class in general with more than a horse, spear and shield.

6. *Agriculture and Village Life.*—There is no doubt that a fairly advanced system of agriculture must have been known to the Anglo-Saxons before they settled in Britain. This is made clear above all by the representation of a plough drawn by two oxen in one of the very ancient rock-carvings at Tegneby in Bohuslän. In Domesday Book the heavy plough with eight oxen seems to be universal, and it can be traced back in Kent to the beginning of the 9th century. In this kingdom the system of agricultural terminology was based on it. The unit was the *sulung* (*aratrum*) or ploughland (from *sulh*, "plough"), the fourth part of which was the *geocled* or *geoc* (*jugum*), originally a yoke of oxen. An analogy is supplied by the *carucata* of the Danelagh, the eighth part of which was the *bouata* or "ox-land." In the 10th century the *sulung* seems to have been identified with the hide, but in earlier times it contained apparently two hides. The hide itself, which was the regular unit in the other kingdoms, usually contained 120 acres in later times and was divided into four *girda* (*virgatae*) or yardlands. But originally it seems to have meant simply the land pertaining to a household, and its area in early times is quite uncertain, though probably far less. For the acre also there was in later times a standard length and

breadth, the former being called *furhlang* (*furlong*) and reckoned at one-eighth of a mile, while the *aecerbraedu* or "acre-breadth" (chain) was also a definite measure. We need not doubt, however, that in practice the form of the acre was largely conditioned by the nature of the ground. Originally it is thought to have been the measure of a day's ploughing, in which case the dimensions given above would scarcely be reached. Account must also be taken of the possibility that in early times lighter teams were in general use. If so the normal dimensions of the acre may very well have been quite different.

The husbandry was of a co-operative character. In the 11th century it was distinctly unusual for a peasant to possess a whole team of his own, and there is no reason for supposing the case to have been otherwise in early times; for though the peasant might then hold a hide, the hide itself was doubtless smaller and not commensurate in any way with the ploughland. The holdings were probably not compact but consisted of scattered strips in common fields, changed perhaps from year to year, the choice being determined by lot or otherwise. As for the method of cultivation itself there is little or no evidence. Both the "two-course system" and the "three-course system" may have been in use; but on the other hand it is quite possible that in many cases the same ground was not sown more than once in three years. The prevalence of the co-operative principle, it may be observed, was doubtless due in large measure to the fact that the greater part of England, especially towards the east, was settled not in scattered farms or hamlets but in compact villages with the cultivated lands lying round them.

The mill was another element which tended to promote the same principle. There can be little doubt that before the Anglo-Saxons came to Britain they possessed no instrument for grinding corn except the quern (*cweorn*), and in remote districts this continued in use until quite late times. The grinding seems to have been performed chiefly by female slaves, but occasionally we hear also of a donkey-mill (*esolcweorn*). The mill proper, however, which was derived from the Romans, as its name (*mylen*, from Lat. *molina*) indicates, must have come into use fairly early. In the 11th century every village of any size seems to have possessed one, while the earliest references go back to the 8th century. It is not unlikely that they were in use during the Roman occupation of Britain, and consequently that they became known to the invaders almost from the first. The mills were presumably driven for the most part by water, though we have a reference to a windmill as early as the year 833.

All the ordinary domestic animals were known. Cattle and sheep were pastured on the common lands appertaining to the village, while pigs, which (especially in Kent) seem to have been very numerous, were kept in the woods. Bee-keeping was also practised. In all these matters the invasion of Britain had brought about no change. The cultivation of fruit and vegetables on the other hand was probably almost entirely new. The names are almost all derived from Latin, though most of them seem to have been known soon after the invasion, at all events by the 7th century.

From the considerations pointed out above we can hardly doubt that the village possessed a certain amount of corporate life, centred perhaps in an ale-house where its affairs were discussed by the inhabitants. There is no evidence, however, which would justify us in crediting such gatherings with any substantial degree of local authority. So far as the limited information at our disposal enables us to form an opinion, the responsibility both for the internal peace of the village, and for its obligations to the outside world, seems to have lain with the lord or his steward (*gerefa*, *villicus*) from the beginning. A quite opposite view has, it is true, found favour with many scholars, viz. that the villages were orginally settlements of free kindreds, and that the lord's authority was superimposed on them at a later date. This view is based mainly on the numerous place-names ending in *-ing*, *-ingham*, *-ington*, &c., in which the syllable *-ing* is thought to refer to kindreds of cultivators. It is more probable, however, that these names are derived from persons of the *twelfhynde* class to whom the land had been granted. In many cases indeed there is good reason for doubting whether the name is a patronymic at all.

The question how far the villages were really new settlements is difficult to answer, for the terminations *-ham*, *-ton*, &c. cannot be regarded as conclusive evidence. Thus according to the Anglo-Saxon Chronicle (ann. 571) Bensington and Eynsham were formerly British villages. Even if the first part of Egonesham is English—which is by no means certain—it is hardly sufficient reason for discrediting this statement, for Canterbury (*Cantwaraburg*) and Rochester (*Hrofes ceaster*) were without doubt Roman places in spite of their English names. On the whole it seems likely that the cultivation of the land was not generally interrupted for more than a very few years; hence the convenience of utilizing existing sites of villages would be obvious, even if the buildings themselves had been burnt.

7. *Towns.*—Gildas states that in the time of the Romans Britain contained twenty-eight cities (*civitates*), besides a number of fortresses (*castetta*). Most of these were situated within the territories eventually occupied by the invaders, and reappear as towns in later times. Their history in the intervening period, however, is wrapped in obscurity. Chester appears to have been deserted for three centuries after its destruction early in the 7th century, and in most of the other cases there are features observable in the situation and plan of the medieval town which suggest that its occupation had not been continuous. Yet London and Canterbury must have recovered a certain amount of importance quite early, at all events within two centuries after the invasion, and the same is probably true of York, Lincoln and a few other places. The term applied to both the cities and the fortresses of the Romans was *ceaster* (Lat. *castra*), less frequently the English word *burg*. There is little or no evidence for the existence of towns other than Roman in early times, for the word *urbs* is merely a translation of *burg*, which was used for any fortified

dwelling-place, and it is improbable that anything which could properly be called a town was known to the invaders before their arrival in Britain. The Danish settlements at the end of the 9th century and the defensive system initiated by King Alfred gave birth to a new series of fortified towns, from which the boroughs of the middle ages are mainly descended.

8. *Houses.*—Owing to the fact that houses were built entirely of perishable materials, wood and wattle, we are necessarily dependent almost wholly upon literary evidence for knowledge of this subject. Stone seems to have been used first for churches, but this was not before the 7th century, and we are told that at first masons were imported from Gaul. Indeed wood was used for many churches, as well as for most secular buildings, until a much later period. The walls were formed either of stout planks laid together vertically or horizontally, or else of posts at a short distance from one another, the interstices being filled up with wattlework daubed with clay. It is not unlikely that the houses of wealthy persons were distinguished by a good deal of ornamentation in carving and painting. The roof was high-pitched and covered with straw, hay, reeds or tiles. The regular form of the buildings was rectangular, the gable sides probably being shorter than the others. There is little evidence for partitions inside, and in wealthy establishments the place of rooms seems to have been supplied by separate buildings within the same enclosure. The windows must have been mere openings in the walls or roof, for glass was not used for this purpose before the latter part of the 7th century. Stoves were known, but most commonly heat was obtained from an open fire in the centre of the building. Of the various buildings in a wealthy establishment the chief were the hall (*heall*), which was both a dining and reception room, and the "lady's bower" (*brydbur*), which served also as a bedroom for the master and mistress. To these we have to add buildings for the attendants, kitchen, bakehouse, &c., and farm buildings. There is little or no evidence for the use of two-storeyed houses in early times, though in the 10th and 11th centuries they were common. The whole group of buildings stood in an enclosure (*tun*) surrounded by a stockade (*burg*), which perhaps rested on an earthwork, though this is disputed. Similarly the homestead of the peasant was surrounded by a fence (*edor*).

9. *Clothes.*—The chief material for clothing was at first no doubt wool, though linen must also have been used and later became fairly common. The chief garments were the coat (*roc*), the trousers (*brec*), and the cloak, for which there seem to have been a number of names (*loða*, *hacele*, *sciccing*, *pad*, *hwitel*). To these we may add the hat (*haet*), belt (*gyrdel*), stockings (*hosa*), shoes (*scoh*, *gescy*, *rifeling*) and gloves (*glof*). The *crusene* was a fur coat, while the *serc* or *smoc* seems to have been an undergarment and probably sleeveless. The whole attire was of national origin and had probably been in use long before the invasion of Britain. In the great bog-deposit at Thorsbjaerg in Angel, which dates from about the 4th century, there were found a coat with long sleeves, in a fair state of preservation, a pair of long trousers with remains of socks attached, several shoes and portions of square cloaks, one of which had obviously been dyed green. The dress of the upper classes must have been of a somewhat gorgeous character, especially when account is taken of the brooches and other ornaments which they wore. It is worth noting that according to Jordanes the Swedes in the 6th century were splendidly dressed.

10. *Trade.*—The few notices of this subject which occur in the early laws seem to refer primarily to cattle-dealing. But there can be no doubt that a considerable import and export trade with the continent had sprung up quite early. In Bede's time, if not before, London was resorted to by many merchants both by land and by sea. At first the chief export trade was probably in slaves. English slaves were to be obtained in Rome even before the end of the 6th century, as appears from the well-known story of Gregory the Great. Since the standard price of slaves on the continent was in general three or four times as great as it was in England, the trade must have been very profitable. After the adoption of Christianity it was gradually prohibited by the laws. The nature of the imports during the heathen period may be learned chiefly from the graves, which contain many brooches and other ornaments of continental origin, and also a certain number of silver, bronze and glass vessels. With the introduction of Christianity the ecclesiastical connexion between England and the continent without doubt brought about a large increase in the imports of secular as well as religious objects, and the frequency of pilgrimages by persons of high rank must have had the same effect. The use of silk (*seoluc*) and the adoption of the mancus (see below) point to communication, direct or indirect, with more distant countries. In the 8th century we hear frequently of tolls on merchant ships at various ports, especially London.

11. *Coinage.*—The earliest coins which can be identified with certainty are some silver pieces which bear in Runic letters the name of the Mercian king Æthelred (675-704). There are others, however, of the same type and standard (about 21 grains) which may be attributed with probability to his father Penda (d. 655). But it is clear from the laws of Æthelberht that a regular silver coinage was in use at least half a century before this time, and it is not unlikely that many unidentified coins may go back to the 6th century. These are fairly numerous, and are either without inscriptions or, if they do bear letters at all, they seem to be mere corruptions of Roman legends. Their designs are derived from Roman or Frankish coins, especially the former, and their weight varies from about 10 to 21 grains, though the very light coins are rare. Anonymous gold coins, resembling Frankish trientes in type and standard (21 grains), are also fairly common, though they must have passed out of use very early, as the laws give no hint of their existence. Larger gold coins (*solidi*) are very rare. In the early laws the money actually in use appears to have been entirely silver. In Offa's time a new gold coin, the *mancus*, resembling in standard the Roman solidus (about 70 grains), was introduced from Mahommedan countries. The oldest extant specimen bears a faithfully copied Arabic inscription. In the same reign the silver coins underwent a considerable change in type, being made larger and thinner, while from this time onwards they always bore the name of the king (or queen or archbishop) for whom they were

issued. The design and execution also became remarkably good. Their weight was at first unaffected, but probably towards the close of Offa's reign it was raised to about 23 grains, at which standard it seems to have remained, nominally at least, until the time of Alfred. It is to be observed that with the exception of Burgred's coins and a few anonymous pieces the silver was never adulterated. No bronze coins were current except in Northumbria, where they were extremely common in the 9th century.

Originally *scilling* ("shilling") and *sceatt* seem to have been the terms for gold and silver coins respectively. By the time of Ine, however, *pending*, *pen(n)ing* ("penny"), had already come into use for the latter, while, owing to the temporary disappearance of a gold coinage, *scilling* had come to denote a mere unit of account. It was, however, a variable unit, for the Kentish shilling contained twenty *sceattas* (pence), while the Mercian contained only four. The West Saxon shilling seems originally to have been identical with the Mercian, but later it contained five pence. Large payments were generally made by weight, 240-250 pence being reckoned to the pound, perhaps from the 7th century onwards. The mancus was equated with thirty pence, probably from the time of its introduction. This means that the value of gold relatively to silver was 10:1 from the end of Offa's reign. There is reason, however, for thinking that in earlier times it was as low as 6:1, or even 5:1. In Northumbria a totally different monetary system prevailed, the unit being the *tryms*, which contained three *sceattas* or pence. As to the value of the bronze coins we are without information.

[v.04 p.0594] The purchasing power of money was very great. The sheep was valued at a shilling in both Wessex and Mercia, from early times till the 11th century. One pound was the normal price of a slave and half a pound that of a horse. The price of a pig was twice, and that of an ox six times as great as that of a sheep. Regarding the prices of commodities other than live-stock we have little definite information, though an approximate estimate may be made of the value of arms. It is worth noticing that we often hear of payments in gold and silver vessels in place of money. In the former case the mancus was the usual unit of calculation.

12. *Ornaments.*—Of these the most interesting are the brooches which were worn by both sexes and of which large numbers have been found in heathen cemeteries. They may be classed under eight leading types: (1) circular or ring-shaped, (2) cruciform, (3) square-headed, (4) radiated, (5) S-shaped, (6) bird-shaped, (7) disk-shaped, (8) cupelliform or saucer-shaped. Of these Nos. 5 and 6 appear to be of continental origin, and this is probably the case also with No. 4 and in part with No. 7. But the last-mentioned type varies greatly, from rude and almost plain disks of bronze to magnificent gold specimens studded with gems. No. 8 is believed to be peculiar to England, and occurs chiefly in the southern Midlands, specimens being usually found in pairs. The interiors are gilt, often furnished with detachable plates and sometimes set with brilliants. The remaining types were probably brought over by the Anglo-Saxons at the time of the invasion. Nos. 1 and 3 are widespread outside England, but No. 2, though common in Scandinavian countries, is hardly to be met with south of the Elbe. It is worth noting that a number of specimens were found in the cremation cemetery at Borgstedterfeld near Rendsburg. In England it occurs chiefly in the more northern counties. Nos. 2 and 3 vary greatly in size, from 2½ to 7 in. or more. The smaller specimens are quite plain, but the larger ones are gilt and generally of a highly ornamental character. In later times we hear of brooches worth as much as six mancusas, *i.e.* equivalent to six oxen.

Among other ornaments we may mention hairpins, rings and ear-rings, and especially buckles which are often of elaborate workmanship. Bracelets and necklets are not very common, a fact which is rather surprising, as in early times, before the issuing of a coinage, these articles (*beagas*) took the place of money to a large extent. The glass vessels are finely made and of somewhat striking appearance, though they closely resemble contemporary continental types. Since the art of glass-working was unknown, according to Bede, until nearly the end of the 7th century, it is probable that these were all of continental or Roman-British origin.

13. *Amusements.*—It is clear from the frequent references to dogs and hawks in the charters that hunting and falconry were keenly pursued by the kings and their retinues. Games, whether indoor or outdoor, are much less frequently mentioned, but there is no doubt that the use of dice (*taefl*) was widespread. At court much time was given to poetic recitation, often accompanied by music, and accomplished poets received liberal rewards. The chief musical instrument was the harp (*hearpe*), which is often mentioned. Less frequently we hear of the flute (*pipe*) and later also of the fiddle (*fiðele*). Trumpets (*horn*, *swegelhorn*, *byme*) appear to have been used chiefly as signals.

14. *Writing.*—The Runic alphabet seems to have been the only form of writing known to the Anglo-Saxons before the invasion of Britain, and indeed until the adoption of Christianity. In its earliest form, as it appears in inscriptions on various articles found in Schleswig and in Scandinavian countries, it consisted of twenty-four letters, all of which occur in abecedaria in England. In actual use, however, two letters soon became obsolete, but a number of others were added from time to time, some of which are found also on the continent, while others are peculiar to certain parts of England. Originally the Runic alphabet seems to have been used for writing on wooden boards, though none of these have survived. The inscriptions which have come down to us are engraved partly on memorial stones, which are not uncommon in the north of England, and partly on various metal objects, ranging from swords to brooches. The adoption of Christianity brought about the introduction of the Roman alphabet; but the older form of writing did not immediately pass out of use, for almost all the inscriptions which we possess date from the 7th or following centuries. Coins with Runic legends were issued at least until the middle of

the 8th century, and some of the memorial stones date probably even from the 9th. The most important of the latter are the column at Bewcastle, Cumberland, believed to commemorate Alhfrith, the son of Oswio, who died about 670, and the cross at Ruthwell, Dumfriesshire, which is probably about a century later. The Roman alphabet was very soon applied to the purpose of writing the native language, *e.g.* in the publication of the laws of Æthelberht. Yet the type of character in which even the earliest surviving MSS. are written is believed to be of Celtic origin. Most probably it was introduced by the Irish missionaries who evangelized the north of England, though Welsh influence is scarcely impossible. Eventually this alphabet was enlarged (probably before the end of the 7th century) by the inclusion of two Runic letters for *th* and *w*.

15. *Marriage.*—This is perhaps the subject on which our information is most inadequate. It is evident that the relationships which prohibited marriage were different from those recognized by the Church; but the only fact which we know definitely is that it was customary, at least in Kent, for a man to marry his stepmother. In the Kentish laws marriage is represented as hardly more than a matter of purchase; but whether this was the case in the other kingdoms also the evidence at our disposal is insufficient to decide. We know, however, that in addition to the sum paid to the bride's guardian, it was customary for the bridegroom to make a present (*morgengifu*) to the bride herself, which, in the case of queens, often consisted of a residence and considerable estates. Such persons also had retinues and fortified residences of their own. In the Kentish laws provision is made for widows to receive a proportionate share in their husbands' property.

16. *Funeral Rites.*—Both inhumation and cremation were practised in heathen times. The former seems to have prevailed everywhere; the latter, however, was much more common in the more northern counties than in the south, though cases are fairly numerous throughout the valley of the Thames. In *Beowulf* cremation is represented as the prevailing custom. There is no evidence that it was still practised when the Roman and Celtic missionaries arrived, but it is worth noting that according to the tradition given in the Anglo-Saxon Chronicle, Oxfordshire, where the custom seems to have been fairly common, was not conquered before the latter part of the 6th century. The burnt remains were generally, if not always, enclosed in urns and then buried. The urns themselves are of clay, somewhat badly baked, and bear geometrical patterns applied with a punch. They vary considerably in size (from 4 to 12 in. or more in diameter) and closely resemble those found in northern Germany. Inhumation graves are sometimes richly furnished. The skeleton is laid out at full length, generally with the head towards the west or north, a spear at one side and a sword and shield obliquely across the middle. Valuable brooches and other ornaments are often found. In many other cases, however, the grave contained nothing except a small knife and a simple brooch or a few beads. Usually both classes of graves lie below the natural surface of the ground without any perceptible trace of a barrow.

17. *Religion.*—Here again the information at our disposal is very limited. There can be little doubt that the heathen Angli worshipped certain gods, among them Ti (Tig), Woden, Thunor and a goddess Frigg, from whom the names Tuesday, Wednesday, Thursday and Friday are derived. Ti was probably the same god of whom early Roman writers speak under the name Mars (see Týr), while Thunor was doubtless the thunder-god (see Thor). From Woden (*q.v.*) most of the royal families traced their descent. Seaxneat, the ancestor of the East Saxon dynasty, was also in all probability a god (see Essex, Kingdom of).

[v.04 p.0595] Of anthropomorphic representations of the gods we have no clear evidence, though we do hear of shrines in sacred enclosures, at which sacrifices were offered. It is clear also that there were persons specially set apart for the priesthood, who were not allowed to bear arms or to ride except on mares. Notices of sacred trees and groves, springs, stones, &c., are much more frequent than those referring to the gods. We hear also a good deal of witches and valkyries, and of charms and magic; as an instance we may cite the fact that certain (Runic) letters were credited, as in the North, with the power of loosening bonds. It is probable also that the belief in the spirit world and in a future life was of a somewhat similar kind to what we find in Scandinavian religion. (See Teutonic Peoples, §6.)

The chief primary authorities are Gildas, *De Excidio Britanniae*, and Nennius, *Historia Britonum* (ed. San-Marte, Berlin, 1844); Th. Mommsen in *Mon. Germ. Hist., Auct. Antiquiss.*, tom. xiii. (Berlin, 1898); Bede, *Hist. Eccl.* (ed. C. Plummer, Oxford, 1896); the *Saxon Chronicle* (ed. C. Plummer, Oxford, 1892-1899); and the *Anglo-Saxon Laws* (ed. F. Liebermann, Halle, 1903), and Charters (W. de G. Birch, *Cartularium Saxonicum*, London, 1885-1893). Modern authorities: Sh. Turner, *History of the Anglo-Saxons* (London, 1799-1805; 7th ed., 1852); Sir F. Palgrave, *Rise and Progress of the English Commonwealth* (London, 1831-1832); J.M. Kemble, *The Saxons in England* (London, 1849; 2nd ed., 1876); K. Maurer, *Kritische Überschau d. deutschen Gesetzgebung u. Rechtswissenschaft*, vols. i.-iii. (Munich, 1853-1855); J.M. Lappenberg, *Geschichte von England* (Hamburg, 1834); *History of England under the Anglo-Saxon Kings* (London, 1845; 2nd ed., 1881); J.R. Green, *The Making of England* (London, 1881); T. Hodgkin, *History of England from the Earliest Times to the Norman Conquest* (vol. i. of *The Political History of England*) (London, 1906); F. Seebohm, *The English Village Community* (London, 1883); A. Meitzen, *Siedelung und Agrarwesen d. Westgermanen, u. Ostgermanen, &c.* (Berlin, 1895); Sir F. Pollock and F.W. Maitland, *History of English Law* (Cambridge, 1895; 2nd ed., 1898); F.W. Maitland, *Domesday Book and Beyond* (Cambridge, 1897); F. Seebohm, *Tribal Custom in Anglo-Saxon Law* (London, 1903); P. Vinogradoff, *The Growth of the Manor* (London, 1905); H.M. Chadwick, *Studies on Anglo-Saxon Institutions* (Cambridge, 1905); *The Origin of the English Nation* (*ib.*, 1907); M. Heyne, *Über die Lage und Construction der Halle Heorot* (Paderborn, 1864); R. Henning, *Das deutsche Haus* (*Quellen u. Forschungen*, 47) (Strassburg, 1882); M.

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(H. M. C.)

[1] The hide (*hid*, *hiwisc*, *familia*, *tributarius*, *cassatus*, *manens*, &c.) was in later times a measure of land, usually 120 acres. In early times, however, it seems to have meant (1) household, (2) normal amount of land appertaining to a household.

BRITANNICUS, son of the Roman emperor Claudius by his third wife Messallina, was born probably A.D. 41. He was originally called Claudius Tiberius Germanicus, and received the name Britannicus from the senate on account of the conquest made in Britain about the time of his birth. Till 48, the date of his mother's execution, he was looked upon as the heir presumptive; but Agrippina, the new wife of Claudius, soon persuaded the feeble emperor to adopt Lucius Domitius, known later as Nero, her son by a previous marriage. After the accession of Nero, Agrippina, by playing on his fears, induced him to poison Britannicus at a banquet (A.D. 55). A golden statue of the young prince was set up by the emperor Titus. Britannicus is the subject of a tragedy by Racine.

Tacitus, *Annals*, xii. 25, 41, xiii. 14-16; Suetonius, *Nero*, 33; Dio Cassius lx. 32, 34; works quoted under NERO.

BRITISH CENTRAL AFRICA, the general name given to the British protectorates in South Central Africa north of the Zambezi river, but more particularly to a large territory lying between 8° 25′ S. on Lake Tanganyika and 17° 6′ S. on the river Shiré, near its confluence with the Zambezi, and between 36° 10′ E. (district of Mlanje) and 26° 30′ E. (river Luengwe-Kafukwe). Originally the term "British Central Africa" was applied by Sir H.H. Johnston to all the territories under British influence north of the Zambezi which were formerly intended to be under one administration; but the course of events having prevented the connexion of Barotseland (see BAROTSE) and the other Rhodesian territories with the more direct British administration north of the Zambezi, the name of British Central Africa was confined officially (in 1893) to the British protectorate on the Shiré and about Lake Nyasa. In 1907 the official title of the protectorate was changed to that of Nyasaland Protectorate, while the titles "North Eastern Rhodesia" and "North Western Rhodesia" (Barotseland) have been given to the two divisions of the British South Africa Company's territory north of the Zambezi. The western boundary, however, of the territory here described has been taken to be a line drawn from near the source of the Lualaba on the southern boundary of Belgian Congo to the western source of the Luanga river, and thence the course of the Luanga to its junction with the Luengwe-Kafukwe, after which the main course of the Kafukwe delimits the territory down to the Zambezi. Thus, besides the Nyasaland Protectorate and North Eastern Rhodesia, part of North Western Rhodesia is included, and for the whole of this region British Central Africa is the most convenient designation.

Physical Features.—Within these limits we have a territory of about 250,000 sq. m., which includes two-thirds of Lake Nyasa, the south end of Lake Tanganyika, more than half Lake Mweru, and the whole of Lake Bangweulu, nearly the whole courses of the rivers Shiré and Luangwa (or Loangwa), the whole of the river Chambezi (the most remote of the headwaters of the river Congo), the right or east bank of the Luapula (or upper Congo) from its exit from Lake Bangweulu to its issue from the north end of Lake Mweru; also the river Luanga and the whole course of the Kafue or Kafukwe.[1] Other lesser sheets of water included within the limits of this territory are the Great Mweru Swamp, between Tanganyika and Mweru, Moir's Lake (a small mountain tarn—possibly a crater lake—lying between the Luangwa and the Luapula), Lake Malombe (on the upper Shiré), and the salt lake Chilwa (wrongly styled Shirwa, being the Bantu word *Kilwa*), which lies on the borders of the Portuguese province of Moçambique. The southern border of this territory is the north bank of the Zambezi from the confluence of the Kafukwe to that of the Luangwa at Zumbo. Eastwards of Zumbo, British Central Africa is separated from the river Zambezi by the Portuguese possessions; nevertheless, considerably more than two-thirds of the country lies within the Zambezi basin, and is included within the subordinate basins of Lake Nyasa and of the rivers Luangwa and Luengwe-Kafukwe. The remaining portions drain into the basins of the river Congo and of Lake Tanganyika, and also into the small lake or half-dried swamp called Chilwa, which at the present time has no outlet, though in past ages it probably emptied itself into the Lujenda river, and thence into the Indian Ocean.

As regards orographical features, much of the country is high plateau, with an average altitude of 3500 ft. above sea-level. Only a very minute portion of its area—the country along the banks of the river Shiré—lies at anything like a low elevation; though the Luangwa valley may not be more than about 900 ft. above sea-level. Lake Nyasa lies at an elevation of 1700 ft. above the sea, is about 350 m. long, with a breadth varying from 15 to 40 m. Lake Tanganyika is about 2600 ft. above sea-level, with a length of about 400 m. and an average breadth of nearly 40 m. Lake

Mweru and Lake Bangweulu are respectively 3000 and 3760 ft. above sea-level; Lake Chilwa is 1946 ft. in altitude. The highest mountain found within the limits previously laid down is Mount Mlanje, in the extreme south-eastern corner of the protectorate. This remarkable and picturesque mass is an isolated "chunk" of the Archean plateau, through which at a later date there has been a volcanic outburst of basalt. The summit and sides of this mass exhibit several craters. The highest peak of Mlanje reaches an altitude of 9683 ft. (In German territory, near the north end of Lake Nyasa, and close to the British frontier, is Mount Rungwe, the altitude of which exceeds 10,000 ft.) Other high mountains are Mounts Chongone and Dedza, in Angoniland, which reach an altitude of 7000 ft., and points on the Nyika Plateau and in the Konde Mountains to the north-west of Lake Nyasa, which probably exceed a height of 8000 ft. There are also Mounts Zomba (6900 ft.) and Chiradzulu (5500 ft.) in the Shiré Highlands. The principal plateaus or high ridges are (1) the Shiré Highlands, a clump of mountainous country lying between the river Shiré, the river Ruo, Lake Chilwa and the south end of Lake Nyasa; (2) Angoniland—a stretch of elevated
[v.04 p.0596] country to the west of Lake Nyasa and the north-west of the river Shiré; (3) the Nyika Plateau, which lies to the north of Angoniland; and (4) the Nyasa-Tanganyika Plateau, between the basin of the river Luangwa, the vicinity of Tanganyika and the vicinity of Lake Mweru (highest point, 7000-8000 ft.). Finally may be mentioned the tract of elevated country between Lake Bangweulu and the river Luapula, and between Lake Bangweulu and the basin of the Luangwa; and also the Lukinga (Mushinga) or Ugwara Mountains of North Western Rhodesia, which attain perhaps to altitudes of 6000 ft.

The whole of this part of Africa is practically without any stretch of desert country, being on the whole favoured with an abundant rainfall. The nearest approach to a desert is the rather dry land to the east and north-east of Lake Mweru. Here, and in parts of the lower Shiré district, the annual rainfall probably does not exceed an average of 35 in. Elsewhere, in the vicinity of the highest mountains, the rainfall may attain an average of 75 in., in parts of Mount Mlanje possibly often reaching to 100 in. in the year. The average may be put at 50 in. per annum, which is also about the average rainfall of the Shiré Highlands, that part of British Central Africa which at present attracts the greatest number of European settlers.

Geology.—The whole formation is Archean and Primary (with a few modern plutonic outbursts), and chiefly consists of granite, felspar, quartz, gneiss, schists, amphibolite and other Archean rocks, with Primary sandstones and limestones in the basin of Lake Nyasa (a great rift depression), the river Shiré, and the regions within the northern watershed of the Zambezi river. Sandstones of Karroo age occur in the basin of the Luangwa (N.E. Rhodesia). There are evidences of recent volcanic activity on the summit of the small Mlanje plateau (S.E. corner of the protectorate: here there are two extinct craters with a basaltic outflow), and at the north end of Lake Nyasa and the eastern edge of the Tanganyika plateau. Here there are many craters and much basalt, or even lava; also hot springs.

Metals and Minerals.—Gold has been found in the Shiré Highlands, in the hills along the Nyasa-Zambezi waterparting, and in the mountainous region west of Lake Nyasa; silver (galena, silver-lead) in the hills of the Nyasa-Zambezi waterparting; lead in the same district; graphite in the western basin of Lake Nyasa; copper (pyrites and pure ore) in the west Nyasa region and in the hills of North Western and North Eastern Rhodesia; iron ore almost universally; mica almost universally; coal occurs in the north and west Nyasa districts (especially in the Karroo sandstones of the Rukuru valley), and perhaps along the Zambezi-Nyasa waterparting; limestone in the Shiré basin; malachite in south-west Angoniland and North Western Rhodesia; and perhaps petroleum in places along the Nyasa-Zambezi waterparting. (See also RHODESIA.)

Flora.—No part of the country comes within the forest region of West Africa. The whole of it may be said to lie within the savannah or park-like division of the continent. As a general rule, the landscape is of a pleasing and attractive character, well covered with vegetation and fairly well watered. Actual forests of lofty trees, forests of a West African type, are few in number, and are chiefly limited to portions of the Nyika, Angoniland and Shiré Highlands plateaus, and to a few nooks in valleys near the south end of Tanganyika. Patches of forest of tropical luxuriance may still be seen on the slopes of Mounts Mlanje and Chiradzulu. On the upper plateaus of Mount Mlanje there are forests of a remarkable conifer (*Widdringtonia whytei*), a relation of the cypress, which in appearance resembles much more the cedar, and is therefore wrongly styled the "Mlanje cedar." This tree is remarkable as being the most northern form of a group of yew-like conifers confined otherwise to South Africa (Cape Colony). Immense areas in the lower-lying plains are covered by long, coarse grass, sometimes reaching 10 ft. in height. Most of the West African forest trees are represented in British Central Africa. A full list of the known flora has been compiled by Sir W. Thiselton-Dyer and his assistants at Kew, and is given in the first and second editions of Sir H. H. Johnston's work on British Central Africa. Amongst the principal vegetable products of the country interesting for commercial purposes may be mentioned tobacco (partly native varieties and partly introduced); coffee (wild coffee is said to grow in some of the mountainous districts, but the actual coffee cultivated by the European settlers has been introduced from abroad); rubber—derived chiefly from the various species of *Landolphia*, *Ficus*, *Clitandra*, *Carpodinus* and *Conopharygia*, and from other apocynaceous plants; the *Strophanthus* pod (furnishing a valuable drug); ground-nuts (*Arachis* and *Voandzeia*); the cotton plant; all African cultivated cereals (*Sorghum*, *Pennisetum*, maize, rice, wheat—cultivated chiefly by Europeans—and *Eleusine*); and six species of palms—the oil palm on the north-west (near Lake Nyasa, at the south end of Tanganyika and on the Luapula), the *Borassus* and *Hyphaene*, *Phoenix* (or wild date), *Raphia* and the coco-nut palm. The last named was introduced by Arabs and Europeans, and is found on Lake Nyasa and on the lower Shiré. Most of the European vegetables

have been introduced, and thrive exceedingly well, especially the potato. The mango has also been introduced from India, and has taken to the Shiré Highlands as to a second home. Oranges, lemons and limes have been planted by Europeans and Arabs in a few districts. European fruit trees do not ordinarily flourish, though apples are grown to some extent at Blantyre. The vine hitherto has proved a failure. Pineapples give the best result among cultivated fruit, and strawberries do well in the higher districts. In the mountains the native wild brambles give blackberries of large size and excellent flavour. The vegetable product through which this protectorate first attracted trade was coffee, the export of which, however, has passed through very disheartening fluctuations. In 1905-1906, 773,919 lb of coffee (value £16,123) were exported; but during this twelve months the crop of cotton—quite a newly developed product, rose to 776,621 lb, from 285,185 lb in 1904-1905. An equally marked increase in tobacco and ground-nuts (*Arachis*) has taken place. Beeswax is a rising export.

Fauna.—The fauna is on the whole very rich. It has affinities in a few respects with the West African forest region, but differs slightly from the countries to the north and south by the absence of such animals as prefer drier climates, as for instance the oryx antelopes, gazelles and the ostrich. There is a complete blank in the distribution of this last between the districts to the south of the Zambezi and those of East Africa between Victoria Nyanza and the Indian Ocean. The giraffe is found in the Luanga valley; it is also met with in the extreme north-east of the country. The ordinary African rhinoceros is still occasionally, but very rarely, seen in the Shiré Highlands, The African elephant is fairly common throughout the whole territory. Lions and leopards are very abundant; the zebra is still found in great numbers, and belongs to the Central African variety of Burchell's zebra, which is completely striped down to the hoofs, and is intermediate in many particulars between the true zebra of the mountains and Burchell's zebra of the plains. The principal antelopes found are the sable and the roan (*Hippotragus*), five species of *Cobus* or waterbuck (the puku, the Senga puku, the lechwe, Crawshay's waterbuck and the common waterbuck); the pallah, tsessébe (*Damaliscus*), hartebeest, brindled gnu (perhaps two species), several duykers (including the large *Cephalophus sylvicultrix*), klipspringer, oribi, steinbok and reedbuck. Among tragelaphs are two or more bushbucks, the inyala, the water tragelaph (*Limnotragus selousi*), the kudu and Livingstone's eland. The only buffalo is the common Cape species. The hyaena is the spotted kind. The hunting dog is present. There are some seven species of monkeys, including two baboons and one colobus. The hippopotamus is found in the lakes and rivers, and all these sheets of water are infested with crocodiles, apparently belonging to but one species, the common Nile crocodile.

Inhabitants.—The human race is represented by only one indigenous native type—the Negro. No trace is anywhere found of a Hamitic intermixture (unless perhaps at the north end of Lake Nyasa, where the physique of the native Awankonde recalls that of the Nilotic negro). Arabs from Zanzibar have settled in the country, but not, as far as is known, earlier than the beginning of the 19th century. As the present writer takes the general term "Negro" to include equally the Bantu, Hottentot, Bushman and Congo Pygmy, this designation will cover all the natives of British Central Africa. The Bantu races, however, exhibit in some parts signs of Hottentot or Bushman intermixture, and there are legends in some mountain districts, especially Mount Mlanje, of the former existence of unmixed Bushman tribes, while Bushman stone implements are found at the south end of Tanganyika. At the present day the population is, as a rule, of a black or chocolate-coloured Negro type, and belongs, linguistically, entirely and exclusively to the Bantu family. The languages spoken offer several very interesting forms of Bantu speech, notably in the districts between the north end of Lake Nyasa, the south end of Lake Tanganyika, and the river Luapula. In the more or less plateau country included within these geographical limits, the Bantu dialects are of an archaic type, and to the present writer it has seemed as though one of them, Kibemba or Kiwemba, came near to the original form of the Bantu mother-language, though not nearer than the interesting Subiya of southern Barotseland. Through dialects spoken on the west and north of Tanganyika, these languages of North Eastern Rhodesia and northern Nyasaland and of the Kafukwe basin are connected with the Bantu languages of Uganda. They also offer a slight resemblance to Zulu-Kaffir, and it would seem as though the Zulu-Kaffir race must have come straight down from the countries to the north-east of Tanganyika, across the Zambezi, to their present home. Curiously enough, some hundreds of years after this southward migration, intestine wars and conflicts actually determined a north-eastward return migration of Zulus. From Matabeleland, Zulu tribes crossed the Zambezi at various periods (commencing from about 1820), and gradually extended their ravages and dominion over the plateaus to the west, north and north-east of Lake Nyasa. The Zulu language is still spoken by the dominating caste in West Nyasaland (see further ZULULAND: *Ethnology*; RHODESIA: *Ethnology*; and YAOS). As regards foreign settlers in this part of Africa, the Arabs may be mentioned first, though they are now met with only in very small numbers. The Arabs undoubtedly first *heard* of this rich country—rich not alone in natural products such as ivory, but also in slaves of good quality—from their settlements near the delta of the river Zambezi, and these settlements may date back to an early period, and might be coeval with the suggested pre-Islamite Arab settlements in the gold-bearing regions of South East Africa. But the Arabs do not seem to have made much progress in their penetration of the country in the days before firearms; and when firearms came into use they were for a long time forestalled by the Portuguese, who ousted them from the Zambezi. But about the beginning of the 19th century the increasing power and commercial enterprise of the Arab sultanate of Zanzibar caused the Arabs of Maskat and Zanzibar to march inland from the east coast. They gradually founded strong slave-trading settlements on the east and west coasts of Lake Nyasa, and thence westwards to Tanganyika and the Luapula. They never came in great numbers, however, and, except here and there on the coast of Lake Nyasa, have left no mixed descendants

in the population. The total native population of all British Central Africa is about 2,000,000, that of the Nyasaland Protectorate being officially estimated in 1907 at 927,355. Of Europeans the protectorate possesses about 600 to 700 settlers, including some 100 officials. (For the European population of the other territories, see RHODESIA.) The Europeans of British Central Africa are chiefly natives of the United Kingdom or South Africa, but there are a few Germans, Dutchmen, French, Italians and Portuguese. The protectorate has also attracted a number of Indian traders (over 400), besides whom about 150 British Indian soldiers (Sikhs) are employed as the nucleus of an armed force.[2]

Trade and Communications.—The total value of the trade of the protectorate in the year 1899-1900 was £255,384, showing an increase of 75% on the figures for the previous year, 1898-1899. Imports were valued at £176,035, an increase of 62%, and exports at £79,449, an increase of 109%. In 1905-1906 the imports reached £222,581 and the exports £56,778. The value of imports into the Rhodesian provinces during the same period was about £50,000, excluding railway material, and the exports £18,000. The principal exports are (besides minerals) coffee, cotton, tobacco, rubber and ivory. A number of Englishmen and Scotsmen (perhaps 200) are settled, mainly in the Shiré Highlands, as coffee planters.

From the Chinde mouth of the Zambezi to Port Herald on the lower Shiré communication is maintained by light-draught steamers, though in the dry season (April-November) steamers cannot always ascend as far as Port Herald, and barges have to be used to complete the voyage. A railway runs from Port Herald to Blantyre, the commercial capital of the Shiré Highlands. The "Cape to Cairo" railway, which crossed the Zambezi in 1905 and the Kafukwe in 1906, reached the Broken Hill mine in 1907, and in 1909 was continued to the frontier of Belgian Congo. There are regular services by steamer between the ports on Lakes Nyasa and Tanganyika. The African trans-continental telegraph line (founded by Cecil Rhodes) runs through the protectorate, and a branch line has been established from Lake Nyasa to Fort Jameson, the present headquarters of the Chartered Company in North Eastern Rhodesia.

Towns.—The principal European settlement or town is Blantyre (*q.v.*), at a height of about 3000 ft. above the sea, in the Shiré Highlands. This place was named after Livingstone's birthplace, and was founded in 1876 by the Church of Scotland mission. The government capital of the protectorate, however, is Zomba, at the base of the mountain of that name. Other townships or sites of European settlements are Port Herald (on the lower Shiré), Chiromo (at the junction of the Ruo and the Shiré), Fort Anderson (on Mount Mlanje), Fort Johnston (near the outlet of the river Shiré from the south end of Lake Nyasa), Kotakota and Bandawe (on the west coast of Lake Nyasa), Likoma (on an island off the east coast of Lake Nyasa), Karonga (on the north-west coast of Lake Nyasa), Fife (on the Nyasa-Tanganyika plateau), Fort Jameson (capital of N.E. Rhodesia, near the river Luangwa), Abercorn (on the south end of Lake Tanganyika), Kalungwisi (on the east coast of Lake Mweru) and Fort Rosebery (near the Johnston Falls on the Luapula [upper Congo]).

Administration.—The present political divisions of the country are as follows:—The Nyasaland Protectorate, *i.e.* the districts surrounding Lake Nyasa and the Shiré province, are administered directly under the imperial government by a governor, who acts under the orders of the colonial office. The governor is assisted by an executive council and by a nominated legislative council, which consists of at least three members. The districts to the westward, forming the provinces of North Eastern and North Western Rhodesia, are governed by two administrators of the British South Africa Chartered Company, in consultation with the governor of Nyasaland and the colonial office.

History.—The history of the territory dealt with above is recent and slight. Apart from the vague Portuguese wanderings during the 16th and 17th centuries, the first European explorer of any education who penetrated into this country was the celebrated Portuguese official, Dr F.J.M. de Lacerda e Almeida, who journeyed from Tete on the Zambezi to the vicinity of Lake Mweru. But the real history of the country begins with the advent of David Livingstone, who in 1859 penetrated up the Shiré river and discovered Lake Nyasa. Livingstone's subsequent journeys, to the south end of Tanganyika, to Lake Mweru and to Lake Bangweulu (where he died in 1873), opened up this important part of South Central Africa and centred in it British interests in a very particular manner. Livingstone's death was soon followed by the entry of various missionary societies, who commenced the evangelization of the country; and these missionaries, together with a few Scottish settlers, steadily opposed the attempts of the Portuguese to extend their sway in this direction from the adjoining provinces of Moçambique and of the Zambezi. From out of the missionary societies grew a trading company, the African Lakes Trading Corporation. This body came into conflict with a number of Arabs who had established themselves on the north end of Lake Nyasa. About 1885 a struggle began between Arab and Briton for the possession of the country, which was not terminated until the year 1896. The African Lakes Corporation in its unofficial war enlisted volunteers, amongst whom were Captain (afterwards Sir F.D.) Lugard and Mr (afterwards Sir) Alfred Sharpe. Both these gentlemen were wounded, and the operations they undertook were not crowned with complete success. In 1889 Mr (afterwards Sir) H.H. Johnston was sent out to endeavour to effect a possible arrangement of the dispute between the Arabs and the African Lakes Corporation, and also to ensure the protection of friendly native chiefs from Portuguese aggression beyond a certain point. The outcome of these efforts and the treaties made was the creation of the British protectorate and sphere of influence north of the Zambezi (see AFRICA; § 5). In 1891 Johnston returned to the country as imperial commissioner and consul-general. In the interval between 1889 and 1891 Mr Alfred Sharpe, on behalf of Cecil Rhodes, had

brought a large part of the country into treaty with the British South Africa Company, These territories (Northern Rhodesia) were administered for four years by Sir Harry Johnston in connexion with the British Central Africa protectorate. Between 1891 and 1895 a long struggle continued, between the British authorities on the one hand and the Arabs and Mahommedan Yaos on the other, regarding the suppression of the slave trade. By the beginning of 1896 the last Arab stronghold was taken and the Yaos were completely reduced to submission. Then followed, during 1896-1898, wars with the Zulu (Angoni) tribes, who claimed to dominate and harass the native populations to the west of Lake Nyasa. The Angoni having been subdued, and the British South Africa Company having also quelled the turbulent Awemba and Bashukulumbwe, there is a reasonable hope of the country enjoying a settled peace and considerable prosperity. This prospect has been, indeed, already realized to a considerable extent, though the increase of commerce has scarcely been as rapid as was anticipated. In 1897, on the transference of Sir Harry Johnston to Tunis, the commissionership was conferred on Mr Alfred Sharpe, who was created a K.C.M.G. in 1903. In 1904 the administration of the protectorate, originally directed by the foreign office, was transferred to the colonial office. In 1907, on the change in the title of the protectorate, the designation of the chief official was altered from commissioner to governor, and executive and legislative councils were established. The mineral surveys and railway construction commenced under the foreign office were carried on vigorously under the colonial office. The increased revenue, from £51,000 in 1901-1902 to £76,000 in 1905-1906, for the protectorate alone (see also RHODESIA), is an evidence of increasing prosperity. Expenditure in excess of revenue is met by grants in aid from the imperial exchequer, so far as the Nyasaland Protectorate is concerned. The British South Africa Company finances the remainder. The native population is well disposed towards European rule, having, indeed, at all times furnished the principal contingent of the armed force with which the African Lakes Company, British South Africa Company or the British government endeavoured to oppose Arab, Zulu or Awemba aggression. The protectorate government maintains three gunboats on Lake Nyasa, and the British South Africa Company an armed steamer on Lake Tanganyika.

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Unfortunately, though so rich and fertile, the land is not as a rule very healthy for Europeans, though there are signs of improvement in this respect. The principal scourges are black-water fever and dysentery, besides ordinary malarial fever, malarial ulcers, pneumonia and bronchitis. The climate is agreeable, and except in the low-lying districts is never unbearably hot; while on the high mountain plateaus frost frequently occurs during the dry season.

See *Narrative of an Expedition to the Zambezi*, &c., by David and Charles Livingstone (1865); *Last Journals of David Livingstone*, edited by the Rev. Horace Waller (1874); L. Monteith Fotheringham, *Adventures in Nyasaland* (1891); Henry Drummond, *Tropical Africa* (4th ed., 1891); Rev. D.C. Scott, *An Encyclopaedic Dictionary of the Mang'anja Language, as spoken in British Central Africa* (1891); Sir H.H. Johnston, *British Central Africa* (2nd ed., 1898); Miss A. Werner, *The Natives of British Central Africa* (1906); John Buchanan, *The Shiré Highlands* (1885); Lionel Décle, *Three Years in Savage Africa* (1898); H.L. Duff, *Nyasaland under the Foreign Office* (1903); J.E.S. Moore, *The Tanganyika Problem* (1904); articles on North Eastern and North Western Rhodesia (chiefly by Frank Melland) in the *Journal of the African Society* (1902-1906); annual *Reports* on British Central Africa published by the Colonial Office; various linguistic works by Miss A. Werner, the Rev. Govan Robertson, Dr R. Laws, A.C. Madan, Father Torrend and Monsieur E. Jacottet.

(H. H. J.)

[1] The nomenclature of several of these rivers is perplexing. It should be borne in mind that the Luanga (also known as the Lunga) is a tributary of the Luengwe-Kafukwe, itself often called Kafue, and that the Luangwa (or Loangwa) is an independent affluent of the Zambezi (*q.v.*).

[2] The organized armed forces and police are under the direction of the imperial government throughout British Central Africa, and number about 880 (150 Sikhs, 730 negroes and 14 British officers).

BRITISH COLUMBIA, the western province of the Dominion of Canada. It is bounded on the east by the continental watershed in the Rocky Mountains, until this, in its north-westerly course, intersects 120° W., which is followed north to 60° N., thus including within the province a part of the Peace river country to the east of the mountains. The southern boundary is formed by 49° N. and the strait separating Vancouver Island from the state of Washington. The northern boundary is 60° N., the western the Pacific Ocean, upon which the province fronts for about 600 m., and the coast strip of Alaska for a further distance of 400 m. Vancouver Island and the Queen Charlotte Islands, as well as the smaller islands lying off the western coast of Canada, belong to the province of British Columbia.

Physical Features.—British Columbia is essentially a mountainous country, for the Rocky Mountains which in the United States lie to the east of the Great Basin, on running to the north bear toward the west and approach the ranges which border the Pacific coast. Thus British Columbia comprises practically the entire width of what has been termed the Cordillera or Cordilleran belt of North America, between the parallels of latitude above indicated. There are two ruling mountain systems in this belt—the Rocky Mountains proper on the north-east side, and the Coast Range on the south-west or Pacific side. Between these are subordinate ranges to which various local names have been given, as well as the "Interior Plateau"—an elevated tract of hilly country, the hill summits having an accordant altitude, which lies to the east of the Coast

Range. The several ranges, having been produced by successive foldings of the earth's crust in a direction parallel to the border of the Pacific Ocean, have a common trend which is south-east and north-west. Vancouver Island and the Queen Charlotte Islands are remnants of still another mountain range, which runs parallel to the coast but is now almost entirely submerged beneath the waters of the Pacific. The province might be said to consist of a series of parallel mountain ranges with long narrow valleys lying between them.

The Rocky Mountains are composed chiefly of palaeozoic sediments ranging in age from the Cambrian to the Carboniferous, with subordinate infolded areas of Cretaceous which hold coal. The average height of the range along the United States boundary is 8000 ft., but the range culminates between the latitudes of 51° and 53°, the highest peak in the Canadian Rockies being Mount Robson, 13,700 ft., although the highest peak in British Columbia is Mount Fairweather on the International Boundary, which rises to 15,287 ft. Other high peaks in the Rocky Mountains of Canada are Columbia, 12,740 ft.; Forbes, 12,075; Assiniboine, 11,860; Bryce. 11,686; Temple, 11,626; Lyell, 11,463. There are a number of passes over the Rocky Mountains, among which may be mentioned, beginning from the south, the South Kootenay or Boundary Pass, 7100 ft.; the Crow's Nest Pass, 5500 (this is traversed by the southern branch of the Canadian Pacific railway and crosses great coal fields); the Kicking Horse or Wapta Pass, 5300 (which is traversed by the main line of the Canadian Pacific railway); the Athabasca Pass, 6025; the Yellow Head Pass, 3733 (which will probably be used by the Grand Trunk Pacific railway); the Pine River Pass, 2850; and the Peace River Pass, 2000, through which the Peace river flows.

The Coast Range, sometimes called the Cascade Range, borders the Pacific coast for 900 m. and gives to it its remarkable character. To its partially submerged transverse valleys are due the excellent harbours on the coast, the deep sounds and inlets which penetrate far inland at many points, as well as the profound and gloomy fjords and the stupendous precipices which render the coast line an exaggerated reproduction of that of Norway. The coast is, in fact, one of the most remarkable in the world, measuring with all its indentations 7000 m. in the aggregate, and being fringed with an archipelago of innumerable islands, of which Vancouver Island and the Queen Charlotte Islands are the largest.

Along the south-western side of the Rocky Mountains is a very remarkable valley of considerable geological antiquity, in which some seven of the great rivers of the Pacific slope, among them the Kootenay, Columbia, Fraser and Finlay, flow for portions of their upper courses. This valley, which is from 1 to 6 m. in width, can be traced continuously for a length of at least 800 m. One of the most important rivers of the province is the Fraser, which, rising in the Rocky Mountains, flows for a long distance to the north-west, and then turning south eventually crosses the Coast Range by a deep canton-like valley and empties into the Strait of Georgia, a few miles south of the city of Vancouver. The Columbia, which rises farther south in the same range, flows north for about 150 m., crossing the main line of the Canadian Pacific railway at Donald, and then bending abruptly back upon its former course, flows south, recrossing the Canadian Pacific railway at Revelstoke, and on through the Arrow Lakes in the Kootenay country into the United States, emptying into the Pacific Ocean at Astoria in the state of Oregon. These lakes, as well as the other large lakes in southern British Columbia, remain open throughout the winter. In the north-western part of the province the Skeena flows south-west into the Pacific, and still farther to the north the Stikine rises in British Columbia, but before entering the Pacific crosses the coast strip of Alaska. The Liard, rising in the same district, flows east and falls into the Mackenzie, which empties into the Arctic Ocean. The headwaters of the Yukon are also situated in the northern part of the province. All these rivers are swift and are frequently interrupted by rapids, so that, as means of communication for commercial purposes, they are of indifferent value. Wherever lines of railway are constructed, they lose whatever importance they may have held in this respect previously.

At an early stage in the Glacial period British Columbia was covered by the Cordilleran glacier, which moved south-eastwards and north-westwards, in correspondence with the ruling features of the country, from a gathering-ground situated in the vicinity of the 57th parallel. Ice from this glacier poured through passes in the coast ranges, and to a lesser extent debouched upon the edge of the great plains, beyond the Rocky Mountain range. The great valley between the coast ranges and Vancouver Island was also occupied by a glacier that moved in both directions from a central point in the vicinity of Valdez Island. The effects of this glacial action and of the long periods of erosion preceding it and of other physiographic changes connected with its passing away, have most important bearings on the distribution and character of the gold-bearing alluviums of the province.

Climate.—The subjoined figures relating to temperature and precipitation are from a table prepared by Mr R.F. Stupart, director of the meteorological service. The station at Victoria may be taken as representing the conditions of the southern part of the coast of British Columbia, although the rainfall is much greater on exposed parts of the outer coast. Agassiz represents the Fraser delta and Kamloops the southern interior district. The mean temperature naturally decreases to the northward of these selected stations, both along the coast and in the interior, while the precipitation increases. The figures given for Port Simpson are of interest, as the Pacific terminus of the Grand Trunk Pacific railway will be in this vicinity.

	Mean Temp., Fahr.			Absolute Temperature.		Rainfall—Inches.		
	Coldest Month.	Warmest Month.	Average Annual.	Highest.	Lowest.	Wettest Month.	Driest Month.	Average Annual.

Victoria[1]	Jan. 37.5°	July 60.3°	48.8°	90°	-1°	Dec. 7.98	July .4	37.77
Agassiz[2]	Jan. 33.0°	Aug. 64.7°	48.9°	97°	-13°	Dec. 9.43	July 1.55	66.85
Kamloops[3]	Jan. 24.2°	Aug. 68.5°	47.1°	101°	-27°	July 1.61	April .37	11.46
Port Simpson[4]	Jan. 34.9°	Aug. 56.9°	45.1°	88°	-10°	Oct. 12.42	June 4.37	94.63

[1] 48° 24′ N., 123° 19′ W., height 85 ft.

[2] 49° 14′ N., 121° 31′ W., height 52 ft.

[3] 50° 41′ N., 120° 29′ W., height 1193 ft.

[4] 54° 34′ N., 130° 26′ W., height 26 ft.

Fauna.—Among the larger mammals are the big-horn or mountain sheep (*Ovis canadensis*), the Rocky Mountain goat (*Mazama montana*), the grizzly bear, moose, woodland caribou, black-tailed or mule deer, white-tailed deer, and coyote. All these are to be found only on the mainland. The black bear, wolf, puma, lynx, wapiti, and Columbian or coast deer are common to parts of both mainland and islands. Of marine mammals the most characteristic are the sea-lion, fur-seal, sea-otter and harbour-seal. About 340 species of birds are known to occur in the province, among which, as of special interest, may be mentioned the burrowing owl of the dry, interior region, the [v.04 p.0599] American magpie, Steller's jay and a true nut-cracker, Clark's crow (*Picicorvus columbianus*). True jays and orioles are also well represented. The gallinaceous birds include the large blue grouse of the coast, replaced in the Rocky Mountains by the dusky grouse. The western form of the "spruce partridge" of eastern Canada is also abundant, together with several forms referred to the genus *Bonasa*, generally known as "partridges" or ruffed grouse. Ptarmigans also abound in many of the higher mountain regions. Of the *Anatidae* only passing mention need be made. During the spring and autumn migrations many species are found in great abundance, but in the summer a smaller number remain to breed, chief among which are the teal, mallard, wood-duck, spoon-bill, pin-tail, buffle-head, red-head, canvas-back, scaup-duck, &c.

Area and Population.—The area of British Columbia is 357,600 sq. m., and its population by the census of 1901 was 190,000. Since that date this has been largely increased by the influx of miners and others, consequent upon the discovery of precious metals in the Kootenay, Boundary and Atlin districts. Much of this is a floating population, but the opening up of the valleys by railway and new lines of steamboats, together with the settlements made in the vicinity of the Canadian Pacific railway, has resulted in a considerable increase of the permanent population. The white population comprises men of many nationalities. There is a large Chinese population, the census of 1901 returning 14,201. The influx of Chinamen has, however, practically ceased, owing to the tax of $500 per head imposed by the government of the dominion. Many Japanese have also come in. The Japanese are engaged chiefly in lumbering and fishing, but the Chinese are found everywhere in the province. Great objection is taken by the white population to the increasing number of "Mongolians," owing to their competition with whites in the labour markets. The Japanese do not appear to be so much disliked, as they adapt themselves to the ways of white men, but they are equally objected to on the score of cheap labour; and in 1907-1908 considerable friction occurred with the Dominion government over the Anti-Japanese attitude of British Columbia, which was shown in some rather serious riots. In the census of 1901 the Indian population is returned at 25,488; of these 20,351 are professing Christians and 5137 are pagans. The Indians are divided into very many tribes, under local names, but fall naturally on linguistic grounds into a few large groups. Thus the southern part of the interior is occupied by the Salish and Kootenay, and the northern interior by the Tinneh or Athapackan people. On the coast are the Haida, Tsimshian, Kwakiatl, Nootka, and about the Gulf of Georgia various tribes related to the Salish proper. There is no treaty with the Indians of British Columbia, as with those of the plains, for the relinquishment of their title to the land, but the government otherwise assists them. There is an Indian superintendent at Victoria, and under him are nine agencies throughout the province to attend to the Indians—relieving their sick and destitute, supplying them with seed and implements, settling their disputes and administering justice. The Indian fishing stations and burial grounds are reserved, and other land has been set apart for them for agricultural and pastoral purposes. A number of schools have been established for their education. They were at one time a dangerous element, but are now quiet and peaceable.

The chief cities are Victoria, the capital, on Vancouver Island; and Vancouver on the mainland, New Westminster on the Fraser and Nanaimo on Vancouver Island. Rossland and Nelson in West Kootenay, as well as Fernie in East Kootenay and Grand Forks in the Boundary district, are also places of importance.

Mining.—Mining is the principal industry of British Columbia. The country is rich in gold, silver, copper, lead and coal, and has also iron deposits. From 1894 to 1904 the mining output increased from $4,225,717 to $18,977,359. In 1905 it had reached $22,460,295. The principal minerals, in order of value of output, are gold, copper, coal, lead and silver. Between 1858—the year of the placer discoveries on the Fraser river and in the Cariboo district—and 1882, the placer yields were much heavier than in subsequent years, running from one to nearly four million dollars annually, but there was no quartz mining. Since 1899 placer mining has increased considerably, although the greater part of the return has been from lode mining. The Rossland, the Boundary

and the Kootenay districts are the chief centres of vein-mining, yielding auriferous and cupriferous sulphide ores, as well as large quantities of silver-bearing lead ores. Ores of copper and the precious metals are being prospected and worked also, in several places along the coast and on Vancouver Island. The mining laws are liberal, and being based on the experience gained in the adjacent mining centres of the Western States, are convenient and effective. The most important smelting and reducing plants are those at Trail and Nelson in the West Kootenay country, and at Grand Forks and Greenwood in the Boundary district. There are also numerous concentrating plants. Mining machinery of the most modern types is employed wherever machinery is required.

The province contains enormous supplies of excellent coal, most of which are as yet untouched. It is chiefly of Cretaceous age. The producing collieries are chiefly on Vancouver Island and on the western slope of the Rockies near the Crow's Nest Pass in the extreme south-eastern portion of the provinces. Immense beds of high grade bituminous coal and semi-anthracite are exposed in the Bulkley Valley, south of the Skeena river, not far from the projected line of the Grand Trunk Pacific railway. About one-half the coal mined is exported to the United States.

Fisheries.—A large percentage of the commerce is derived from the sea, the chief product being salmon. Halibut, cod (several varieties), oolachan, sturgeon, herring, shad and many other fishes are also plentiful, but with the exception of the halibut these have not yet become the objects of extensive industries. There are several kinds of salmon, and they run in British Columbia waters at different seasons of the year. The quinnat or spring salmon is the largest and best table fish, and is followed in the latter part of the summer by the sockeye, which runs in enormous numbers up the Fraser and Skeena rivers. This is the fish preferred for canning. It is of brighter colour, more uniform in size, and comes in such quantities that a constant supply can be reckoned upon by the canneries. About the mouth of the Fraser river from 1800 to 2600 boats are occupied during the run. There is an especially large run of sockeye salmon in the Fraser river every fourth year, while in the year immediately following there is a poor run. The silver salmon or cohoe arrives a little later than the sockeye, but is not much used for packing except when required to make up deficiencies. The dog-salmon is not canned, but large numbers are caught by the Japanese, who salt them for export to the Orient. The other varieties are of but little commercial importance at present, although with the increasing demand for British Columbia salmon, the fishing season is being extended to cover the runs of all the varieties of this fish found in the waters of the province.

Great Britain is the largest but not the only market for British Columbia salmon. The years vary in productiveness, 1901 having been unusually large and 1903 the smallest in eleven years, but the average pack is about 700,000 cases of forty-eight 1-lb tins, the greater part of all returns being from the Fraser river canneries, the Skeena river and the Rivers Inlet coming next in order. [v.04 p.0600] There are between 60 and 70 canneries, of which about 40 are on the banks of the Fraser river. There is urgent need for the enactment of laws restricting the catch of salmon, as the industry is now seriously threatened. The fish oils are extracted chiefly from several species of dog-fish, and sometimes from the basking shark, as well as from the oolachan, which is also an edible fish.

The fur-seal fishery is an important industry, though apparently a declining one. Owing to the scarcity of seals and international difficulties concerning pelagic sealing in Bering Sea, where the greatest number have been taken, the business of seal-hunting is losing favour. Salmon fish-hatcheries have been established on the chief rivers frequented by these fish. Oysters and lobsters from the Atlantic coast have been planted in British Columbia waters.

Timber.—The province is rich in forest growth, and there is a steady demand for its lumber in the other parts of Canada as well as in South America, Africa, Australia and China. The following is a list of some of the more important trees—large leaved maple (*Acer macrophyllum*), red alder (*Alnus rubra*), western larch (*Larix occidentalis*), white spruce (*Picea alba*), Engellmann's spruce (*Picea Engelmanii*), Menzies's spruce (*Picea sitchensis*), white mountain pine (*Pinus monticola*), black pine (*Pinus murrayana*), yellow pine (*Pinus ponderosa*), Douglas fir (*Pseudotsuga Douglasii*), western white oak (*Quercus garryana*), giant cedar (*Thuya gigantea*), yellow cypress or cedar (*Thuya excelsa*), western hemlock (*Tsuga mertensiana*). The principal timber of commerce is the Douglas fir. The tree is often found 300 ft. high and from 8 to 10ft. in diameter. The wood is tough and strong and highly valued for ships' spars as well as for building purposes. Red or giant cedar, which rivals the Douglas fir in girth, is plentiful, and is used for shingles as well as for interior work. The western white spruce is also much employed for various purposes. There are about eighty sawmills, large and small, in the province. The amount of timber cut on Dominion government lands in 1904 was 22,760,222 ft., and the amount cut on provincial lands was 325,271,568 ft., giving a total of 348,031,790 ft. In 1905 the cut on dominion lands exceeded that in 1904, while the amount cut on provincial lands reached 450,385,554 ft. The cargo shipments of lumber for the years 1904 and 1905 were as follows:—

	1904. Ft.	1905. Ft.
United Kingdom	7,498,301	13,690,869
South America	15,647,808	13.332,993
Australia	10,045,094	11,596,482
South Africa	2,517,154	7,093,681
China and Japan	4,802,426	4,787,784
Germany		983,342

Fiji Islands	308,332	29,949
France	1,308,662	
	42,199,777	51,515,100

There is a very large market for British Columbia lumber in the western provinces of Canada.

Agriculture.—Although mountainous in character the province contains many tracts of good farming land. These lie in the long valleys between the mountain ranges of the interior, as well as on the lower slopes of the mountains and on the deltas of the rivers running out to the coast. On Vancouver Island also there is much good farming land. The conditions are in most places best suited to mixed farming; the chief crops raised are wheat, oats, potatoes and hay. Some areas are especially suited for cattle and sheep raising, among which may be mentioned the Yale district and the country about Kamloops. Much attention has been given to fruit raising, especially in the Okanagan valley. Apples, plums and cherries are grown, as well as peaches, apricots, grapes and various small fruits, notably strawberries. All these are of excellent quality. Hops are also cultivated. A large market for this fruit is opening up in the rapidly growing provinces of Alberta and Saskatchewan.

Imports and Exports.—For the year ending June 30th 1905 the total exports and imports (showing a slight gradual increase on the two preceding years) were valued at $16,677,882 and $12,565,019 respectively. The exports were classified as follows:—Mines, $9,777,423; fisheries, $2,101,533; forests, $1,046,718; animals, $471,231; agriculture, $119,426; manufactures, $1,883,777; miscellaneous, $1,106,643; coin and bullion, $171,131.

Railways.—The Pacific division of the Canadian Pacific railway enters British Columbia through the Rocky Mountains on the east and runs for about 500 m. across the province before reaching the terminus at Vancouver. A branch of the same railway leaves the main line at Medicine Hat, and running to the south-west, crosses the Rocky Mountains through the Crow's Nest Pass, and thus enters British Columbia a short distance north of the United States boundary. This continues across the province, running approximately parallel to the boundary as far as Midway in what is known as the Boundary district. The line has opened up extensive coal fields and crosses a productive mining district. On Vancouver Island there are two railways, the Esquimalt & Nanaimo railway (78 m.) connecting the coal fields with the southern ports, and the Victoria & Sydney railway, about 16 m. in length. The Great Northern has also a number of short lines in the southern portion of the province, connecting with its system in the United States. In 1905 there were 1627m. of railway in the province, of which 1187 were owned or controlled by the Canadian Pacific railway.

Shipping.—The Canadian Pacific Railway Company has two lines of mail steamer running from Vancouver and Victoria: (l) the Empress line, which runs to Japan and China once in three weeks, and (2) the Australian line to Honolulu, Fiji and Sydney, once a month. The same company also has a line of steamers running to Alaska, as well as a fleet of coasting steamers.

Government.—The province is governed by a lieutenant-governor, appointed by the governor-general in council for five years, but subject to removal for cause, an executive council of five ministers, and a single legislative chamber. The executive council is appointed by the lieutenant-governor on the advice of the first minister, and retains office so long as it enjoys the support of a majority of the legislature. The powers of the lieutenant-governor in regard to the provincial government are analogous to those of governor-general in respect of the dominion government.

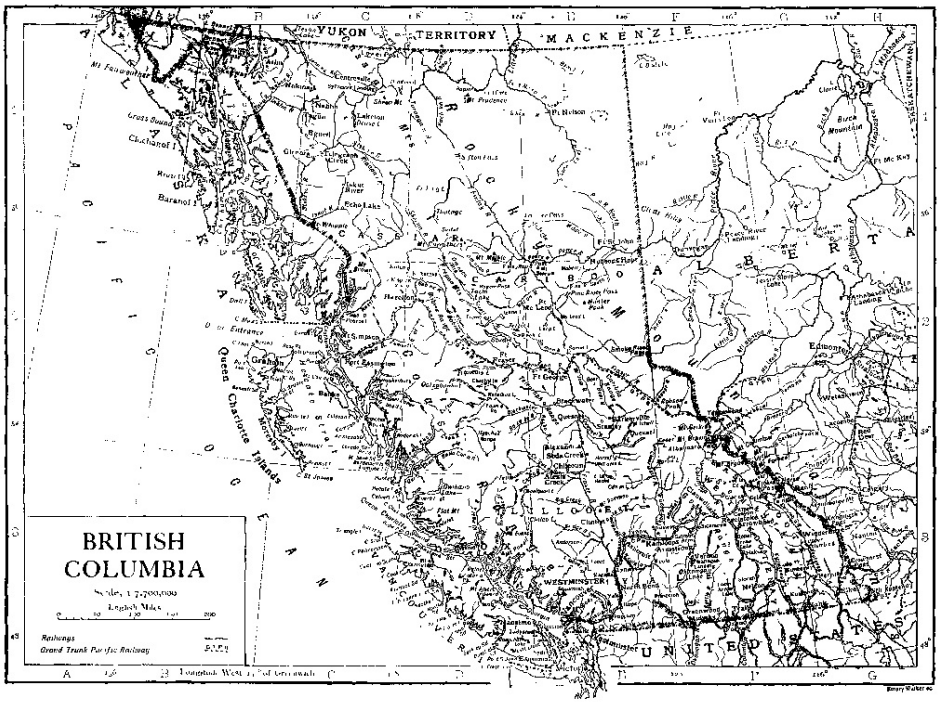
The British North America Act (1867) confederating the colonies, defines the jurisdiction of the provincial legislature as distinguished from that of the federal parliament, but within its own jurisdiction the province makes the laws for its own governance. The act of the legislature may be disallowed, within one year of its passage, by the governor-general in council, and is also subject to challenge as to its legality in the supreme court of Canada or on appeal to the juridical committee of the privy council of the United Kingdom. British Columbia sends three senators and seven members to the lower house of the federal parliament, which sits at Ottawa.

Justice.—There is a supreme court of British Columbia presided over by a chief justice and five puisne judges, and there are also a number of county courts. In British Columbia the supreme court has jurisdiction in divorce cases, this right having been invested in the colony before confederation.

Religion and Education.—In 1901 the population was divided by creeds as follows: Church of England, 40,687; Methodist, 25,047; Presbyterian, 34,081; Roman Catholic, 33,639; others, 40,197; not stated, 5003; total, 178,654. The educational system of British Columbia differs slightly from that of other provinces of Canada. There are three classes of schools—common, graded and high—all maintained by the government and all free and undenominational. There is only one college in the province, the "McGill University College of British Columbia" at Vancouver, which is one of the colleges of McGill University, whose chief seat is at Montreal. The schools are controlled by trustees selected by the ratepayers of each school district, and there is a superintendent of education acting under the provincial secretary.

Finance.—Under the terms of union with Canada, British Columbia receives from the dominion government annually a certain contribution, which in 1905 amounted to $307,076. This, with provincial taxes on real property, personal property, income tax, sales of public land, timber

dues, &c., amounted in the year 1905 to $2,920,461. The expenditure for the year was $2,302,417. The gross debt of the province in 1905 was $13,252,097, with assets of $4,463,869, or a net debt of $8,788,228. These assets do not include new legislative buildings or other public works. The income tax is on a sliding scale. In 1899 a fairly close estimate was made of the capital invested in the province, which amounted to $307,385,000 including timber, $100,000,000; railways and telegraphs, $47,500,000; mining plant and smelters, $10,500,000; municipal assessments, $45,000,000; provincial assessments, $51,500,000; in addition to private wealth, $280,000,000. There are branch offices of one or more of the Canadian banks in each of the larger towns.



History.—The discovery of British Columbia was made by the Spaniard Perez in 1774. With Cook's visit the geographical exploration of the coast began in 1778. Vancouver, in 1792-1794, surveyed almost the entire coast of British Columbia with much of that to the north and south, for the British government. The interior, about the same time, was entered by Mackenzie and traders of the N.W. Company, which in 1821 became amalgamated with the Hudson's Bay Company. For the next twenty-eight years the Hudson's Bay Company ruled this immense territory with beneficent despotism. In 1849 Vancouver Island was proclaimed a British colony. In 1858, consequent on the discovery of gold and the large influx of miners, the mainland territory was erected into a colony under the name of British Columbia, and in 1866 this was united with the colony of Vancouver Island, under the same name. In 1871 British Columbia entered the confederation and became part of the Dominion of Canada, sending three senators and six (now seven) members to the House of Commons of the federal parliament. One of the conditions under which the colony entered the dominion was the speedy construction of the Canadian Pacific railway, and in 1876 the non-fulfilment of this promise and the apparent indifference of the government at Ottawa to the representations of British Columbia created strained relations, which were only ameliorated when the construction of a transcontinental road was begun. In subsequent years the founding of the city of Vancouver by the C.P.R., the establishment of the first Canadian steamship line to China and Japan, and that to Australia, together with the disputes with the United States on the subject of pelagic sealing, and the discovery of the Kootenay and Boundary mining districts, have been the chief events in the history of the province.

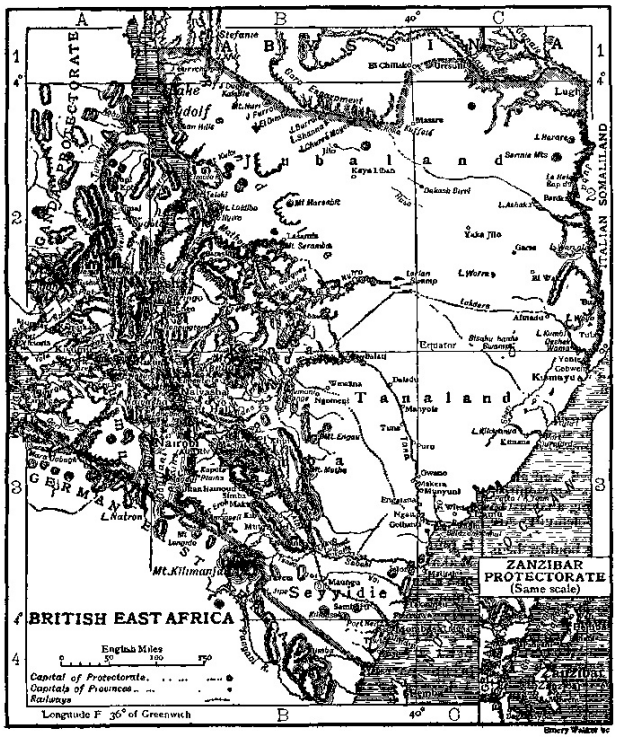
[v.04 p.0601]

AUTHORITIES.—Cook's *Voyage to the Pacific Ocean* (London, 1784); Vancouver, *Voyage of Discovery to the Pacific Ocean* (London, 1798); H.H. Bancroft's works, vol. xxxii., *History of British Columbia* (San Francisco, 1887); Begg's *History of British Columbia* (Toronto, 1894); Gosnell, *Year Book* (Victoria, British Columbia, 1897 and 1903); *Annual Reports British Columbia Board of Trade* (Victoria); *Annual Reports of Minister of Mines and other Departmental Reports of the Provincial and Dominion Governments; Catalogue of Provincial Museum* (Victoria); *Reports Geological Survey of Canada* (from 1871 to date); *Reports of Canadian Pacific (Government) Surveys* (1872-1880); *Reports of Committee of Brit. Assn. Adv. Science on N.W. Tribes* (1884-1895); Lord, *Naturalist in Vancouver Island* (London, 1866); *Bering Sea Arbitration* (reprint of letters to *Times*), (London, 1893); *Report of Bering Sea Commission* (London, Government, 1892); A. Métin, *La Colombie Britannique* (Paris, 1908). See also various works of reference under CANADA.

(G. M. D.; M. ST J.; F. D. A.)

BRITISH EAST AFRICA, a term, in its widest sense, including all the territory under British influence on the eastern side of Africa between German East Africa on the south and Abyssinia

and the Anglo-Egyptian Sudan on the north. It comprises the protectorates of Zanzibar, Uganda and East Africa. Apart from a narrow belt of coastland, the continental area belongs almost entirely to the great plateau of East Africa, rarely falling below an elevation of 2000 ft., while extensive sections rise to a height of 6000 to 8000 ft. From the coast lowlands a series of steps with intervening plateaus leads to a broad zone of high ground remarkable for the abundant traces of volcanic action. This broad upland is furrowed by the eastern "rift-valley," formed by the subsidence of its floor and occupied in parts by lakes without outlet. Towards the west a basin of lower elevation is partially occupied by Victoria Nyanza, drained north to the Nile, while still farther inland the ground again rises to a second volcanic belt, culminating in the Ruwenzori range. (See ZANZIBAR, and for Uganda protectorate see UGANDA.) The present article treats of the East Africa protectorate only.



Topography.—The southern frontier, coterminous with the northern frontier of German East Africa, runs north-west from the mouth of the Umba river in 4° 40′ S. to Victoria Nyanza, which it strikes at 1° S., deviating, however, so as to leave Mount Kilimanjaro wholly in German territory. The eastern boundary is the Indian Ocean, the coast line being about 400 m. On the north the protectorate is bounded by Abyssinia and Italian Somaliland; on the west by Uganda. It has an area of about 240,000 sq. m., and a population estimated at from 2,000,000 to 4,000,000, including some 25,000 Indians and 3000 Europeans. Of the Europeans many are emigrants from South Africa; they include some hundreds of Boer families.

The first of the parallel zones—the coast plain or "Temborari"—is generally of insignificant width, varying from 2 to 10 m., except in the valleys of the main rivers. The shore line is broken by bays and branching creeks, often cutting off islands from the mainland. Such are Mvita or Mombasa in 4° 4′ S., and the larger islands of Lamu, Manda and Patta (the Lamu archipelago), between 2° 20′ and 2° S. Farther north the coast becomes straighter, with the one indentation of Port Durnford in 1° 10′ S., but skirted seawards by a row of small islands. Beyond the coast plain the country rises in a generally well defined step or steps to an altitude of some 800 ft., forming the wide level plain called "Nyika" (uplands), largely composed of quartz. It contains large waterless areas, such as the Taru desert in the Mombasa district. The next stage in the ascent is marked by an intermittent line of mountains—gneissose or schistose—running generally north-north-west, sometimes in parallel chains, and representing the primitive axis of the continent. Their height varies from 5000 to 8000 ft. Farther inland grassy uplands extend to the eastern edge of the rift-valley, though varied with cultivated ground and forest, the former especially in Kikuyu, the latter between 0° and 0° 40′ S. The most extensive grassy plains are those of Kapte or Kapote and Athi, between 1° and 2° S. The general altitude of these uplands, the surface of which is largely composed of lava, varies from 5000 to 8000 ft. This zone contains the highest elevations in British East Africa, including the volcanic pile of Kenya (*q.v.*) (17,007 ft.), Sattima (13,214 ft.) and Nandarua (about 12,900 ft.). The Sattima (Settima) range, or Aberdare Mountains, has a general elevation of fully 10,000 ft. To the west the fall to the rift-valley is marked by a line of cliffs, of which the best-defined portions are the Kikuyu escarpment (8000 ft.), just south of 1° S., and the Laikipia escarpment, on the equator. One of the main watersheds of East Africa runs close to the eastern wall of the rift-valley, separating the basins of inland drainage from the rivers of the east coast, of which the two largest wholly within British East Africa are the Sabaki and Tana, both separately noticed. The Guaso Nyiro rises in the hills north-west of Kenya and flows in a north-east direction. After a course of over 350 m. the river in about 1° N., 39° 30′ E. is lost in a marshy expanse known as the Lorian Swamp.

The rift-valley, though with a generally level floor, is divided by transverse ridges into a series of basins, each containing a lake without outlet. The southernmost section within British East Africa is formed by the arid Dogilani plains, drained south towards German territory. At their north end rise the extinct volcanoes of Suswa (7800 ft.) and Longonot (8700), the latter on the ridge dividing off the next basin—that of Lake Naivasha. This is a small fresh-water lake, 6135 ft. above the sea, measuring some 13 m each way. Its basin is closed to the north by the ridge of Mount Buru, beyond which is the basin of the still smaller Lakes Nakuro (5845 ft.) and Elmenteita (5860 ft.), followed in turn by that of Lakes Hannington and Baringo (*q.v.*). Beyond Baringo the valley is drained north into Lake Sugota, in 2° N., some 35 m. long, while north of this lies the much larger Lake Rudolf (*q.v.*), the valley becoming here somewhat less defined.

[v.04 p.0602]

On the west of the rift-valley the wall of cliffs is best marked between the equator and 1° S., where it is known as the Mau Escarpment, and about 1° N., where the Elgeyo Escarpment falls to

a longitudinal valley separated from Lake Baringo by the ridge of Kamasia. Opposite Lake Naivasha the Mau Escarpment is over 8000 ft. high. Its crest is covered with a vast forest. To the south the woods become more open, and the plateau falls to an open country drained towards the Dogilani plains. On the west the cultivated districts of Sotik and Lumbwa, broken by wooded heights, fall towards Victoria Nyanza. The Mau plateau reaches a height of 9000 ft. on the equator, north of which is the somewhat lower Nandi country, well watered and partly forested. In the treeless plateau of Uasin Gishu, west of Elgeyo, the land again rises to a height of over 8000 ft., and to the west of this is the great mountain mass of Elgon (*q.v.*). East of Lake Rudolf and south of Lake Stefanie is a large waterless steppe, mainly volcanic in character, from which rise mountain ranges. The highest peak is Mount Kanjora, 6900 ft. high. South of this arid region, strewn with great lava stones, are the Rendile uplands, affording pasturage for thousands of camels. Running north-west and south-east between Lake Stefanie and the Daua tributary of the Juba is a mountain range with a steep escarpment towards the south. It is known as the Goro Escarpment, and at its eastern end it forms the boundary between the protectorate and Abyssinia. South-east of it the country is largely level bush covered plain, mainly waterless.

[*Geology.*—The geological formations of British East Africa occur in four regions possessing distinct physiographical features. The coast plain, narrow in the south and rising somewhat steeply, consists of recent rocks. The foot plateau which succeeds is composed of sedimentary rocks dating from Trias to Jurassic. The ancient plateau commencing at Taru extends to the borders of Kikuyu and is composed of ancient crystalline rocks on which immense quantities of volcanic rocks—post-Jurassic to Recent—have accumulated to form the volcanic plateau of Central East Africa.

The formations recognized are given in the following table:—

	Sedimentary.
Recent	1. Alluvium and superficial sands. 2. Modern lake deposits, living coral rock. 3. Raised coral rock, conglomerate of Mombasa Island.
Pleistocene	4. Gravels with flint implements. 5. Glacial beds of Kenya
Jurassic	6. Shales and limestones of Changamwe.
Karroo	7. Flags and sandstones. 8. Grits and shales of Masara and Taru.
Carboniferous?	9. Shales of the Sabaki river.
Archaean	10. Schists and quartzites of Nandi. 11. Gneisses, schists, granites.
	Igneous and Volcanic.
Recent	Active, dormant and extinct volcanoes.
Post-Jurassic to Pleistocene	Kibo and volcanoes of the rift-valley. Kimawenzi, Kenya and plateau eruptions.

Archaean.—These rocks prevail in the districts of Taru, Nandi and throughout Ukamba. A course gneiss is the predominant rock, but is associated with garnetiferous mica-schists and much intrusive granite. Hornblende schists and beds of metamorphic limestone are rare. Cherty quartzites interbedded with mylonites occur on the flanks of the Nandi hills, but their age is not known.

Carboniferous?—From shales on the Sabaki river Dr Gregory obtained fish-scales and specimens of *Palaeanodonta Fischeri.*

Karroo.—The grits of Masara, near Rabai mission station and Mombasa, have yielded specimens of *Glossopteris browniana* var. *indica*, thus indicating their Karroo age.

Jurassic.—Shales and limestones of this age are well seen along the railway near Changamwe. They contain gigantic ammonites. According to Dr Waagen the ammonites show a striking analogy to forms from the Acanthicus zone of East India. Belemnites are plentiful.

Pleistocene.—These are feebly represented by some boulder beds on the higher slopes of Kilimanjaro and Kenya. They show that in Pleistocene times the glaciers of Kilimanjaro and Kenya extended much farther down the mountain slopes.

Recent.—The ancient and more modern lake deposits have so far yielded no mammalian or other organic remains of interest.

Igneous and Volcanic.—A belt of volcanic rocks, over 150,000 sq. m. in area, extends from beyond the southern to beyond the northern territorial limits. They belong to an older and a newer set. The older group commenced with a series of fissure eruptions along the site of the present rift-valley and parallel with it. From these fissures immense and repeated flows of lava

spread over the Kapte and Laikipia plateaus. At about the same time, or a little later, Kenya and Kimawenzi, Elgon and Chibcharagnani were in eruption. The age of these volcanic outbursts cannot be more definitely stated than that they are post-Jurassic, and probably extended through Cretaceous into early Tertiary times. This great volcanic period was followed by the eruptions of Kibo and some of the larger volcanoes of the rift-valley. The flows from Kibo include nepheline and leucite basanite lavas rich in soda felspars. They bear a close resemblance to the Norwegian "Rhombenporphyrs." The chain of volcanic cones along the northern lower slopes of Kilimanjaro, those of the Kyulu mountains, Donyo Longonot and numerous craters in the rift-valley region, are of a slightly more recent date. A few of the volcanoes in the latter region have only recently become extinct; a few may be only dormant. Donyo Buru still emits small quantities of steam, while Mount Teleki, in the neighbourhood of Lake Rudolf, was in eruption at the close of the 19th century.]

Climate, Flora and Fauna.—In its climate and vegetation British East Africa again shows an arrangement of zones parallel to the coast. The coast region is hot but is generally more healthy than the coast lands of other tropical countries, this being due to the constant breeze from the Indian Ocean and to the dryness of the soil. The rainfall on the coast is about 35 in. a year, the temperature tropical. The succeeding plains and the outer plateaus are more arid. Farther inland the highlands—in which term may be included all districts over 5000 ft. high—are very healthy, fever being almost unknown. The average temperature is about 66° F. in the cool season and 73° F. in the hot season. Over 7000 ft. the climate becomes distinctly colder and frosts are experienced. The average rainfall in the highlands is between 40 and 50 in. The country bordering Victoria Nyanza is typically tropical; the rainfall exceeds 60 in. in the year, and this region is quite unsuitable to Europeans. The hottest period throughout the protectorate is December to April, the coolest, July to September. The "greater rains" fall from March to June, the "smaller rains" in November and December. The rainfall is not, however, as regular as is usual in countries within the tropics, and severe droughts are occasionally experienced.

In the districts bordering Victoria Nyanza the flora resembles that of Uganda (*q.v.*). The characteristic trees of the coast regions are the mangrove and coco-nut palm. Ebony grows in the scrub-jungle. Vast forests of olives and junipers are found on the Mau escarpment; the cotton, fig and bamboo on the Kikuyu escarpment; and in several regions are dense forests of great trees whose lowest branches are 50 ft. from the ground. Two varieties of the valuable rubber-vine, *Landolphia florida* and *Landolphia Kirkii*, are found near the coast and in the forests. The higher mountains preserve distinct species, the surviving remnants of the flora of a cooler period.

The fauna is not abundant except in large mammals, which are very numerous on the drier steppes. They include the camel (confined to the arid northern regions), elephant (more and more restricted to unfrequented districts), rhinoceros, buffalo, many kinds of antelope, zebra, giraffe, hippopotamus, lion and other carnivora, and numerous monkeys. In many parts the rhinoceros is particularly abundant and dangerous. Crocodiles are common in the larger rivers and in Victoria Nyanza. Snakes are somewhat rare, the most dangerous being the puff-adder. Centipedes and scorpions, as well as mosquitoes and other insects, are also less common than in most tropical countries. In some districts bees are exceedingly numerous. The birds include the ostrich, stork, bustard and secretary-bird among the larger varieties, the guinea fowl, various kinds of spur fowl, and the lesser bustard, the wild pigeon, weaver and hornbill. By the banks of lakes and rivers are to be seen thousands of cranes, pelicans and flamingoes.

Inhabitants.—The white population is chiefly in the Kikuyu uplands, the rift-valley, and in the Kenya region. The whites are mostly agriculturists. There are also numbers of Indian settlers in the same districts. The African races include representatives of various stocks, as the country forms a borderland between the Negro and Hamitic peoples, and contains many tribes of doubtful affinities. The Bantu division of the negroes is represented chiefly in the south, the principal tribes being the Wakamba, Wakikuyu and Wanyika. By the north-east shores of Victoria Nyanza dwell the Kavirondo (*q.v.*), a race remarkable among the tribes of the protectorate for their nudity. Nilotic tribes, including the Nandi (*q.v.*), Lumbwa, Suk and Turkana, are found in the north-west. Of Hamitic strain are the Masai (*q.v.*), a race of cattle-rearers speaking a Nilotic language, who occupy part of the uplands bordering on the eastern rift-valley. A branch of the Masai which has adopted the settled life of agriculturists is known as the Wakuafi. The Galla
[v.04 p.0603] section of the Hamites is represented, among others, by Borani living south of the Goro Escarpment (though the true Boran countries are Liban and Dirri in Abyssinian territory), while Somali occupy the country between the Tana and Juba rivers. Of the Somali tribes the Herti dwell near the coast and are more or less stationary. Further inland is the nomadic tribe of Ogaden Somali. The Gurre, another Somali tribe, occupy the country south of the lower Daua. Primitive hunting tribes are the Wandorobo in Masailand, and scattered tribes of small stature in various parts. The coast-land contains a mixed population of Swahili, Arab and Indian immigrants, and representatives of numerous interior tribes.

Provinces and Towns.—The protectorate has been divided into the provinces of Seyyidie (the south coast province, capital Mombasa); Ukamba, which occupies the centre of the protectorate (capital Nairobi); Kenya, the district of Mt. Kenya (capital Fort Hall); Tanaland, to the north of the two provinces first named (capital Lamu); Jubaland, the northern region (capital Kismayu); Naivasha (capital Naivasha); and Kisumu (capital Kisumu); each being in turn divided into districts and sub-districts. Naivasha and Kisumu, which adjoin the Victoria Nyanza, formed at first the eastern province of Uganda, but were transferred to the East Africa protectorate on the 1st of April 1902. The chief port of the protectorate is Mombasa (*q.v.*) with a population of about

30,000. The harbour on the south-west side of Mombasa island is known as Kilindini, the terminus of the Uganda railway. On the mainland, nearly opposite Mombasa town, is the settlement of freed slaves named Freretown, after Sir Bartle Frere. Freretown (called by the natives Kisaoni) is the headquarters in East Africa of the Church Missionary Society. It is the residence of the bishop of the diocese of Mombasa and possesses a fine church and mission house. Lamu, on the island of the same name, 150 m. north-east of Mombasa, is an ancient settlement and the headquarters of the coast Arabs. Here are some Portuguese ruins, and a large Arab city is buried beneath the sands. The other towns of note on the coast are Malindi, Patta, Kipini and Kismayu. At Malindi, the "Melind" of *Paradise Lost*, is the pillar erected by Vasco da Gama when he visited the port in 1498. The harbour is very shallow. Kismayu, the northernmost port of the protectorate, 320 m. north-east of Mombasa, is the last sheltered anchorage on the east coast and is invaluable as a harbour of refuge. Flourishing towns have grown up along the Uganda railway. The most important, Nairobi (*q.v.*), 327 m. from Mombasa, 257 from Port Florence, was chosen in 1907 as the administrative capital of the protectorate. Naivasha, 64 m. north-north-west of Nairobi, lies in the rift-valley close to Lake Naivasha, and is 6230 ft. above the sea. It enjoys an excellent climate and is the centre of a European agricultural settlement. Kisumu or Port Florence (a term confined to the harbour) is a flourishing town built on a hill overlooking Victoria Nyanza. It is the entrepôt for the trade of Uganda.

Communications.—Much has been done to open up the country by means of roads, including a trunk road from Mombasa, by Kibwezi in the upper Sabaki basin, and Lake Naivasha, to Berkeley Bay on Victoria Nyanza. But the most important engineering work undertaken in the protectorate was the construction of a railway from Mombasa to Victoria Nyanza, for which a preliminary survey was executed in 1892, and on which work was begun in 1896. The line chosen roughly coincides with that of the road, until the equator is reached, after which it strikes by a more direct route across the Mau plateau to the lake, which it reaches at Port Florence on Kavirondo Gulf. The railway is 584 m. long and is of metre (3.28 ft.) gauge, the Sudan, and South and Central African lines being of 3 ft. 6 in. gauge. The Uganda railway is essentially a mountain line, with gradients of one in fifty and one in sixty. From Mombasa it crosses to the mainland by a bridge half a mile long, and ascends the plateau till it reaches the edge of the rift-valley, 346 m. from its starting point, at the Kikuyu Escarpment, where it is 7600 ft. above the sea. It then descends across ravines bridged by viaducts to the valley floor, dropping to a level of 6011 ft., and next ascending the opposite (Mau) escarpment to the summit, 8321 ft. above sea-level—the highest point on the line. In the remaining 100 m. of its course the level sinks to 3738 ft., the altitude of the station at Port Florence. The railway was built by the British government at a cost of £5,331,000, or about £9500 per mile. The first locomotive reached Victoria Nyanza on the 26th of December 1901; and the permanent way was practically completed by March 1903, when Sir George Whitehouse, the engineer who had been in charge of the construction from the beginning, resigned his post. The railway, by doing away with the carriage of goods by men, gave the final death-blow to the slave trade in that part of East Africa. It also facilitated the continued occupation and development of Uganda, which was, previous to its construction, an almost impossible task, owing to the prohibitive cost of the carriage of goods from the coast—£60 per ton. The two avowed objects of the railway—the destruction of the slave trade and the securing of the British position in Uganda—have been attained; moreover, the railway by opening up land suitable for European settlement has also done much towards making a prosperous colony of the protectorate, which was regarded before the advent of the line as little better than a desert (see below, *History*). The railway also shows a fair return on the capital expenditure, the surplus after defraying all working expenses being £56,000 in 1905-1906 and £76,000 in 1906-1907.

Mombasa is visited by the boats of several steamship companies, the German East Africa line maintaining a fortnightly service from Hamburg. There is also a regular service to and from India. A cable connecting Mombasa with Zanzibar puts the protectorate in direct telegraphic communication with the rest of the world. There is also an inland system of telegraphs connecting the chief towns with one another and with Uganda.

Agriculture and other Industries.—In the coast region and by the shores of Victoria Nyanza the products are tropical, and cultivation is mainly in the hands of the natives or of Indian immigrants. There are, however, numerous plantations owned by Europeans. Rice, maize and other grains are raised in large quantities; cotton and tobacco are cultivated. The coco-nut palm plantations yield copra of excellent quality, and the bark of the mangrove trees is exported for tanning purposes. In some inland districts beans of the castor oil plant, which grows in great abundance, are a lucrative article of trade. The sugar-cane, which grows freely in various places, is cultivated by the natives. The collection of rubber likewise employs numbers of people.

Among the European settlers in the higher regions much attention is devoted to the production of vegetables, and very large crops of potatoes are raised. Oats, barley, wheat and coffee are also grown. The uplands are peculiarly adapted for the raising of stock, and many of the white settlers possess large flocks and herds. Merino sheep have been introduced from Australia. Ostrich farms have also been established. Clover, lucerne, ryegrass and similar grasses have been introduced to improve and vary the fodder. Other vegetable products of economic value are many varieties of timber trees, and fibre-producing plants, which are abundant in the scrub regions between the coast and the higher land bordering the rift-valley. Over the greater part of the country the soil is light reddish loam; in the eastern plains it is a heavy black loam. As a rule it is easily cultivated. While the majority of the African tribes in the territory are not averse from agricultural labour, the number of men available for work on European holdings is small. Moreover, on some of the land most suited for cultivation by white men there is no native population.

In addition to the fibre industry and cotton ginning there are factories for the curing of bacon. Native industries include the weaving of cloth and the making of mats and baskets. Stone and lime quarries are worked, and copper is found in the Tsavo district. Diamonds have been discovered in the Thika river, one of the headstreams of the Tana.

Trade.—The imports consist largely of textiles, hardware and manufactured goods from India and Europe; Great Britain and India between them supplying over 50% of the total imports. Of other countries Germany has the leading share in the trade. The exports, which include the larger part of the external trade of Uganda, are chiefly copra, hides and skins, grains, potatoes, rubber, ivory, chillies, beeswax, cotton and fibre. The retail trade is largely in the hands of Indians. The value of the exports rose from £89,858 in 1900-1901 to £234,664 in 1904-1905, in which year the value of the imports for the first time exceeded £500,000. In 1906-1907 the volume of trade was £1,194,352, imports being valued at £753,647 and exports at £440,705. The United States takes 33% of the exports, Great Britain coming next with 15%.

Government.—The system of government resembles that of a British crown colony. At the head of the administration is a governor, who has a deputy styled lieutenant-governor, provincial commissioners presiding over each province. There are also executive and legislative councils, unofficial nominated members serving on the last-named council. In the "ten-mile strip" (see below, *History*), the sultan of Zanzibar being territorial sovereign, the laws of Islam apply to the native and Arab population. The extra-territorial jurisdiction granted by the sultan to various Powers was in 1907 transferred to Great Britain. Domestic slavery formerly existed; but on the advice of the British government a decree was issued by the sultan on the 1st of August 1890, enacting that no one born after that date could be a slave, and this was followed in 1907 by a decree abolishing the legal status of slavery. In the rest of the protectorate slavery is not recognized in any form. Legislation is by ordinances made by the governor, with the assent of the legislative council. The judicial system is based on Indian models, though in cases in which
[v.04 p.0604] Africans are concerned regard is had to native customs. Europeans have the right to trial by jury in serious cases. There is a police force of about 2000 men, and two battalions of the King's African Rifles are stationed in the protectorate. Revenue is derived chiefly from customs, licences and excise, railway earnings, and posts and telegraphs. Natives pay a hut tax. Since the completion of the Uganda railway, trade, and consequently revenue, has increased greatly. In 1900-1901 the revenue was £64,275 and the expenditure £193,438; in 1904-1905 the figures were: revenue £154,756, expenditure £302,559; in 1905-1906 the totals were £270,362 and £418,839, and in 1906-1907 (when the railway figures were included for the first time) £461,362 and £616,088. The deficiencies were made good by grants-in-aid from the imperial exchequer. The standard coin used is the rupee (16d.).

Education is chiefly in the hands of the missionary societies, which maintain many schools where instruction is given in handicrafts, as well as in the ordinary branches of elementary education. There are Arab schools in Mombasa, and government schools for Europeans and Indians at Nairobi.

History.—From the 8th century to the 11th Arabs and Persians made settlements along the coast and gained political supremacy at many places, leading to the formation of the so-called Zenj empire. The history of the coast towns from that time until the establishment of British rule is identified with that of Zanzibar (*q.v.*). The interior of what is now British East Africa was first made known in the middle of the 19th century by the German missionaries Ludwig Krapf and Johannes Rebmann, and by Baron Karl von der Decken (1833-1865) and others. Von der Decken and three other Europeans were murdered by Somali at a town called Bardera in October 1865, whilst exploring the Juba river. The countries east of Victoria Nyanza (Masailand, &c.) were, however, first traversed throughout their whole extent by the Scottish traveller Joseph Thomson (*q.v.*) in 1883-1884. In 1888 Count S. Teleki (a Hungarian) discovered Lakes Rudolf and Stefanie.

The growth of British interests in the country now forming the protectorate arises from its connexion with the sultanate of Zanzibar. At Zanzibar British influence was very strong in the last quarter of the 19th century, and the seyyid or sultan, Bargash, depended greatly on the advice of the British representative, Sir John Kirk. In 1877 Bargash offered to Mr (afterwards Sir) William Mackinnon (1823-1893), chairman of the British India Steam Navigation Company, a merchant in whom he had great confidence, or to a company to be formed by him, a lease for 70 years of the customs and administration of the whole of the mainland dominions of Zanzibar including, with certain reservations, rights of sovereignty. This was declined owing to a lack of support by the foreign office, and concessions obtained in 1884 by Mr (afterwards Sir) H.H. Johnston in the Kilimanjaro district were, at the time, disregarded. The large number of concessions acquired by Germans in 1884-1885 on the East African coast aroused, however, the interest of those who recognized the paramount importance of the maintenance of British influence in those regions. A British claim, ratified by an agreement with Germany in 1886, was made to the districts behind Mombasa; and in May 1887 Bargash granted to an association formed by Mackinnon a concession for the administration of so much of his mainland territory as lay outside the region which the British government had recognized as the German sphere of operations. By international agreement the mainland territories of the sultan were defined as extending 10 m. inland from the coast. Mackinnon's association, whose object was to open up the hinterland as well as this ten-mile strip, became the Imperial British East Africa Company by a founder's agreement of April 1888, and received a royal charter in September of the same year. To this company the sultan made a further concession dated October 1888. On the faith of these concessions and the

A chartered company formed.

charters a sum of £240,000 was subscribed, and the company received formal charge of their concessions. The path of the company was speedily beset with difficulties, which in the first instance arose out of the aggressions of the German East African Company. This company had also received a grant from the sultan in October 1888, and its appearance on the coast was followed by grave disturbances among the tribes which had welcomed the British. This outbreak led to a joint British and German blockade, which seriously hampered trade operations. It had also been anticipated, in reliance on certain assurances of Prince Bismarck, emphasized by Lord Salisbury, that German enterprise in the interior of the country would be confined to the south of Victoria Nyanza. Unfortunately this expectation was not realized. Moreover German subjects put forward claims to coast districts, notably Lamu, within the company's sphere and in many ways obstructed the company's operations. In all these disputes the German government countenanced its own subjects, while the British foreign office did little or nothing to assist the company, sometimes directly discouraging its activity. Moreover, the company had agreed by the concession of October 1888 to pay a high revenue to the sultan—Bargash had died in the preceding March and the Germans were pressing his successor to give them a grant of Lamu—in lieu of the customs collected at the ports they took over. The disturbance caused by the German claims had a detrimental effect on trade and put a considerable strain on the resources of the company. The action of the company in agreeing to onerous financial burdens was dictated partly by regard for imperial interests, which would have been seriously weakened had Lamu gone to the Germans.

By the hinterland doctrine, accepted both by Great Britain and Germany in the diplomatic correspondence of July 1887, Uganda would fall within Great Britain's "sphere of influence"; but German public opinion did not so regard the matter. German maps assigned the territory to Germany, while in England public opinion as strongly expected British influence to be paramount. In 1889 Karl Peters, a German official, led what was practically a raiding expedition into that country, after running a blockade of the ports. An expedition under F.J. Jackson had been sent by the company in the same year to Victoria Nyanza, but with instructions to avoid Uganda. In consequence of representations from Uganda, and of tidings he received of Peters's doings, Jackson, however, determined to go to that country. Peters retired at Jackson's approach, claiming, nevertheless, to have made certain treaties which constituted "effective occupation." Peters's treaty was dated the 1st of March 1890: Jackson concluded another in April. Meantime negotiations were proceeding in Europe; and by the Anglo-German agreement of the 1st of July 1890 Uganda was assigned to the British sphere. To consolidate their position in Uganda—the French missionaries there were hostile to Great Britain—the company sent thither Captain F.D. Lugard, who reached Mengo, the capital, in December 1890 and established the authority of the company despite French intrigues. In July 1890 representatives of the powers assembled at Brussels had agreed on common efforts for the suppression of the slave trade. The interference of the company in Uganda had been a material step towards that object, which they sought to further and at the same time to open up the country by the construction of a railway from Mombasa to Victoria Nyanza. But their resources being inadequate for such an undertaking they sought imperial aid. Although Lord Salisbury, then prime minister, paid the highest tribute to the company's labours, and a preliminary grant for the survey had been practically agreed upon, the scheme was wrecked in parliament. At a later date, however, the railway was built entirely at government cost (*supra*, § *Communications*). Owing to the financial strain imposed upon it the company decided to withdraw Captain Lugard and his forces in August 1891; and eventually the British government assumed a protectorate over the country (see UGANDA).

The company and the crown.

Further difficulties now arose which led finally to the extinction of the company. Its pecuniary interests sustained a severe blow owing to the British government—which had taken Zanzibar under its protection in November 1890—declaring (June 1892) the dominions of the sultan within the free trade zone. This act extinguished the treaties regulating all tariffs and duties with foreign powers, and gave free trade all along the coast. The result for the company was that dues were now swept away without compensation, and the company was left saddled with the payment of the rent, and with the cost, in addition, of administration, the necessary revenue for which had been derived from the dues thus abolished. Moreover, a scheme of taxation which it drew up failed to gain the approval of the foreign office.

[v.04 p.0605]

In every direction the company's affairs had drifted into an *impasse*. Plantations had been taken over on the coast and worked at a loss, money had been advanced to native traders and lost, and expectations of trade had been disappointed. At this crisis Sir William Mackinnon, the guiding spirit of the company, died (June 1893). At a meeting of shareholders on the 8th of May 1894 an offer to surrender the charter to the government was approved, though not without strong protests. Negotiations dragged on for over two years, and ultimately the terms of settlement were that the government should purchase the property, rights and assets of the company in East Africa for £250,000. Although the company had proved unprofitable for the shareholders (when its accounts were wound up they disclosed a total deficit of £193,757) it had accomplished a great deal of good work and had brought under British sway not only the head waters of the upper Nile, but a rich and healthy upland region admirably adapted for European colonization. To the judgment, foresight and patriotism of Sir William Mackinnon British East Africa practically owes its foundation. Sir William and his colleagues of the company were largely animated by humanitarian motives—the desire to suppress slavery and to improve the condition of the natives. With this aim they prohibited the drink traffic, started industrial missions, built roads, and administered impartial justice. In the opinion of a later administrator (Sir C. Eliot), their work and that of their immediate successors was the greatest philanthropic achievement of the latter

part of the 19th century.

On the 1st of July 1895 the formal transfer to the British crown of the territory administered by the company took place at Mombasa, the foreign office assuming responsibility for its administration. The territory, hitherto known as "Ibea," from the initials of the company, was now styled the East Africa protectorate. The small sultanate of Witu (*q.v.*) on the mainland opposite Lamu, from 1885 to 1890 a German protectorate, was included in the British protectorate. Coincident with the transfer of the administration to the imperial government a dispute as to the succession to a chieftainship in the Mazrui, the most important Arab family on the coast, led to a revolt which lasted ten months and involved much hard fighting. It ended in April 1896 in the flight of the rebel leaders to German territory, where they were interned. The rebellion marks an important epoch in the history of the protectorate as its suppression definitely substituted European for Arab influence. "Before the rebellion," says Sir C. Eliot, "the coast was a protected Arab state; since its suppression it has been growing into a British colony."

A white man's country.

From 1896, when the building of the Mombasa-Victoria Nyanza railway was begun, until 1903, when the line was practically completed, the energies of the administration were largely absorbed in that great work, and in establishing effective control over the Masai, Somali, and other tribes. The coast lands apart, the protectorate was regarded as valuable chiefly as being the high road to Uganda. But as the railway reached the high plateaus the discovery was made that there were large areas of land—very sparsely peopled—where the climate was excellent and where the conditions were favourable to European colonization. The completion of the railway, by affording transport facilities, made it practicable to open the country to settlers. The first application for land was made in April 1902 by the East Africa Syndicate—a company in which financiers belonging to the Chartered Company of South Africa were interested—which sought a grant of 500 sq. m.; and this was followed by other applications for considerable areas, a scheme being also propounded for a large Jewish settlement.

During 1903 the arrival of hundreds of prospective settlers, chiefly from South Africa, led to the decision to entertain no more applications for large areas of land, especially as questions were raised concerning the preservation for the Masai of their rights of pasturage. In the carrying out of this policy a dispute arose between Lord Lansdowne, foreign secretary, and Sir Charles Eliot, who had been commissioner since 1900. The foreign secretary, believing himself bound by pledges given to the syndicate, decided that they should be granted the lease of the 500 sq. m. they had applied for; but after consulting officials of the protectorate then in London, he refused Sir Charles Eliot permission to conclude leases for 50 sq. m. each to two applicants from South Africa. Sir Charles thereupon resigned his post, and in a public telegram to the prime minister, dated Mombasa, the 21st of June 1904, gave as his reason:—"Lord Lansdowne ordered me to refuse grants of land to certain private persons while giving a monopoly of land on unduly advantageous terms to the East Africa Syndicate. I have refused to execute these instructions, which I consider unjust and impolitic."[1]

On the day Sir Charles sent this telegram the appointment of Sir Donald W. Stewart, the chief commissioner of Ashanti, to succeed him was announced. Sir Donald induced the Masai whose grazing rights were threatened to remove to another district, and a settlement of the land claims was arranged. An offer to the Zionist Association of land for colonization by Jews was declined in August 1905 by that body, after the receipt of a report by a commissioner sent to examine the land (6000 sq. m.) offered. Sir Donald Stewart died on the 1st of October 1905, and was succeeded by Colonel Hayes Sadler, the commissioner of Uganda. Meantime, in April 1905, the administration of the protectorate had been transferred from the foreign to the colonial office. By the close of 1905 considerably over a million acres of land had been leased or sold by the protectorate authorities—about half of it for grazing purposes. In 1907, to meet the demands of the increasing number of white inhabitants, who had formed a Colonists' Association[2] for the promotion of their interests, a legislative council was established, and on this council representatives of the settlers were given seats. The style of the chief official was also altered, "governor" being substituted for "commissioner". In the same year a scheme was drawn up for assisting the immigration of British Indians to the regions adjacent to the coast and to Victoria Nyanza, districts not suitable for settlement by Europeans.

In general the relations of the British with the tribes of the interior have been satisfactory. The Somali in Jubaland have given some trouble, but the Masai, notwithstanding their warlike reputation, accepted peaceably the control of the whites. This was due, in great measure, to the fact that at the period in question plague carried off their cattle wholesale and reduced them for years to a state of want and weakness which destroyed their warlike habits. One of the most troublesome tribes proved to be the Nandi, who occupied the southern part of the plateau west of the Mau escarpment. They repeatedly raided their less warlike neighbours and committed wholesale thefts from the railway and telegraph lines. In September 1905 an expedition was sent against them which reduced the tribe to submission in the following November; and early in 1906 the Nandi were removed into a reserve. The majority of the natives, unaccustomed to regular work, showed themselves averse from taking service under the white farmers. The inadequacy of the labour supply was an early cause of trouble to the settlers, while the labour regulations enforced led, during 1907-1908, to considerable friction between the colonists and the administration.

For several years after the establishment of the protectorate the northern region remained very

little known and no attempt was made to administer the district. The natives were frequently raided by parties of Gallas and Abyssinians, and in the absence of a defined frontier Abyssinian government posts were pushed south to Lake Rudolf. The Abyssinians also made themselves masters of the Boran country. After long negotiations an agreement as to the boundary line [v.04 p.0606] between the lake and the river Juba was signed at Adis Ababa on the 6th of December 1907, and in 1908-1909 the frontier was delimited by an Anglo-Abyssinian commission, Major C.W. Gwynn being the chief British representative. Save for its north-eastern extremity Lake Rudolf was assigned to the British, Lake Stefanie falling to Abyssinia, while from about 4° 20′ N. the Daua to its junction with the Juba became the frontier.

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(F. R. C.)

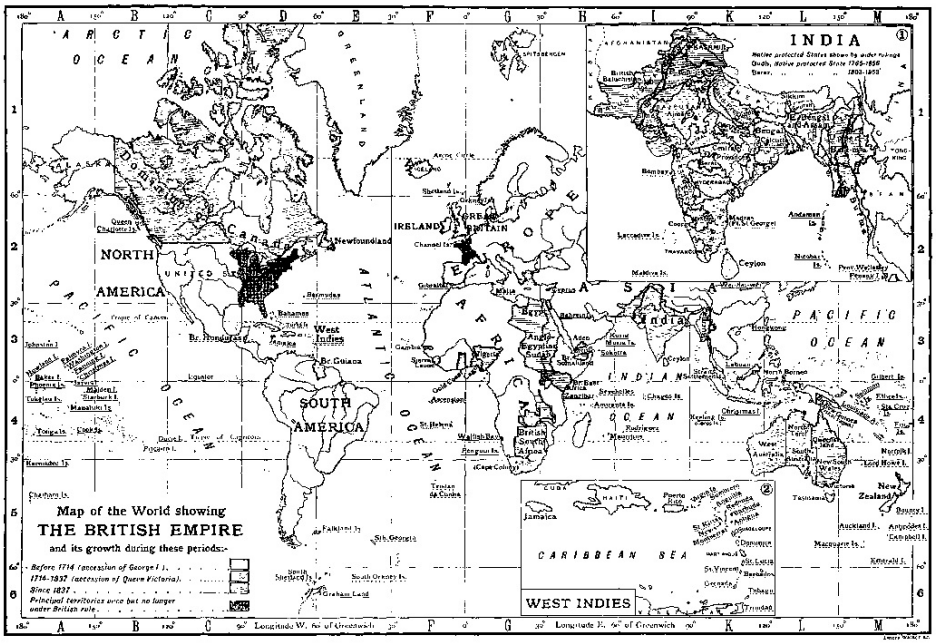
[1] See *Correspondence relating to the Resignation of Sir C. Eliot, Africa, No. 8* (1904).

[2] The Planters and Farmers' Association, as this organization was originally called, dates from 1903.

BRITISH EMPIRE, the name now loosely given to the whole aggregate of territory, the inhabitants of which, under various forms of government, ultimately look to the British crown as the supreme head. The term "empire" is in this connexion obviously used rather for convenience than in any sense equivalent to that of the older or despotic empires of history.

Extent.

The land surface of the earth is estimated to extend over about 52,500,000 sq. m. Of this area the British empire occupies nearly one-quarter, extending over an area of about 12,000,000 sq. m. By far the greater portion lies within the temperate zones, and is suitable for white settlement. The notable exceptions are the southern half of India and Burma; East, West and Central Africa; the West Indian colonies; the northern portion of Australia; New Guinea, British Borneo and that portion of North America which extends into Arctic regions. The area of the territory of the empire is divided almost equally between the southern and the northern hemispheres, the great divisions of Australasia and South Africa covering between them in the southern hemisphere 5,308,506 sq. m., while the United Kingdom, Canada and India, including the native states, cover between them in the northern hemisphere 5,271,375 sq. m. The alternation of the seasons is thus complete, one-half of the empire enjoying summer, while one-half is in winter. The division of territory between the eastern and western hemispheres is less equal, Canada occupying alone in the western hemisphere 3,653,946 sq. m., while Australasia, South Africa, India and the United Kingdom occupy together in the eastern hemisphere 6,925,975 sq. m. As a matter of fact, however, the eastern portions of Australasia border so nearly upon the western hemisphere that the distribution of day and night throughout the empire is, like the alternations of the seasons, almost complete, one-half enjoying daylight, while the other half is in darkness. These alternations of time and of seasons, combined with the variety of soils and climates, are calculated to have an increasingly important effect upon the material and industrial, as well as upon the social and political developments of the empire. This will become evident in considering the industrial productions of the different divisions, and the harvest seasons which permit the summer produce of one portion of the empire to supply the winter requirements of its other markets, and conversely.



The empire contains or is bounded by some of the highest mountains, the greatest lakes, and the most important rivers of the world. Its climates may be said to include all the known climates of the world; its soils are no less various. In the prairies of central Canada it possesses some of the most valuable wheat-producing land; in the grass lands of the interior of Australia the best pasture country; and in the uplands of South Africa the most valuable gold- and diamond-bearing beds which exist. The United Kingdom at present produces more coal than any other single country except the United States. The effect of climate throughout the empire in modifying the type of the Anglo-Saxon race has as yet received only partial attention, and conclusions regarding it are of a somewhat empiric nature. The general tendency in Canada is held to be towards somewhat smaller size, and a hardy active habit; in Australia to a tall, slight, pale development locally known as "cornstalkers," characterized by considerable nervous and intellectual activity. In New Zealand the type preserves almost exactly the characteristics of the British Isles. The South African, both Dutch and British, is readily recognized by an apparently sun-dried, lank and hard habit of body. In the tropical possessions of the empire, where white settlement does not take place to any considerable extent, the individual alone is affected. The type undergoes no modification. It is to be observed in reference to this interesting aspect of imperial development, that the multiplication and cheapening of channels of communication and means of travel throughout the empire will tend to modify the future accentuation of race difference, while the variety of elements in the vast area occupied should have an important, though as yet not scientifically traced, effect upon the British imperial type.

Population.

The white population of the empire[1] reached in 1901 a total of over 53,000,000, or something over one-eighth of its entire population, which, including native races, is estimated at about 400,000,000. The white population includes some French, Dutch and Spanish peoples, but is mainly of Anglo-Saxon race. It is distributed roughly as follows:—

United Kingdom and home dependencies	41,608,791
Australasia	4,662,000
British North America	5,500,000
Africa (Dutch and British)[2]	1,000,000
India	169,677
West Indies and Bermuda	100,000
	53,040,468

The native population of the empire includes types of the principal black, yellow and brown races, classing with these the high-type races of the East, which may almost be called white. The native population of India, mainly high type, brown, was returned at the census of 1901 as 294,191,379. The population of India is divided into 118 groups on the basis of language. These may, however, be collected into the following principal groups:—

(A) Malayo-Polynesian.
(B) Indo-Chinese:
  i. Mon-Khmer.
  ii. Tibeto-Burman.
  iii. Siamese-Chinese.
(C) Dravido-Muṇḍā:

i. Muṇḍā (Kolarian).
ii. Dravidian.
(D) Indo-European.
Indo-Aryan sub-family.
(E) Semitic.
(F) Hamitic.
(G) Unclassed, e.g. Gipsy.

Eastern Colonies

Ceylon, high type, brown and mixed	3,568,824
Straits Settlements, brown, mixed and Chinese	570,000
Hong-Kong, Chinese and brown	306,130
North Borneo, mixed brown and Sarawak	700,000
	5,144,954

[v.04 p.0607] Of the various races which inhabit these Eastern dependencies the most important are the 2,000,000 Sinhalese and the 954,000 Tamil that make up the greater part of the population of Ceylon. The rest is made up of Arabs, Malays, Chinese (in the Straits Settlements and Hong-Kong), Dyaks, Eurasians and others.

West Indies.

The West Indies, including the continental colonies of British Guiana and Honduras, and seventeen islands or groups of islands, have a total coloured population of about 1,912,655. The colonies of this group which have the largest coloured populations are:—

Jamaica—Chiefly black, some brown and yellow	790,000
Trinidad and Tobago—Black and brown	250,000
British Guiana—Black and brown	286,000
	1,326,000

The populations of the West Indies are very various, being made up largely of imported African negroes. In Jamaica these contribute four-fifths of the population. There are also in the islands a considerable number of imported East Indian coolies and some Chinese. The aboriginal races include American Indians of the mainland and Caribs. With these there has been intermixture of Spanish and Portuguese blood, and many mixed types have appeared. The total European population of this group of colonies amounts to upwards of 80,000, to which 15,000 on account of Bermuda may be added.

Africa.

Chiefly black, estimated	
South	5,211,329
Central	2,000,000

The aboriginal races of South Africa were the Bushmen and Hottentots. Both these races are rapidly diminishing in numbers, and in British South Africa it is expected that they will in the course of the twentieth century become extinct. Besides these primitive races there are the dark-skinned negroids of Bantu stock, commonly known in their tribal groups as Kaffirs, Zulu, Bechuana and Damara, which are again subdivided into many lesser groups. The Bantu compose the greater part of the native population. There are also in South Africa Malays and Indians and others, who during the last two hundred years have been introduced from Java, Ceylon, Madagascar, Mozambique and British India, and by intermarriage with each other and with the natives have produced a hybrid population generally classed together under the heading of the Mixed Races. These are of all colours, varying from yellow to dark brown. The tribes of Central Africa are as yet less known. Many of them exhibit racial characteristics allied to those of the tribes of South Africa, but with in some cases an admixture of Arab blood.

East Africa.

Protectorate—Black and brown:	
—Natives (estimated)	4,000,000
—Asiatics (estimated)	25,000

Zanzibar—Black and brown	200,000
Uganda	3,200,000
Total	7,425,000

West Africa.

	Estimated.
Nigeria (including Lagos)—Black and brown	15,000,000
Gold Coast and hinterland—Chiefly black	2,700,000
Sierra Leone—Chiefly black	1,000,000
Gambia—Chiefly black	163,000
	18,863,000

From east to west across Africa the aboriginal nations are mostly of the black negroid type, their varieties being only imperfectly known. The tendency of some of the lower negroid types has been to drift towards the west coast, where they still practise cannibalistic and fetish rites. On the east coast are found much higher types approaching to the Christian races of Abyssinia, and from east to west there has been a wide admixture of Arab blood producing a light-brown type. In Uganda and Nigeria a large proportion of the population is Arab and relatively light-skinned.

Australasia.

Australia—Black, very low type	200,000
—Chinese and half castes, yellow	50,000
New Zealand—Maoris, brown, Chinese and half castes	53,000
Fiji—Polynesian, black and brown	121,000
Papua—Polynesian, black and brown	400,000
	824,000

The native races of Australia and the Polynesian groups of islands are divided into two main types known as the dark and light Polynesian. The dark type, which is black, is of a very low order, and in some of the islands still retains its cannibal habits. The aboriginal tribes of Australia are of a low-class black race, but generally peaceful and inoffensive in their habits. The white Polynesian races are of a very superior type, and exhibit, as in the Maoris of New Zealand, characteristics of a high order. The natives of Papua (New Guinea) are in a very low state of civilization. The estimate given of their numbers is approximate, as no census has been taken.

Canada.

Indians—Brown	100,000

The only coloured native races of Canada are the Red Indians, many in tribal variety, but few in number.

Summary.

Native Populations:	
India	294,191,379
Ceylon and Eastern Colonies	5,144,954
West Indies	1,912,655
South Africa	5,211,329
British Central Africa	2,000,000
East Africa	7,425,000
West Africa	18,863,000
Australasia and Islands	824,000
Canada	100,000
	335,672,317
White populations	53,040,468
Total	388,712,785

This is without taking into account the population of the lesser crown colonies or allowing for the increase likely to be shown by later censuses. Throughout the empire, and notably in the United Kingdom, there is among the white races a considerable sprinkling of Jewish blood.

The latest calculation of the entire population of the world, including a liberal estimate of 650,000,000 for peoples not brought under any census, gives a total of something over 1,500,000,000. The population of the empire may therefore be calculated as amounting to something more than one-fourth of the population of the world.

Divisions.

It is a matter of first importance in the geographical distribution of the empire that the five principal divisions, the United Kingdom, South Africa, India, Australia and Canada are separated from each other by the three great oceans of the world. The distance as usually calculated in nautical miles: from an English port to the Cape of Good Hope is 5840 m.; from the Cape of Good Hope to Bombay is 4610; from Bombay to Melbourne is 5630; from Melbourne to Auckland is 1830; from Auckland to Vancouver is 6210; from Halifax to Liverpool is 2744. From a British port direct to Bombay by way of the Mediterranean it is 6272; from a British port by the same route to Sydney 11,548 m. These great distances have necessitated the acquisition of intermediate ports suitable for coaling stations on the trade routes, and have determined the position of many of the lesser crown colonies which are held simply for military and commercial purposes. Such are the Bermudas, Gibraltar, Malta, Aden, Ceylon, the Straits Settlements, Labuan, Hong-Kong, which complete the chain of connexion on the eastern route, and such on other routes are the lesser West African stations, Ascension, St. Helena, the Mauritius and Seychelles, the Falklands, Tristan da Cunha, and the groups of the western Pacific. Other annexations of the British empire have been rocky islets of the northern Pacific required for the purpose of telegraph stations in connexion with an all-British cable.

[v.04 p.0608]

For purposes of political administration the empire falls into the three sections of the United Kingdom of Great Britain and Ireland, with the dependencies of the Channel Islands and the Isle of Man; the Indian empire, consisting of British India and the feudatory native states; and the colonial empire, comprising all other colonies and dependencies.

Growth.

In the modern sense of extension beyond the limits of the United Kingdom the growth of the empire is of comparatively recent date. The Channel Islands became British as a part of the Norman inheritance of William the Conqueror. The Isle of Man, which was for a short time held in conquest by Edward I. and restored, was sold by its titular sovereign to Sir William Scrope, earl of Wiltshire, in 1393, and by his subsequent attainder for high treason and the confiscation of his estates, became a fief of the English crown. It was granted by Henry IV. in 1406 to Sir John Stanley, K.C., ancestor of the earls of Derby, by whom it was held till 1736, when it passed to James Murray, 2nd duke of Atholl, as heir-general of the 10th earl. It was inherited by his daughter Charlotte, wife of the 3rd duke of Atholl, who sold it to the crown for £70,000 and an annuity of £2000. With these exceptions and the nominal possession taken of Newfoundland by Sir Humphrey Gilbert in 1583, all the territorial acquisitions of the empire have been made in the 17th and subsequent centuries.

The following is a list of the British colonies and dependencies (other than those belonging to the Indian empire) together with a summary statement of the date and method of their acquisition. Arranged in chronological order they give some idea of the rate of growth of the empire. The dates are not, however, in all cases those in which British sovereignty was established. They indicate in some instances only the first definite step, such as the building of a fort, the opening of a trading station, or other act, which led later to the incorporation in the empire of the country indicated. In the case of Australian states or Canadian provinces originally part of other states or provinces the date is that, approximately, of the first settlement of British in the district named; *e.g.* there were British colonists in Saskatchewan in the last half of the 18th century, but the province was not constituted until 1905. Save where otherwise stated, British authority has been continuous from the first date mentioned in the table. Reference should be made to the articles on the various colonies.

Name.	Date.	Method of Acquisition.
Newfoundland	1583	Possession taken by Sir H. Gilbert for the crown.
		17th Century.
Barbados	1605-1625	Settlement.
Bermudas	1609	"
Gambia	*c.* 1618	" A second time in 1816.
St Christopher	1623	" Did not become wholly British until 1713.
Novia Scotia	1628	" Ceded to France 1632; recovered 1713.
Nevis	1628	"
Montserrat	1632	"
Antigua	1632	"
Honduras	1638	"
St Lucia	1638	" Finally passed to Great Britain in 1803.
Gold Coast	*c.* 1650	Settlement. Danish forts bought 1850, Dutch forts

		1871. Northern Territories added 1897.
St Helena	1651	Settled by East India Co. Government vested in British crown 1833.
Jamaica	1655	Conquest.
Bahamas	1666	Settlement.
Virgin Islands	1666-1672	Settlement and conquest.
N.W. Territories of Canada	1669	Settlement under royal charter of Hudson's Bay Co. Purchased from imp. gov. 1869, and transferred to Canada 1870.
Turks and Caicos Is.	1678	Settlement.
		18th Century.
Gibraltar	1704	Capitulation.
New Brunswick	1713	Cession.
Prince Edward Is.	1758	Conquest.
Ontario	1759-1790	With New Brunswick and Nova
Quebec	1759-1790	Scotia constituted Dominion of Canada 1867. Prince Edward Is. enters the confederation 1873. In 1880 all British possessions (other than Newfoundland) in North America annexed to the Dominion.
Dominica	1761	Conquest.
St Vincent	1762	Capitulation.
Grenada	1762	"
Tobago	1763	Cession. Afterwards in French possession. Reconquered 1803.
Falkland Is.	1765	Settlement. Reoccupied 1832.
Saskatchewan	1766	Settlement. Separation from N.W. Territories of Canada 1905.
Pitcairn I.	1780	Settlement.
Straits Settlements	1786 to 1824	Settlement and cession. Vested (1858) in crown by E.I. Co. Transferred from Indian to colonial possessions 1867. Malacca in British occupation 1795-1818.
Sierra Leone	1787	Settlement.
Alberta	*c.* 1788	Separated from N. W. Territories of Canada 1905.
New South Wales	1788	Settlement.
Ceylon	1795	Capitulation.
Trinidad	1797	"
Malta	1800	"
		19th Century.
British Guiana	1803	Capitulation.
Tasmania	1803	Settlement.
Cape of Good Hope	1806	Capitulation. Present limits not attained until 1895. First British occupation 1795-1803.
Seychelles	1806	Capitulation.
Mauritius	1810	"
Manitoba	1811	Settlement by Red River or Selkirk colony. Created province of Canada 1870.
Ascension and Tristan da Cunha	1815	Military occupation.
B. Columbia and Vancouver Island	1821	Settlement under Hudson's Bay Co. Entered Canadian confederation 1871.
Natal	1824	Settlement. Natal Boers submit 1843.
Queensland	1824	Separated from New South Wales 1859.
West Australia	1826	Settlement.
Victoria	1834	Separated from New South Wales 1851.
South Australia	1836	Settlement.
New Zealand	1840	Settlement and treaty.
Hong-Kong	1841	Treaties. Kowloon on the mainland added in 1860; additional area leased 1898.
Labuan	1846	Cession. Incorporated in Straits Settlements 1906.
Lagos	1861	Cession. South Nigeria amalgamated with Lagos, under style of Colony and Protectorate of Southern Nigeria 1906.
Basutoland	1868	Annexation.

Fiji	1874	Cession.
W. Pacific Islands, including including Union, Ellice, Gilbert, Southern Solomon, and other groups	1877	High commission created by order in council, giving jurisdiction over islands not included in other colonial governments, nor within jurisdiction of other civilized powers. Protectorates declared over all these islands by 1900.
Federated Malay States	1874-1895	Treaty.
Cyprus	1878	Occupied by treaty.
North Borneo	1881	Treaty and settlement under royal charter. Protectorate assumed 1888.
Papua	1884	Protectorate declared.
Nigeria	1884-1886	Treaty, conquest and settlement under royal charter. Chartered Co.'s territory transferred to crown, and whole divided into North and South Nigeria 1900.
Somaliland	1884-1886	Occupation and cession. Protectorate declared 1887.
Bechuanaland	1885-1891	Protectorate declared. Southern portion annexed to Cape Colony 1895.
Zululand	1887	Annexation. Incorporated in Natal 1897.
Sarawak	1888	Protectorate declared.
Brunei	1888	" "
British East Africa	1888	Treaty, conquest and settlement under royal charter. Transferred to crown 1895.
Rhodesia	1888-1893	Treaty, conquest and settlement under royal charter.
Zanzibar	1890	Protectorate declared.
Uganda	1890-1896	Treaty and protectorate.
Nyasaland	1891	Protectorate declared.
Ashanti	1896	Military occupation.
Wei-hai-wei	1898	Lease from China.
Pacific Islands—		
—Christmas, Fanning, Penrhyn, Suvarov	1898	Annexed for purposes of projected Pacific cable.
—Choiseul and Isabel Is. (Solomon Group)	1899	Cession.
—Tonga and Niué	1900	Protectorate declared.
Orange Free State	1900	Annexation. Formerly British 1848-1854.
Transvaal and Swaziland	1900	Annexation. Formerly British 1877-1881.
	20th Century.	
Kelantan, Trengganu, &c.	1909	Cession from Siam.

In the Pacific are also Bird Island, Bramble Cay, Cato Island, Cook Islands, Danger Islands, Ducie Island, Dudosa, Howland Island, Jarvis Island, Kermadec Islands, Macquarie Island, Manihiki Islands, Nassau Island, Palmerston Island, Palmyra Island, Phoenix Group, Purdy Group, Raine Island, Rakaanga Island, Rotumah Island, Surprise Island, Washington or New York Island, Willis Group and Wreck Reef.

In the Indian Ocean there are, besides the colonies already mentioned, Rodriguez, the Chagos Islands, St Brandon Islands, Amirante Islands, Aldabra, Kuria Muria Islands, Maldive Islands and some other small groups.

In certain dependencies the sovereignty of Great Britain is not absolute. The island of Cyprus is nominally still part of the Turkish empire, but in 1878 was handed over to Great Britain for occupation and administration; Great Britain now making to the Porte on account of the island an annual payment of £5000. The administration is in the hands of an official styled high commissioner, who is invested with the powers usually conferred on a colonial governor. In Zanzibar and other regions of equatorial Africa the native rulers retain considerable powers; in the Far East certain areas are held on lease from China.

Egypt, without forming part of the British empire, came under the military occupation of Great Britain in 1882. "By right of conquest" Great Britain subsequently claimed a share in the administration of the former Sudan provinces of Egypt, and an agreement of the 19th of January 1899 established the joint sovereignty of Great Britain and Egypt over what is now known as the Anglo-Egyptian Sudan.

The Indian section of the empire was acquired during the 17th-19th centuries under a royal charter granted to the East India Company by Queen Elizabeth in 1600. It was transferred to the imperial government in 1858, and Queen Victoria was proclaimed empress under the Royal Titles Act in 1877. The following list gives the dates and method of acquisition of the centres of the main divisions of the Indian empire. They have, in most instances, grown by general process of

extension to their present dimensions.

Name.	Date.	Method of Acquisition.
Madras	1639 to 1748	By treaty and subsequent conquest. Fort St George, the foundation of Madras was the first territorial possession of the E.I. Co. in India. It was acquired by treaty with its Indian ruler. Madras was raised into a presidency in 1683; ceded to France 1746; recovered 1748.
Bombay	1608 to 1685	Treaty and cession. Trade first established 1608. Ceded to British crown by Portugal 1661. Transferred to E.I. Co. 1668. Presidency removed from Surat 1687.
Bengal	1633 to 1765	Treaty and subsequent conquests. First trade settlement established by treaty at Pipli in Orissa 1633. Erected into presidency by separation from Madras 1681. Virtual sovereignty announced by E.I. Co., as result of conquests of Clive, 1765.
United Provinces of Agra and Oudh	1764 to 1856	By conquests and treaty through successive stages, of which the principal dates were 1801-3-14-15. In 1832 the nominal sovereignty of Delhi, till then retained by the Great Mogul, was resigned into the hands of the E.I. Co. Oudh, of which the conquest may be said to have begun with the battle of Baxar in 1764, was finally annexed in 1856.
Central Provinces	1802-1817	By conquest and treaty.
Eastern Bengal and Assam	1825-1826	Conquest and cession. The Bengal portion of the province by separation from Bengal in 1905.
Burma	1824-1852	Conquest and cession.
Punjab	1849	Conquest and annexation. Made into distinct province 1859.
N.-W. Frontier Province	1901	Subdivision.
Ajmere and Merwara	1818	By conquest and cession.
Coorg	1834	Conquest and annexation.
British Baluchistan	1854-1876	Conquest and treaty.
Andaman Islands	1858	Annexation.

The following is a list of some of the principal Indian states which are more or less under the control of the British government:—

1. In direct political relations with the governor-general in council.

Hyderabad.
Baroda.
Mysote.
Kashmir.

2. Under the Rajputana agency.

Udaipur.
Jodhpur.
Bikanir.
Jaipur (and feudatories).
Bharatpur.
Dholpur.
Alwar.
Tonk.

3. Under the Central Indian agency.

Indore.
Rewa.
Bhopal.
Gwalior.

4. Under the Bombay government.

Cutch.
Kolhapur (and dependencies).
Khairpur (Sind).
Bhaunagar.

[v.04 p.0610] 5. Under the Madras government.

Travancore.
Cochin.

6. Under the Central Provinces government.

Bastar.

7. Under the Bengal government.

Kuch Behar.
Sikkim.

8. Under United Provinces government.

Rampur.
Garhwal.

9. Under the Punjab government.

Patiala.
Bahawalpur.
Jind.
Nabha.
Kapurthala.
Mandi.
Sirmur (Nahan).
Faridkot.
Chamba.

10. Under the government of Burma.

Shan states.
Karen states.

In addition to these there are British tracts known as the Upper Burma frontier and the Burma frontier. There is also a sphere of British influence in the border of Afghanistan. The state of Nepal, though independent as regards its internal administration, has been since the campaign of 1814-15 in close relations with Great Britain. It is bound to receive a British resident, and its political relations with other states are controlled by the government of India. All these native states have come into relative dependency upon Great Britain as a result of conquest or of treaty consequent upon the annexation of the neighbouring provinces. The settlement of Aden, with its dependencies of Perim and Sokotra Island, forms part of the government of Bombay.

Administration.

This vast congeries of states, widely different in character, and acquired by many different methods, holds together under the supreme headship of the crown on a generally acknowledged triple principle of self-government, self-support and self-defence. The principle is more fully applied in some parts of the empire than in others; there are some parts which have not yet completed their political evolution; some others in which the principle is temporarily or for special reasons in abeyance; others, again—chiefly those of very small extent, which are held for purposes of the defence or advantage of the whole—to which it is not applicable; but the principle is generally acknowledged as the structural basis upon which the constitution of the empire exists.

In its relation to the empire the home section of the British Isles is distinguished from the others as the place of origin of the British race and the residence of the crown. The history and constitutional development of this portion of the empire will be found fully treated under separate headings. (See ENGLAND; WALES; IRELAND; SCOTLAND; UNITED KINGDOM; ENGLISH HISTORY; INDIA; AFRICA; AUSTRALIA; CANADA; &c.)

It is enough to say that for purposes of administration the Indian empire is divided into nine great provinces and four minor commissionerships. The nine great provinces are presided over by two governors (Bombay and Madras), five lieut.-governors (Bengal, Eastern Bengal and Assam, United Provinces [Agra and Oudh], the Punjab and Burma), a chief commissioner (the Central Provinces) and an agent to the governor-general (the N.-W. Frontier Province). The four minor commissionerships are presided over each by a chief commissioner. Above these the supreme executive authority in India is vested in the viceroy in council. The council consists of six ordinary members besides the existing commander-in-chief. For legislative purposes the governor-general's council is increased by the addition of fifteen members nominated by the crown, and has power under certain restrictions to make laws for British India, for British subjects in the native states, and for native Indian subjects of the crown in any part of the world. The administration of the Indian empire in England is carried on by a secretary of state for India assisted by a council of not less than ten members. The expenditure of the revenues is under the control of the secretary in council.

The colonial empire comprises over fifty distinct governments. It is divided into colonies of three classes and dependencies; these, again, are in some instances associated for administrative purposes in federated groups. The three classes of colonies are crown colonies, colonies possessing representative institutions but not responsible government, and colonies possessing

representative institutions and responsible government. In crown colonies the crown has entire control of legislation, and the public officers are under the control of the home government. In representative colonies the crown has only a veto on legislation, but the home government retains control of the public officers. In responsible colonies the crown retains a veto upon legislation, but the home government has no control of any public officer except the governor.

In crown colonies—with the exception of Gibraltar and St Helena, where laws may be made by the governor alone—laws are made by the governor with the concurrence of a council nominated by the crown. In some crown colonies, chiefly those acquired by conquest or cession, the authority of this council rests wholly on the crown; in others, chiefly those acquired by settlement, the council is created by the crown under the authority of local or imperial laws. The crown council of Ceylon may be cited as an example of the first kind, and the crown council of Jamaica of the second.

In colonies possessing representative institutions without responsible government, the crown cannot (generally) legislate by order in council, and laws are made by the governor with the concurrence of the legislative body or bodies, one at least of these bodies in cases where a second chamber exists possessing a preponderance of elected representatives. The Bahamas, Barbados, and Bermuda have two legislative bodies—one elected and one nominated by the crown; Malta and the Leeward Islands have but one, which is partly elected and partly nominated.

Under responsible government legislation is carried on by parliamentary means exactly as at home, with a cabinet responsible to parliament, the crown reserving only a right of veto, which is exercised at the discretion of the governor in the case of certain bills. The executive councils in those colonies, designated as at home by parliamentary choice, are appointed by the governor alone, and the other public officers only nominally by the governor on the advice of his executive council.

Colonial governors are classed as governors-general; governors; lieut.-governors; administrators; high commissioners; and commissioners, according to the status of the colony and dependency, or group of colonies and dependencies, over which they preside. Their powers vary according to the position which they occupy. In all cases they represent the crown.

As a consequence of this organization the finance of crown colonies is under the direct control of the imperial government; the finance of representative colonies, though not directly controlled, is usually influenced in important departures by the opinion of the imperial government. In responsible colonies the finance is entirely under local control, and the imperial government is dissociated from either moral or material responsibility for colonial debts.

In federated groups of colonies and dependencies matters which are of common interest to a given number of separate governments are by mutual consent of the federating communities adjudged to the authority of a common government, which, in the case of self-governing colonies, is voluntarily created for the purpose. The associated states form under the federal government one federal body, but the parts retain control of local matters, and exercise all their original rights of government in regard to these. The two great self-governing groups of federated colonies within the empire are the Dominion of Canada and the Commonwealth of Australia. In South Africa unification was preferred to federation, the then self-governing colonies being united in 1910 into one state—the Union of South Africa. India, of which the associated provinces are under the control of the central government, may be given as an example of the practical federation of dependencies. Examples of federated crown colonies and lesser dependencies are to be found in the Leeward Island group of the West Indies and the federated Malay States.

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This rough system of self-government for the empire has been evolved not without some strain and friction, by the recognition through the vicissitudes of three hundred years of the value of independent initiative in the development of young countries. Queen Elizabeth's first patent to Sir Walter Raleigh permitted British subjects to accompany him to America, "with guarantee of a continuance of the enjoyment of all the rights which her subjects enjoyed at home."

This guarantee may presumably have been intended at the time only to assure the intending settlers that they should lose no rights of British citizenship at home by taking up their residence in America. Its mutual interpretation in a wider sense, serving at once to establish in the colony rights of citizenship equivalent to those enjoyed in England, and to preserve for the colonist the status of British subject at home and abroad, has formed in application to all succeeding systems of British colonization the unconscious charter of union of the empire.

The first American colonies were settled under royal grants, each with its own constitution. The immense distance in time which in those days separated America from Great Britain secured them from interference by the home authorities. They paid their own most moderate governing expenses, and they contributed largely to their own defence. From the middle of the 17th century their trade was not free, but this was the only restriction from which they suffered. The great war with France in the middle of the 18th century temporarily destroyed this system. That war, which resulted in the conquest of Canada and the delivery of the North American colonies from French antagonism, cost the imperial exchequer £90,000,000. The attempt to avert the repetition of such expenditure by the assertion of a right to tax the colonies through the British parliament led to the one great rupture which has marked the history of the empire. It has to be noted that at home during the latter half of the 17th century and the earlier part of the 18th century parliamentary power had to a great extent taken the place of the divine right of kings. But

parliamentary power meant the power of the English people and taxpayers. The struggle which developed itself between the American colonies and the British parliament was in fact a struggle on the part of the people and taxpayers of one portion of the empire to resist the domination of the people and taxpayers of another portion. In this light it may be accepted as having historically established the fundamental axiom of the constitution of the empire, that the crown is the supreme head from which the parts take equal dependence.

The crown requiring advice in the ordinary and constitutional manner receives it in matters of colonial administration from the secretaries of state for the colonies and for India. After the great rupture separate provision in the home government for the administration of colonial affairs was at first judged to be unnecessary, and the "Council[3] of Trade and Plantations," which up to that date had supplied the place now taken by the two offices of the colonies and India, was suppressed in 1782. There was a reaction from the liberal system of colonial self-government, and an attempt was made to govern the colonies simply as dependencies.

In 1791, not long after the extension of the range of parliamentary authority in another portion of the empire, by the creation in 1784 of the Board of Control for India, Pitt made the step forward of granting to Canada representative institutions, of which the home government kept the responsible control. Similar institutions were also given at a later period to Australia and South Africa. But the long peace of the early part of the 19th century was marked by great colonial developments; Australia, Canada and South Africa became important communities. Representative institutions controlled by the home government were insufficient, and they reasserted the claim for liberty to manage their own affairs.

Fully responsible government was granted to Canada in 1840, and gradually extended to the other colonies. In 1854 a separate secretary of state for the colonies was appointed at home, and the colonial office was established on its present footing. In India, as in the colonies, there came with the growing needs of empire a recognition of the true relations of the parts to each other and of the whole to the crown. In 1858, on the complete transference of the territories of the East India Company to the crown, the board of control was abolished, and the India Council, under the presidency of a secretary of state for India, was created. It was especially provided that the members of the council may not sit in parliament.

Thus, although it has not been found practicable in the working of the British constitution to carry out the full theory of the direct and exclusive dependence of colonial possessions on the crown, the theory is recognized as far as possible. It is understood that the principal sections of the empire enjoy equal rights under the crown, and that none is subordinate to another. The intervention of the imperial parliament in colonial affairs is only admitted theoretically in so far as the support of parliament is required by the constitutional advisers of the crown. To bring the practice of the empire into complete harmony with the theory it would be necessary to constitute, for the purpose of advising the crown on imperial affairs, a council in which all important parts of the empire should be represented.

Imperialism.

The gradual recognition of the constitutional theory of the British empire, and the assumption by the principal colonies of full self-governing responsibilities, has cleared the way for a movement in favour of a further development which should bring the supreme headship of the empire more into accord with modern ideas.

It was during the period of domination of the "Manchester school," of which the most effective influence in public affairs was exerted for about thirty years, extending from 1845 to 1875, that the fullest development of colonial self-government was attained, the view being generally accepted at that time that self-governing institutions were to be regarded as the preliminary to inevitable separation. A general inclination to withdraw from the acceptance of imperial responsibilities throughout the world gave to foreign nations at the same time an opportunity by which they were not slow to profit, and contributed to the force of a reaction of which the part played by Great Britain in the scramble for Africa marked the culmination. Under the increasing pressure of foreign enterprise, the value of a federation of the empire for purposes of common interest began to be discussed. Imperial federation was openly spoken of in New Zealand as early as 1852. A similar suggestion was officially put forward by the general association of the Australian colonies in London in 1857. The Royal Colonial Institution, of which the motto "United Empire" illustrates its aims, was founded in 1868. First among leading British statesmen to repudiate the old interpretation of colonial self-government as a preliminary to separation, Lord Beaconsfield, in 1872, spoke of the constitutions accorded to the colonies as "part of a great policy of imperial consolidation." In 1875 W. E. Forster, afterwards a member of the Liberal government, made a speech in which he advocated imperial federation as a means by which it might become practicable to "replace dependence by association." The foundation of the Imperial Federation League—in 1884, with Forster for its first president, shortly to be succeeded by Lord Rosebery—marked a distinct step forward. The Colonial Conferences of 1887 and subsequent years (the title being changed to Imperial Conference in 1907), in which colonial opinion was sought and accepted in respect of important questions of imperial organization and defence, and the enthusiastic loyalty displayed by the colonies towards the crown on the occasion of the jubilee manifestations of Queen Victoria's reign, were further indications of progress in the same direction. Coincidently with this development, the achievements of Sir George Goldie and Cecil Rhodes, who, the one in West Africa and the other in South Africa, added between them to the empire in a space of less than twenty years a dominion of greater extent than the whole of British India, followed by the action of a host of distinguished disciples in other parts of the world, effectually stemmed the movement initiated by Cobden and Bright. A tendency which had

seemed temporarily to point towards a complacent dissolution of the empire was arrested, and the closing years of the 19th century were marked by a growing disposition to appreciate the value and importance of the unique position which the British empire has created for itself in the world. No stronger demonstration of the reality of imperial union could be needed than that which was afforded by the support given to the imperial forces by the colonies and India in the South African War. It remained only to be seen by what process of evolution the further consolidation of the empire would find expression in the machinery of government. A step in this direction was taken in 1907, when at the Colonial Conference held in London that year it was decided to form a permanent secretariat to deal with the common interests of the self-governing colonies and the mother-country. It was further decided that conferences, to be called in future Imperial Conferences, between the home government and the governments of the self-governing dominions, should be held every four years, and that the prime minister of Great Britain should be *ex officio* president of the conference. No executive power was, however, conferred upon the conference.

The movement in favour of tariff reform initiated by Mr Chamberlain (*q.v.*) in 1903 with the double object of giving a preference to colonial goods and of protecting imperial trade by the imposition in certain cases of retaliative duties on foreign goods, was a natural evolution of the imperialist idea, and of the fact that by this time the trade-statistics of the United Kingdom had proved that trade with the colonies was forming an increasingly large proportion of the whole. In spite of the defeat of the Unionist party in England in 1906, and the accession to power of a Liberal government opposed to anything which appeared to be inconsistent with free trade, the movement for colonial preference, based on tariff reform, continued to make headway in the United Kingdom, and was definitely adopted by the Unionist party. And at the Imperial Conference of 1907 it was advocated by all the colonial premiers, who could point to the progress made in their own states towards giving a tariff preference to British goods and to those of one another.

The question of self-government is closely associated with the question of self-support. Plenty of good land and the liberty to manage their own affairs were the causes assigned by Adam Smith for the marked prosperity of the British colonies towards the end of the 18th century. The same causes are still observed to produce the same effects, and it may be pointed out that, since the date of the latest of Adam Smith's writings, upwards of 6,000,000 sq. m. of virgin soil, rich with possibilities of agricultural, pastoral and mineral wealth, have been added to the empire. In the same period the white population has grown from about 12,000,000 to 53,000,000, and the developments of agricultural and industrial machinery have multiplied, almost beyond computation, the powers of productive labour.

The imperial factor in industry and trade.

It is scarcely possible within this article to deal with so widely varied a subject as that of the productions and industry of the empire. For the purposes of a general statement, it is interesting to observe that concurrently with the acquisition of the vast continental areas during the 19th century, the progress of industrial science in application to means of transport and communication brought about a revolution of the most radical character in the accepted laws of economic development. Railways did away with the old law that the spread of civilization is necessarily governed by facilities for water carriage and is consequently confined to river valleys and sea-shores. Steam and electricity opened to industry the interior of continents previously regarded as unapproachable. The resources of these vast inland spaces which have lain untouched since history began became available to individual enterprise, and over a great portion of the earth's surface were brought within the possessions of the British empire. The production of raw material within the empire increased at a rate which can only be appreciated by a careful study of figures, and by a comparison of the total of these figures with the total figures of the world. The tropical and temperate possessions of the empire include every field of production which can be required for the use of man. There is no main staple of human food which is not grown; there is no material of textile industry which is not produced. The British empire gives occupation to more than one-third of the persons employed in mining and quarrying in the world. It may be interesting, as an indication of the relative position in this respect of the British empire to the world, to state that at present it produces one-third of the coal supply of the world, one-sixth of the wheat supply, and very nearly two-thirds of the gold supply. But while these figures may be taken as in themselves satisfactory, it is far more important to remember that as yet the potential resources of the new lands opened to enterprise have been barely conceived, and their wealth has been little more than scratched. Population as yet has been only very sparsely sprinkled over the surface of many of the areas most suitable for white settlement. In the wheat lands of Canada, the pastoral country of Australasia, and the mineral fields of South Africa and western Canada alone, the undeveloped resources are such as to ensure employment to the labour and satisfaction to the needs of at least as many millions as they now contain thousands of the British race. In respect of this promise of the future the position of the British empire is unique.

It is not too much to say that trade has been at once the most active cause of expansion and the most potent bond of union in the development of the empire. Trade with the tropical and settlement in the temperate regions of the world formed the basis upon which the foundations of the empire were laid. Trading companies founded most of the American and West Indian colonies; a trading company won India; a trading company colonized the north-western districts of Canada; commercial wars during the greater part of the 18th century established the British command of the sea, which rendered the settlement of Australasia possible. The same wars gave Great Britain South Africa, and chartered companies in the 19th century carried the British flag

into the interior of the African continent from south and east and west. Trading companies developed Borneo and Fiji. The bonds of prosperous trade have kept the Australasian colonies within the empire. The protection of colonial commerce by the imperial navy is one of the strongest of material links which connect the crown with the outlying possessions of the empire.

Imperial trade policy.

The trade of the empire, like the other developments of imperial public life, has been profoundly influenced by the variety of local conditions under which it has flourished. In the early settlement of the North American colonies their trade was left practically free; but by the famous Navigation Act of 1660 the importation and exportation of goods from British colonies were restricted to British ships, of which the master and three-fourths of the mariners were English. This act, of which the intention was to encourage British shipping and to keep the monopoly of British colonial trade for the benefit of British merchants, was followed by many others of a similar nature up to the time of the repeal of the Corn Laws in 1846 and the introduction of free trade into Great Britain. The Navigation Acts were repealed in 1849. Thus for very nearly two hundred years British trade was subject to restrictions, of which the avowed intention was to curtail the commercial intercourse of the empire with the world. During this period the commercial or mercantile system, of which the fallacies were exposed by the economists of the latter half of the 18th century, continued to govern the principles of British trade. Under this system monopolies were common, and among them few were more important than that of the East India Company. In 1813 the trade of India was, however, thrown open to competition, and in 1846, after the introduction of free trade at home, the principal British colonies which had not yet at that date received the grant of responsible government were specially empowered to abolish differential duties upon foreign
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trade. A first result of the commercial emancipation of the colonies was the not altogether unnatural rise in the manufacturing centres of the political school known as the Manchester school, which was disposed to question the value to Great Britain of the retention of colonies which were no longer bound to give her the monopoly of their commercial markets. An equally natural desire on the part of the larger colonies to profit by the opportunity which was opened to them of establishing local manufactures of their own, combined with the convenience in new countries of using the customs as an instrument of taxation, led to something like a reciprocal feeling of resentment, and there followed a period during which the policy of Great Britain was to show no consideration for colonial trade, and the policy of the principal colonies was to impose heavy duties upon British trade. By a gradual process of better understanding, largely helped by the development of means of communication, the antagonistic extreme was abandoned, and a tendency towards a system of preferential duties within the empire displayed itself.

Colonial preference.

At the Colonial Conference held in London in 1887 a proposal was formally submitted by the South African delegate for the establishment within the empire of a preferential system, imposing a duty of 2% upon all foreign goods, the proceeds to be directed to the maintenance of the imperial navy. To this end it was requested that certain treaties with foreign nations which imposed restrictions on the trade of various parts of the empire with each other should be denounced. Some years later, a strong feeling having been manifested in England against any foreign engagement standing in the way of new domestic trade arrangements between a colony and the mother-country, the German and Belgian treaties in question were denounced (1897). Meanwhile, simultaneously with the movement in favour of reciprocal fiscal advantages to be granted within the empire by the many local governments to each other, there was a growth of the perception that an increase of the foreign trade of Great Britain, carried on chiefly in manufactured goods, was accompanied by a corresponding enlargement of the home markets for colonial raw material, and consequently that injury to the foreign trade of Great Britain, while as yet it so largely outweighed the trade between the United Kingdom and the colonies, must necessarily react upon the colonies. This view was definitely expressed at the Colonial Conference at Ottawa in 1894, and was one of the factors which led to the relinquishment of the demand that in return for colonial concessions there should be an imposition on the part of Great Britain of a differential duty upon foreign goods. Canada was the first important British colony to give substantial expression to the new imperial sentiment in commercial matters by the introduction in 1897 of an imperial tariff, granting without any reciprocal advantage a deduction of 25% upon customs duties imposed upon British goods. The same advantage was offered to all British colonies trading with her upon equal terms. In later years the South African states, Australia and New Zealand also granted preferential treatment to British goods. Meanwhile in Great Britain the system of free imports, regarded as "free trade" (though only one-sided free trade), had become the established policy, customs duties being only imposed for purposes of revenue on a few selected articles, and about half the national income was derived from customs and excise. In most of the colonies customs form of necessity one of the important sources of revenue. It is, however, worthy of remark that in the self-governing colonies, even those which are avowedly protectionist, a smaller proportion of the public revenue was derived from customs and excise than was derived from these sources in the United Kingdom. The proportion in Australasia before federation was about one quarter. In Canada it is more difficult to estimate it, as customs and excise form the principal provision made for federal finance, and note must therefore be taken of the separate sources of revenue in the provinces. With these reservations it will still be seen that customs, or, in other words, a tax upon the movements of trade, forms one of the chief sources of imperial revenue.

The development of steam shipping and electricity gave to the movements of trade a stimulus no less remarkable than that given by the introduction of railroads and industrial machinery to production and manufactures. Whereas at the beginning of the 19th century the journey to Australia occupied eight months, and business communications between Sydney and London

could not receive answers within the year, at the beginning of the 20th century the journey could be accomplished in thirty-one days, and telegraphic despatches enabled the most important business to be transacted within twenty-four hours. For one cargo carried in the year at the beginning of the 19th century at least six could now be carried by the same ship, and from the point of view of trade the difference of a venture which realizes its profits in two months, as compared with one which occupied a whole year, does not need to be insisted on. The increased rapidity of the voyage and the power of daily communication by telegraph with the most distant markets have introduced a wholly new element into the national trade of the empire, and commercial intercourse between the southern and the northern hemispheres has received a development from the natural alternation of the seasons, of which until quite recent years the value was not even conceived. Fruit, eggs, butter, meat, poultry and other perishable commodities pass in daily increasing quantities between the northern and the southern hemispheres with an alternate flow which contributes to raise in no inconsiderable degree the volume of profitable trade. Thus the butter season of Australasia is from October to March, while the butter season of Ireland and northern Europe is from March to October. In three years after the introduction of ice-chambers into the steamers of the great shipping lines, Victoria and New South Wales built up a yearly butter trade of £1,000,000 with Great Britain without seriously affecting the Irish and Danish markets whence the summer supply is drawn. These facilities, combined with the enormous additions made to the public stock of land and labour, contributed to raise the volume of trade of the empire from a total of less than £100,000,000 in the year 1800 to a total of nearly £1,500,000,000 in 1900. The declared volume of British exports to all parts of the world in 1800 was £38,120,120, and the value of British imports from all parts of the world was £30,570,605; total, £68,690,725. As in those days the colonies were not allowed to trade with any other country this must be taken as representing imperial trade. The exact figures of the trade of India, the colonies, and the United Kingdom for 1900 were: imports, £809,178,209; exports, £657,899,363; total, £1,467,077,572.

Imperial defence.

A question of sovereign importance to the continued existence of the empire is the question of defence. A country of which the main thoroughfares are the oceans of the world demands in the first instance a strong navy. It has of late years been accepted as a fundamental axiom of defence that the British navy should exceed in strength any reasonable combination of foreign navies which could be brought against it, the accepted formula being the "two-power standard," *i.e.* a 10% margin over the joint strength of the two next powers. The expense of maintaining such a floating armament must be colossal, and until within the decade 1890-1900 it was borne exclusively by the taxpayers of the United Kingdom. As the benefits of united empire have become more consciously appreciated in the colonies, and the value of the fleet as an insurance for British commerce has been recognized, a desire has manifested itself on the part of the self-governing colonies to contribute towards the formation of a truly imperial navy. In 1895 the Australasian colonies voted a subsidy of £126,000 per annum for the maintenance of an Australasian squadron, and in 1897 the Cape Colony also offered a contribution of £30,000 a year to be used at the discretion of the imperial government for naval purposes. The Australian contribution was in 1902 increased to £240,000, and that of the Cape to £50,000, while Natal voted £35,000 a year and Newfoundland £3000. But apart from these comparatively slight contributions, and the local up-keep of colonial fortifications,—and the beginning in 1908-1909 of an Australian torpedo-boat flotilla provided by the Commonwealth,—the whole cost of the imperial navy, on which ultimately the security of the [v.04 p.0614] empire rested, remained to be borne by the taxpayers in the British islands. The extent of this burden was emphasized in 1909 by the revelations as to the increase of the German (and the allied Austrian) fleet. At this crisis in the history of the two-power standard a wave of enthusiasm started in the colonies, resulting in the offer of "Dreadnoughts" from New Zealand and elsewhere; and the British government called an Imperial Conference to consider the whole question afresh.

Land defence, though a secondary branch of the great question of imperial defence, has been intimately connected with the development and internal growth of the empire. In the case of the first settlement of the American colonies they were expected to provide for their own land defence. To some extent in the early part of their career they carried out this expectation, and even on occasion, as in the taking of Louisburg, which was subsequently given back at the peace of Aix-la-Chapelle as the price of the French evacuation of Madras, rendered public service to the empire at large. In India the principle of local self-defence was from the beginning carried into practice by the East India Company. But in America the claim of the French wars proved too heavy for local resources. In 1755 Great Britain intervened with troops sent from home under General Braddock, and up to the outbreak of the American War the cost of the defence of the North American colonies was borne by the imperial exchequer. To meet this expense the imperial parliament took upon itself the right to tax the American colonies. In 1765 a Quartering Act was passed by which 10,000 imperial troops were quartered in the colonies. As a result of the American War which followed and led to the loss of the colonies affected, the imperial authorities accepted the charge of the land defences of the empire, and with the exception of India and the Hudson Bay territories, where the trading companies determined to pay their own expenses, the whole cost of imperial defence was borne, like the cost of the navy, by the taxpayers of the United Kingdom. This condition of affairs lasted till the end of the Napoleonic Wars. During the thirty years' peace which followed there came time for consideration. The fiscal changes which towards the middle of the 19th century gave to the self-governing colonies the command of their own resources very naturally carried with them the consequence that a call should be made on colonial exchequers to provide for their own governing expenses. Of these defence is obviously

one of the most essential. Coincidently, therefore, with the movements of free trade at home, the renunciation of what was known as the mercantile system and the accompanying grants of constitutional freedom to the colonies, a movement for the reorganization of imperial defence was set on foot. In the decade which elapsed between 1846 and 1856 the movement as regards the colonies was confined chiefly to calls made upon them to contribute to their own defence by providing barracks, fortifications, &c., for the accommodation of imperial troops, and in some cases paying for the use of troops not strictly required for imperial purposes. In 1857 the Australian colonies agreed to pay the expenses of the imperial garrison quartered in Australia. This was a very wide step from the imperial attempt to tax the American colonies for a similar purpose in the preceding century. Nevertheless, in evidence given before a departmental committee in 1859, it was shown that at that time the colonies of Great Britain were free from almost every obligation of contributing either by personal service or money payment towards their own defence, and that the cost of military expenditure in the colonies in the preceding year had amounted in round figures to £4,000,000. A committee of the House of Commons sat in 1861 to consider the question, and in 1862 it was resolved, without a division, that "colonies exercising the right of self-government ought to undertake the main responsibility of providing for their own internal order and security, and ought to assist in their own external defence." The decision was accepted as the basis of imperial policy. The first effect was the gradual withdrawing of imperial troops from the self-governing colonies, together with the encouragement of the development of local military systems by the loan, when desired, of imperial military experts. A call was also made for larger military contributions from some of the crown colonies. The committee of 1859 had emphasized in its report the fact that the principal dependence of the colonies for defence is necessarily upon the British navy, and in 1865, exactly 100 years after the Quartering Act, which had been the cause of the troubles that led to the independence of the United States, a Colonial Naval Defence Act was passed which gave power to the colonies to provide ships of war, steamers, and volunteers for their own defence, and in case of necessity to place them at the disposal of the crown. In 1868 the Canadian Militia Act gave the fully organized nucleus of a local army to Canada. In the same year the imperial troops were withdrawn from New Zealand, leaving the colonial militia to deal with the native war still in progress. In 1870 the last imperial troops were withdrawn from Australia, and in 1873 it was officially announced that military expenditure in the colonies was almost "wholly for imperial purposes." In 1875 an imperial officer went to Australia to report for the Australian government upon Australian defence. The appointment in 1879 of a royal commission to consider the question of imperial defence, which presented its report in 1882, led to a considerable development and reorganization of the system of imperial fortifications. Coaling stations were also selected with reference to the trade routes. In 1885 rumours of war roused a very strong feeling in connexion with the still unfinished and in many cases unarmed condition of the fortifications recommended by the commission of 1879. Military activity was stimulated throughout the empire, and the Colonial Defence Committee was created to supply a much-felt need for organized direction and advice to colonial administrations acting necessarily in independence of each other. The question of colonial defence was among the most important of the subjects discussed at the colonial conference held in London in 1887, and it was at this conference that the Australasian colonies first agreed to contribute to the expense of their own naval defence. From this date the principle of local responsibility for self-defence has been fully accepted. India has its own native army, and pays for the maintenance within its frontiers of an imperial garrison. Early in the summer of 1899, when hostilities in South Africa appeared to be imminent, the governments of the principal colonies took occasion to express their approval of the South African policy pursued by the imperial government, and offers were made by the governments of India, the Australasian colonies, Canada, Hong-Kong, the Federal Malay states, some of the West African and other colonies, to send contingents for active service in the event of war. On the outbreak of hostilities these offers, on the part of the self-governing colonies, were accepted, and colonial contingents upwards of 30,000 strong were among the most efficient sections of the British fighting force. The manner in which these colonial contingents were raised, their admirable fighting qualities, and the service rendered by them in the field, disclosed altogether new possibilities of military organization within the empire, and in subsequent years the subject continued to engage the attention of the statesmen of the empire. Progress in this field lay chiefly in the increased support given in the colonial states to the separate local movements for self-defence; but in 1909 a scheme was arranged by Mr Haldane, by which the British War Office should co-operate with the colonial governments in providing for the training of officers and an interchange of views on a common military policy.

Justice, &c.

The important questions of justice, religion and instruction will be found dealt with in detail under the headings of separate sections of the empire. Systems of justice throughout the empire have a close resemblance to each other, and the judicial committee of the privy council, on which the self-governing colonies and India are represented, constitutes a supreme court of appeal (*q.v.*) for the entire empire. In the matter of religion, while no imperial organization in the strict sense is possible, the progress made by the Lambeth Conferences and otherwise (see Anglican Communion) has done much to bring the work of the Church of England in different parts of the world into a co-operative system. Religion, of which the forms are infinitely varied, is however everywhere free, except in cases where the exercise of religious rites leads to practices foreign to accepted laws of humanity. It is perhaps interesting to state that the number of persons in the empire nominally professing the Christian religion is 58,000,000, of Mahommedans 94,000,000, of Buddhists 12,000,000, of Hindus 208,000,000, of pagans and others 25,000,000. Systems of instruction, of which the aim is generally similar in the white portions of the empire and is directed towards giving to every individual the basis of a liberal education, are governed wholly by local

requirements. Native schools are established in all settled communities under British rule.

LITERATURE.—In recent years the subject of British imperialism has inspired a growing literature, and it is only possible here to name a selected number of the more important works which may usefully be consulted on different topics: Sir C.P. Lucas, *Historical Geography of the British Colonies* (1888, et seq.); H.E. Egerton, *Short History of British Colonial Policy* (1897); H.J. Mackinder, *Britain and the British Seas* (1902); Sir J.R. Seeley, *Expansion of England* (1883); *Growth of British Policy* (1895); Sir Charles Dilke, *Greater Britain* (1869), *Problems of Greater Britain* (1890), *The British Empire* (1899); G.R. Parkin, *Imperial Federation* (1892); Sir John Colomb, *Imperial Federation, Naval and Military* (1886); Sir G.S. Clarke, *Imperial Defence* (1897); Sidney Goldmann and others, *The Empire and the Century* (1905); J.L. Garvin, *Imperial Reciprocity* (1903); J.W. Welsford, *The Strength of a Nation* (1907); *Compatriots Club Essays* (1906); Sir H. Jenkyns, *British Rule and Jurisdiction beyond the Seas* (1902); Bernard Holland, *Imperium et libertas* (1901); (for an anti-imperialist view) J.A. Hobson, *Imperialism* (1902). See also the Reports of the various colonial conferences, especially that of the Imperial Conference of 1907; and for trade statistics, J. Holt Schooling's *British Trade Book*. For the tariff reform movement in England see the articles FREE TRADE and PROTECTION.

(F. L. L.)

[1] The census returns for 1901 from the various parts of the empire were condensed for the first time in 1906 into a blue-book under the title of *Census of the British Empire, Report with Summary*.

[2] The white population of British South Africa according to the census of 1904 was 1,132,226.

[3] Or "Board," as it became in 1605.

BRITISH HONDURAS, formerly called BALIZE, or BELIZE, a British crown colony in Central America; bounded on the N. and N.W. by the Mexican province of Yucatan, N.E. and E. by the Bay of Honduras, an inlet of the Caribbean Sea, and S. and W. by Guatemala. (For map, see CENTRAL AMERICA.) Pop. (1905) 40,372; area, 7562 sq. m. The frontier of British Honduras, as defined by the conventions of 1859 and 1893 between Great Britain and Guatemala, begins at the mouth of the river Sarstoon or Sarstun, in the Bay of Honduras; ascends that river as far as the rapids of Gracias à Dios; and thence, turning to the right, runs in a straight line to Garbutt's Rapids, on the Belize river. From this point it proceeds due north to the Mexican frontier, where it follows the river Hondo to its mouth in Chetumal Bay.

British Honduras differs little from the rest of the Yucatan peninsula. The approach to the coast is through the islets known as cays, and through coral reefs. It is both difficult and dangerous. For some miles inland the ground is low and swampy, thickly covered with mangroves and tropical jungle. Next succeeds a narrow belt of rich alluvial land, not exceeding a mile in width, beyond which, and parallel to the rivers, are vast tracts of sandy, arid land, called "pine ridges," from the red pines with which they are covered. Farther inland these give place, first, to the less elevated "broken ridges," and then to what are called "cahoon ridges," with a deep rich soil covered with myriads of palm trees. Next come broad savannas, studded with clumps of, trees, through which the streams descending from the mountains wind in every direction. The mountains themselves rise in a succession of ridges parallel to the coast. The first are the Manatee Hills, from 800 to 1000 ft. high; and beyond these are the Cockscomb Mountains, which are about 4000 ft. high. No less than sixteen streams, large enough to be called rivers, descend from these mountains to the sea, between the Hondo and Sarstoon. The uninhabited country between Garbutt's Rapids and the coast south of Deep river was first explored in 1879, by Henry Fowler, the colonial secretary of British Honduras; it was then found to consist of open and undulating grasslands, affording fine pasturage in the west and of forests full of valuable timber in the east. Its elevation varies from 1200 to 3300 ft. Auriferous quartz and traces of other minerals have been discovered, but not in sufficient quantity to repay the cost of mining. The geology, fauna and flora of British Honduras do not materially differ from those of the neighbouring regions (see CENTRAL AMERICA).

Although the colony is in the tropics, its climate is subtropical. The highest shade temperature recorded is 98° F., the lowest 50°. Easterly sea-winds prevail during the greater part of the year. The dry season lasts from the middle of February to the middle of May; rain occurs at intervals during the other months, and almost continuously in October, November and December. The annual rainfall averages about 81½ in., but rises in some districts to 150 in. or more. Cholera, yellow fever and other tropical diseases occur sporadically, but, on the whole, the country is not unhealthy by comparison with the West Indies or Central American states.

Inhabitants.—British Honduras is a little larger than Wales, and has a population smaller than that of Chester (England). In 1904 the inhabitants of European descent numbered 1500, the Europeans 253, and the white Americans 118. The majority belong to the hybrid race descended from negro slaves, aboriginal Indians and white settlers. At least six distinct racial groups can be traced. These consist of (1) native Indians, to be found chiefly in forest villages in the west and north of the colony away from the sea coast; (2) descendants of the English buccaneers, mixed with Scottish and German traders; (3) the woodcutting class known as "Belize Creoles," of more or less pure descent from African negroes imported, as slaves or as labourers, from the West Indies; (4) the Caribs of the southern districts, descendants of the population deported in 1796 from St Vincent, who were of mixed African and Carib origin; (5) a mixed population in the south,

of Spanish-Indian origin, from Guatemala and Honduras; and (6) in the north another Spanish-Indian group which came from Yucatan in 1848. The population tends slowly to increase; about 45% of the births are illegitimate, and males are more numerous than females. Many tracts of fallow land and forest were once thickly populated, for British Honduras has its ruined cities, and other traces of a lost Indian civilization, in common with the rest of Central America.

Natural Products.—-For more than two centuries British Honduras has been supported by its trade in timber, especially in mahogany, logwood, cedar and other dye-woods and cabinet-woods, such as lignum-vitae, fustic, bullet-wood, santa-maria, ironwood, rosewood, &c. The coloured inhabitants are unsurpassed as woodmen, and averse from agriculture; so that there are only about 90 sq. m. of tilled land. Sugar-cane, bananas, cocoanut-palms, plantains, and various other fruits are cultivated; vanilla, sarsaparilla, sapodilla or chewing-gum, rubber, and the cahoon or coyol palm, valuable for its oil, grow wild in large quantities. In September 1903 all the pine trees on crown lands were sold to Mr B. Chipley, a citizen of the United States, at one cent (½ d.) per tree; the object of the sale being to secure the opening up of undeveloped territory. Unsuccessful attempts have been made to establish sponge fisheries on a large scale.

Chief Towns and Communications.—Belize (pop. in 1904, 9969), the capital and principal seaport, is described in a separate article. Other towns are Stann Creek (2459), Corosal (1696), Orange Walk (1244), Punta Gorda (706), the Cayo (421), Monkey River (384) and Mullins River (243). All these are administered by local boards, whose aggregate revenue amounts to some £7000. Telegraph and telephone lines connect the capital with Corosal in the north, and Punta Gorda in the south; but there are no railways, and few good roads beyond municipal limits. Thus the principal means of communication are the steamers which ply along the coast. Mail steamers from New Orleans, Liverpool, Colon and Puerto Cortes in Honduras, regularly visit Belize.

Commerce and Finance.—Between 1901 and 1905 the tonnage of vessels accommodated at the ports of British Honduras rose from 300,000 to 496,465; the imports rose from £252,500 to £386,123; the exports from £285,500 to £377,623. The exports consist of the timber, fruit and other vegetable products already mentioned, besides rum, deerskins, tortoiseshell, turtles and sponges, while the principal imports are cotton goods, hardware, beer, wine, spirits, groceries and specie. The sea-borne trade is mainly shared by Great Britain and the United States. On the 14th of October 1894, the American gold dollar was adopted as the standard coin, in place of the Guatemalan dollar; and the silver of North, South and Central America ceased to be legal tender. Government notes are issued to the value of 1, 2, 5, 10, 50 and 100 dollars, and there is a local currency of one cent bronze pieces, and of 5, 10, 25 and 50 cent silver pieces. The British sovereign and half sovereign are legal tender. In 1846 the government savings bank was founded in Belize; branches were afterwards opened in the principal towns; and in 1903 the British Bank of Honduras was established at Belize. The revenue, chiefly derived from customs, rose from
[v.04 p.0616] £60,150 in 1901 to £68,335 in 1905. The expenditure, in which the cost of police and education are important items, rose, during the same period, from £51,210 to £61,800. The public debt, amounting in 1905 to £34,736, represents the balance due on three loans which were raised in 1885, 1887, and 1891, for public works in Belize. The loans are repayable between 1916 and 1923.

Constitution and Administration.—From 1638 to 1786 the colonists were completely independent, and elected their own magistrates, who performed all judicial and executive functions. The customs and precedents thus established were codified and published under the name of "Burnaby's Laws," after the visit of Admiral Sir W. Burnaby, in 1756, and were recognized as valid by the crown. In 1786 a superintendent was appointed by the home government, and although this office was vacant from 1790 to 1797, it was revived until 1862. An executive council was established in 1839, and a legislative assembly, of three nominated and eighteen elected members, in 1853. British Honduras was declared a colony in 1862, with a lieutenant governor, subject to the governor of Jamaica, as its chief magistrate. In 1870 the legislative assembly was abolished, and a legislative council substituted—the constitution of this body being fixed, in 1892, at three official and five unofficial members. In 1884 the lieutenant governor was created governor and commander-in-chief, and rendered independent of Jamaica. He is assisted by an executive council of three official and three unofficial members. For administrative purposes the colony is divided into six districts—Belize, Corosal, Orange Walk, the Cayo, Stann Creek and Toledo. The capital of the last named is Punta Gorda; the other districts take the names of their chief towns. English common law is valid throughout British Honduras, subject to modification by local enactments, and to the operation of the *Consolidated Laws of British Honduras*. This collection of ordinances, customs, &c., was officially revised and published between 1884 and 1888. Appeals may be carried before the privy council or the supreme court of Jamaica,

Religion and Education.—The churches represented are Roman Catholic, Anglican, Wesleyan, Baptist and Presbyterian; but none of them receives assistance from public funds. The bishopric of British Honduras is part of the West Indian province of the Church of England. Almost all the schools, secondary as well as primary, are denominational. School fees are charged, and grants-in-aid are made to elementary schools. Most of these, since 1894, have been under the control of a board, on which the religious bodies managing the schools are represented.

Defence.—The Belize volunteer light infantry corps, raised in 1897, consists of about 200 officers and men; a mounted section, numbering about 40, was created in 1904. For the whole colony, the police Dumber about 120. There is also a volunteer fire brigade of 335 officers and men.

History.—"His Majesty's Settlement in the Bay of Honduras," as the territory was formerly styled

in official documents, owes, its origin, in 1638, to log-wood cutters who had formerly been buccaneers. These were afterwards joined by agents of the Chartered Company which exploited the pearl fisheries of the Mosquito coast. Although thus industriously occupied, the settlers so far retained their old habits as to make frequent descents on the logwood establishments of the Spaniards, whose attempts to expel them were generally successfully resisted. The most formidable of these was made by the Spaniards in April 1754, when, in consequence of the difficulty of approaching the position from the sea, an expedition, consisting of 1500 men, was organized inland at the town of Peten. As it neared the coast, it was met by 250 British, and completely routed. The log-wood cutters were not again disturbed for a number of years, and their position had become so well established that, in the treaty of 1763 with Spain, Great Britain, while agreeing to demolish "all fortifications which English subjects had erected in the Bay of Honduras," insisted on a clause in favour of the cutters of logwood, that "they or their Workmen were not to be disturbed or molested, under any pretext whatever, in their said places of cutting and loading logwood." Strengthened by the recognition of the crown, the British settlers made fresh encroachments on Spanish territory. The Spaniards, asserting that they were engaged in smuggling and other illicit practices, organized a large force, and on the 15th of September 1779, suddenly attacked and destroyed the establishment at Belize, taking the inhabitants prisoners to Mérida in Yucatan, and afterwards to Havana, where most of them died, The survivors were liberated in 1782, and allowed to go to Jamaica. In 1783 they returned with many new adventurers, and were soon engaged in cutting woods. On the 3rd of September in that year a new treaty was signed between Great Britain and Spain, in which it was expressly agreed that his Britannic Majesty's subjects should have "the right of cutting, loading, and carrying away logwood in the district lying between the river Wallis or Belize and Rio Hondo, taking the course of these two rivers for unalterable boundaries." These concessions "were not to be considered as derogating from the rights of sovereignty of the king of Spain" over the district in question, where all the English dispersed in the Spanish territories were to concentrate themselves within eighteen months. This did not prove a satisfactory arrangement; for in 1786 a new treaty was concluded, in which the king of Spain made an additional grant of territory, embracing the area between the rivers Sibun or Jabon and Belize. But these extended limits were coupled with still more rigid restrictions. It is not to be supposed that a population composed of so lawless a set of men was remarkably exact in its observance of the treaty. They seem to have greatly annoyed their Spanish neighbours, who eagerly availed themselves of the breaking out of war between the two countries in 1796 to concert a formidable attack on Belize. They concentrated a force of 2000 men at Campeachy, which, under the command of General O'Neill, set sail in thirteen vessels for Belize, and arrived on the 10th of July, 1798. The settlers, aided by the British sloop of war "Merlin," had strongly fortified a small island in the harbour, called St George's Cay. They maintained a determined resistance against the Spanish forces, which were obliged to retire to Campeachy. This was the last attempt to dislodge the British.

The defeat of the Spanish attempt of 1798 has been adduced as an act of conquest, thereby permanently establishing British sovereignty. But those who take this view overlook the important fact that, in 1814, by a new treaty with Spain, the provisions of the earlier treaty were revived. They forget also that for many years the British government never laid claim to any rights acquired in virtue of the successful defence; for so late as 1817-1819 the acts of parliament relating to Belize always refer to it as "a settlement, for certain purposes, under the protection of His Majesty." After Central America had attained its independence (1819-1822) Great Britain secured its position by incorporating the provisions of the treaty of 1786 in a new treaty with Mexico (1826), and in the drafts of treaties with New Granada (1825) and the United States of Central America (1831). The territories between the Belize and Sarstoon rivers were claimed by the British in 1836. The subsequent peaceful progress of the country under British rule; the exception of Belize from that provision of the Clayton-Bulwer Treaty (*q.v.*) of 1850 which forbade Great Britain and the United States to fortify or colonize any point on the Central American mainland; and the settlement of the boundary disputes with Guatemala in 1859, finally confirmed the legal sovereignty of Great Britain over the whole colony, including the territories claimed in 1836. The Bay Islands were recognized as part of the republic of Honduras in 1859. Between 1849, when the Indians beyond the Hondo rose against their Mexican rulers, and 1901, when they were finally subjugated, rebel bands occasionally attacked the northern and north-western marches of the colony. The last serious raid was foiled in 1872.

Bibliography.—For all statistical matter relating to the colony, see the annual reports to the British Colonial Office (London). For the progress of exploration, see *A Narrative of a Journey across the unexplored Portion of British Honduras*, by H. Fowler (Belize, 1879); and "An Expedition to the Cockscomb Mountains," by J. Bellamy, in *Proceedings of the Royal Geographical Society*, vol. xi. (London, 1889). A good general description is given in the *Handbook of British Honduras*, by L.W. Bristowe and P.B. Wright (Edinburgh, 1892); and the local history is recounted in the *History of British Honduras*, by A.R. Gibbs (London, 1883); in *Notes on Central America*, by E.J. Squier (New York, 1855); and in *Belize or British Honduras*, a paper read before the Society of Arts by Chief Justice Temple (London, 1847).

(K. G. J.)

BRITOMARTIS ("sweet maiden"), an old Cretan goddess, later identified with Artemis. According to Callimachus (*Hymn to Diana*, 190), she was a nymph, the daughter of Zeus and Carme, and a favourite companion of Artemis. Being pursued by Minos, king of Crete, who was enamoured of her, she sprang from a rock into the sea, but was saved from drowning by falling into some fishermen's nets. She was afterwards made a goddess by Artemis under the name of

Dictynna (δίκτυον, "a net"). She was the patroness of hunters, fishermen and sailors, and also a goddess of birth and health. The centre of her worship was Cydonia, whence it extended to Sparta and Aegina (where she was known as Aphaea) and the islands of the Mediterranean. By some she is considered to have been a moon-goddess, her flight from Minos and her leap into the sea signifying the revolution and disappearance of the moon (Pausanias ii. 30, iii. 14; Antoninus Liberalis 40).

BRITON-FERRY, a seaport in the mid-parliamentary division of Glamorganshire, Wales, on the eastern bank of the estuary of the Neath river in Swansea Bay, with stations on the Great Western and the Rhondda & Swansea Bay railways, being 174 m. by rail from London. Pop. of urban district (1901) 6973. A tram-line connects it with Neath, 2 m. distant, and the Vale of Neath Canal (made in 1797) has its terminus here. The district was formerly celebrated for its scenery, but this has been considerably marred by industrial development which received its chief impetus from the construction in 1861 of a dock of 13 acres, the property of the Great Western Railway Company, and the opening up about the same time of the mining districts of Glyncorrwg and Maesteg by means of the South Wales mineral railway, which connects them with the dock and supplies it with its chief export, coal. Steel and tinplates are manufactured here on a large scale. There are also iron-works and a foundry.

The name La Brittone was given by the Norman settlers of the 12th century to its ferry across the estuary of the Neath (where Archbishop Baldwin and Giraldus crossed in 1188, and which is still used), but the Welsh name of the town from at least the 16th century has been Llansawel.

BRITTANY, or BRITANNY (Fr. *Bretagne*), known as Armorica (*q.v.*) until the influx of Celts from Britain, an ancient province and duchy of France, consisting of the north-west peninsula, and nearly corresponding to the departments of Finistère, Côtes-du-Nord, Morbihan, Ille-et-Vilaine and Lower Loire. It is popularly divided into Upper or Western, and Lower or Eastern Brittany. Its greatest length between the English Channel and the Atlantic Ocean is 250 kilometres (about 155 English miles), and its superficial extent is 30,000 sq. kilometres (about 18,630 English sq. m.). It comprises two distinct zones, a maritime zone and an inland zone. In the centre there are two plateaus, partly covered with *landes*, unproductive moorland: the southern plateau is continued by the Montagnes Noires, and the northern is dominated by the Monts d'Arrée. These ranges nowhere exceed 1150 ft. in height, but from their wild nature they recall the aspect of high mountains. The waterways of Brittany are for the most part of little value owing to their torrent-like character. The only river basin of any importance is that of the Vilaine, which flows through Rennes. The coast is very much indented, especially along the English Channel, and is rocky and lined with reefs and islets. The mouths of the rivers form deep estuaries. Thus nature itself condemned Brittany to remain for a long time shut out from civilization. But in the 19th century the development of railways and other means of communication drew Brittany from its isolation. In the 19th century also agriculture developed in a remarkable manner. Many of the *landes* were cleared and converted into excellent pasturage, and on the coast market-gardening made great progress. In the fertile districts cereals too are cultivated. Industrial pursuits, except in a few seaport towns, which are rather French than Breton, have hitherto received but little attention.

The Bretons are by nature conservative. They cling with almost equal attachment to their local customs and their religious superstitions. It was not till the 17th century that paganism was even nominally abolished in some parts, and there is probably no district in Europe where the popular Christianity has assimilated more from earlier creeds. Witchcraft and the influence of fairies are still often believed in. The costume of both sexes is very peculiar both in cut and colour, but varies considerably in different districts. Bright red, violet and blue are much used, not only by the women, but in the coats and waistcoats of the men. The reader will find full illustrations of the different styles in Bouet's *Breiz-izel, ou vie des Breions de l'Armorique* (1844). The Celtic language is still spoken in lower Brittany. Four dialects are pretty clearly marked (see the article CELT: *Language*, "*Breton*," p. 328). Nowhere has the taste for marvellous legends been kept so green as in Brittany; and an entire folk-literature still flourishes there, as is manifested by the large number of folk-tales and folk-songs which have been collected of late years.

The whole duchy was formerly divided into nine bishoprics:—Rennes, Dol, Nantes, St Malo and St Brieuc, in Upper Brittany and Tréguier, Vannes, Quimper and St Pol de Léon in Lower.

History.—Of Brittany before the coming of the Romans we have no exact knowledge. The only traces left by the primitive populations are the megalithic monuments (dolmens, menhirs and cromlechs), which remain to this day in great numbers (see STONE MONUMENTS). In 56 B.C. the Romans destroyed the fleet of the Veneti, and in 52 the inhabitants of Armorica took part in the great insurrection of the Gauls against Caesar, but were subdued finally by him in 51. Roman civilization was then established for several centuries in Brittany.

In the 5th century numbers of the Celtic inhabitants of Britain, flying from the Angles and Saxons, emigrated to Armorica, and populated a great part of the peninsula. Converted to Christianity, the new-comers founded monasteries which helped to clear the land, the greater part of which was barren and wild. The Celtic immigrants formed the counties of Vannes, Cornouaille, Léon and Domnonée. A powerful aristocracy was constituted, which owned estates and had them cultivated by serfs or villeins. The Celts sustained a long struggle against the Frankish kings, who only nominally occupied Brittany. Louis the Pious placed a native chief Nomenoë at the head of Brittany. There was then a fairly long period of peace; but Nomenoë rebelled against Charles the Bald, defeated him, and forced him, in 846, to recognize the

independence of Brittany. The end of the 9th century and the beginning of the 10th were remarkable for the invasions of the Northmen. On several occasions they were driven back—by Salomon (d. 874) and afterwards by Alain, count of Vannes (d. 907)—but it was Alain Barbetorte (d. 952) who gained the decisive victory over them.

In the second half of the 10th century and in the 11th century the counts of Rennes were predominant in Brittany. Geoffrey, son of Conan, took the title of duke of Brittany in 992. Conan II., Geoffrey's grandson, threatened by the revolts of the nobles, was attacked also by the duke of Normandy (afterwards William I. of England). Alain Fergent, one of his successors, defeated William in 1085, and forced him to make peace. But in the following century the Plantagenets succeeded in establishing themselves in Brittany. Conan IV., defeated by the revolted Breton nobles, appealed to Henry II. of England, who, in reward for his help, forced Conan to give his daughter in marriage to his son Geoffrey. Thus Henry II. became master of Brittany, and Geoffrey was recognized as duke of Brittany. But this new dynasty was not destined to last long. Geoffrey's posthumous son, Arthur, was assassinated by John of England in 1203, and Arthur's sister Alix, who succeeded to his rights, was married in 1212 to Pierre de Dreux, who became duke. This was the beginning of a ducal dynasty of French origin, which lasted till the end of the 15th century.

From that moment the ducal power gained strength in Brittany and succeeded in curbing the feudal nobles. Under French influence civilization made notable progress. For more than a century peace reigned undisturbed in Brittany. But in 1341 the death of John III., without direct heir, provoked a war of succession between the houses of Blois and Montfort, which lasted till 1364. This war of succession was, in reality, an incident of the Hundred Years' War, the partisans of Blois and Montfort supporting respectively the kings of France and England. In 1364 John of Montfort (d. 1399) was recognized as duke of Brittany under the style of John IV.[1], but his reign
[v.04 p.0618] was constantly troubled, notably by his struggle with Olivier de Clisson (1336-1407). John V. (d. 1442), on the other hand, distinguished himself by his able and pacific policy. During his reign and the reigns of his successors, Francis I., Peter II. and Arthur III., the ducal authority developed in a remarkable manner. The dukes formed a standing army, and succeeded in levying hearth taxes (*fouages*) throughout Brittany. Francis II. (1435-1488) fought against Louis XI., notably during the War of the Public Weal, and afterwards engaged in the struggle against Charles VIII., known as "The Mad War" (*La Guerre Folle*). After the death of Francis II. the king of France invaded Brittany, and forced Francis's daughter, Anne of Brittany, to marry him in 1491. Thus the reunion of Brittany and France was prepared. After the death of Charles VIII. Anne married Louis XII. Francis I., who married Claude, the daughter of Louis XII. and Anne, settled the definitive annexation of the duchy by the contract of 1532, by which the maintenance of the privileges and liberties of Brittany was guaranteed. Until the Revolution Brittany retained its own estates. The royal power, however, was exerted to reduce the privileges of the province as much as possible. It often met with vigorous resistance, notably in the 18th century. The struggle was particularly keen between 1760 and 1769, when E. A. de V. du Plessis Richelieu, duc d'Aiguillon, had to fight simultaneously the estates and the parliament, and had a formidable adversary in L. R. de C. de la Chalotais. But under the monarchy the only civil war in Brittany in which blood was shed was the revolt of the duc de Mercœur (d. 1602) against the crown at the time of the troubles of the League, a revolt which lasted from 1589 to 1598. Mention, however, must also be made of a serious popular revolt which broke out in 1675—"the revolt of the stamped paper."

See Bertrand d'Argentré, *Histoire de Bretagne* (Paris, 1586); Dom Lobineau, *Histoire de Bretagne* (Paris, 1702); Dom Morice, *Histoire de Bretagne* (1742-1756); T. A. Trollope, *A Summer in Brittany* (1840); A. du Chatellier, *L'Agriculture et les classes agricoles de la Bretagne* (1862); F. M. Luzel, *Légendes chrétiennes de la Basse-Bretagne* (Paris, 1881), and *Veillées bretonnes* (Paris, 1879); A. Dupuy, *La Réunion de la Bretagne à la France* (Paris, 1880), and *Études sur l'administration municipale en Bretagne au XVIII*e *siècle* (1891); J. Loth, *L'Émigration bretonne en Armorique du V*e *au VII*e *siècle* (Rennes, 1883); H. du Cleuziou, *Bretagne artistique et pittoresque* (Paris, 1886); Arthur de la Borderie, *Histoire de Bretagne* (Rennes, 1896 seq.); J. Lemoine, *La Révolte du papier timbré ou des bonnets rouges en Bretagne en 1675* (1898); M. Marion, *La Bretagne et le duc d'Aiguillon* (Paris, 1898); B. Pocquet, *Le Duc d'Aiguillon et la Chalotais* (Paris, 1900-1902); Anatole le Braz, *Vieilles Histoires du pays breton* (1897), and *La Légende de la mort* (Paris, 1902); Ernest Lavisse, *Histoire de France*, vol. i. (Paris, 1903); Henri Sée, *Étude sur les classes rurales en Bretagne au moyen âge* (1896), and *Les Classes rurales en Bretagne du XVI*e *siècle à la Revolution* (1906).

[1] Certain authorities count the father of this duke, another John of Montfort (d. 1345), among the dukes of Brittany, and according to this enumeration the younger John becomes John V., not John IV., and his successor John VI. and not John V.

BRITTON, JOHN (1771-1857), English antiquary, was born on the 7th of July 1771 at Kington-St-Michael, near Chippenham. His parents were in humble circumstances, and he was left an orphan at an early age. At sixteen he went to London and was apprenticed to a wine merchant. Prevented by ill-health from serving his full term, he found himself adrift in the world, without money or friends. In his fight with poverty he was put to strange shifts, becoming cellarman at a tavern and clerk to a lawyer, reciting and singing at a small theatre, and compiling a collection of common songs. After some slight successes as a writer, a Salisbury publisher commissioned him to compile an account of Wiltshire and, in conjunction with his friend Edward Wedlake Brayley, Britton produced *The Beauties of Wiltshire* (1801; 2 vols., a third added in 1825), the first of the series *The Beauties of England and Wales*, nine volumes of which Britton and his friend wrote.

Britton was the originator of a new class of literary works. "Before his time," says Digby Wyatt, "popular topography was unknown." In 1805 Britton published the first part of his *Architectural Antiquities of Great Britain* (9 vols., 1805-1814); and this was followed by *Cathedral Antiquities of England* (14 vols., 1814-1835). In 1845 a Britton Club was formed, and a sum of £1000 was subscribed and given to Britton, who was subsequently granted a civil list pension by Disraeli, then chancellor of the exchequer. Britton was an earnest advocate of the preservation of national monuments, proposing in 1837 the formation of a society such as the modern Society for the Preservation of Ancient Monuments. Britton himself supervised the reparation of Waltham Cross and Stratford-on-Avon church. He died in London on the 1st of January 1857.

Among other works with which Britton was associated either as author or editor are *Historical Account of Redcliffe Church, Bristol* (1813); *Illustrations of Fonthill Abbey* (1823); *Architectural Antiquities of Normandy*, with illustrations by Pugin (1825-1827); *Picturesque Antiquities of English Cities* (1830); and *History of the Palace and Houses of Parliament at Westminster* (1834-1836), the joint work of Britton and Brayley. He contributed much to the *Gentleman's Magazine* and other periodicals.

His *Autobiography* was published in 1850. A *Descriptive Account of his Literary Works* was published by his assistant T.E. Jones.

BRITTON, the title of the earliest summary of the law of England in the French tongue, which purports to have been written by command of King Edward I. The origin and authorship of the work have been much disputed. It has been attributed to John le Breton, bishop of Hereford, on the authority of a passage found in some MSS. of the history of Matthew of Westminster; there are difficulties, however, involved in this theory, inasmuch as the bishop of Hereford died in 1275, whereas allusions are made in *Britton* to several statutes passed after that time, and more particularly to the well-known statute *Quia emptores terrarum*, which was passed in 1290. It was the opinion of Selden that the book derived its title from Henry de Bracton, the last of the chief justiciaries, whose name is sometimes spelled in the fine Rolls "Bratton" and "Bretton", and that it was a royal abridgment of Bracton's great work on the customs and laws of England, with the addition of certain subsequent statutes. The arrangement, however, of the two works is different, and but a small proportion of Bracton's work is incorporated in *Britton*. The work is entitled in an early MS. of the 14th century, which was once in the possession of Selden, and is now in the Cambridge university library, *Summa de legibus Anglie que vocatur Bretone*; and it is described as "a book called Bretoun" in the will of Andrew Horn, the learned chamberlain of the city of London, who bequeathed it to the chamber of the Guildhall in 1329, together with another book called *Mirroir des Justices*.

Britton was first printed in London by Robert Redman, without a date, probably about the year 1530. Another edition of it was printed in 1640, corrected by E. Wingate. A third edition of it, with an English translation, was published at the University Press, Oxford, 1865, by F. M. Nichol. An English translation of the work without the Latin text had been previously published by R. Kelham in 1762.

BRITZSKA, or Britska (from the Polish *bryczka*; a diminutive of *bryka*, a goods-wagon), a form of carriage, copied in England from Austria early in the 19th century; as used in Poland and Russia it had four wheels, with a long wicker-work body constructed for reclining and a calash (hooded) top.

BRIVE, or Brives-la-Gaillarde, a town of south-central France, capital of an arrondissement in the department of Corrèze, 62 m. S.S.E. of Limoges on the main line of the Orléans railway from Paris to Montauban. Pop. (1906) town 14,954; commune 20,636. It lies on the left bank of the Corrèze in an ample and fertile plain, which is the meeting-place of important roads and railways. The *enceinte* which formerly surrounded the town has been replaced by shady boulevards, and a few wide thoroughfares have been made, but many narrow winding streets and ancient houses still remain. Outside the boulevards lie the modern quarters, also the fine promenade planted with plane trees which stretches to the Corrèze and contains the chief restaurants and the theatre. Here also is the statue of Marshal Guillaume Marie Anne Brune, who was a native of Brive. A fine bridge leads over the river to suburbs on its right bank. The public buildings are of little interest apart from the church of St Martin, which stands in the heart of the old town. It is a building of the 12th century in the Romanesque style of Limousin, with three narrow naves of almost equal height. The ecclesiastical seminary occupies a graceful mansion of the 16th century, with a façade, a staircase and fireplaces of fine Renaissance workmanship. Brive is the seat of a sub-prefect and has a tribunal of first instance, a tribunal of commerce, a communal college and a school of industry. Its position makes it a market of importance, and it has a very large trade in the early vegetables and fruit of the valley of the Corrèze, and in grain, live-stock and truffles. Table-delicacies, paper, wooden shoes, hats, wax and earthenware are manufactured, and there are slate and millstone workings and dye-works.

[v.04 p.0619]

In the vicinity are numerous rock caves, many of them having been used as dwellings in prehistoric times. The best known are those of Lamouroux, excavated in stages in a vertical wall of rock, and four grotto-chapels resorted to by pilgrims in memory of St Anthony of Padua, who founded a Franciscan monastery at Brive in 1226. Under the Romans Brive was known as *Briva Curretiae* (bridge of the Corrèze). In the middle ages it was the capital of lower Limousin.

BRIXEN (Ital. *Bressanone*), a small city in the Austrian province of Tirol, and the chief town of the administrative district of Brixen. Pop. (1900) 5767. It is situated in the valley of the Eisack, at

the confluence of that stream with the Rienz, and is a station on the Brenner railway, being 34 m. south-east of that pass, and 24 m. north-east of Botzen. The aspect of the city is very ecclesiastical; it is still the see of a bishop, and contains an 18th-century cathedral church, an episcopal palace and seminary, twelve churches and five monasteries. The see was founded at the end of the 8th century (possibly of the 6th century) at Säben on the rocky heights above the town of Klausen (some way to the south of Brixen), but in 992 was transferred to Brixen, which, perhaps a Roman station, became later a royal estate, under the name of *Prichsna*, and in 901 was given by Louis the Child to the bishop. In 1027 the bishop received from the emperor Conrad II. very extensive temporal powers, which he only lost to Austria in 1803. The town was surrounded in 1030 by walls. In 1525 it was the scene of the first outbreak of the great peasants' revolt. About 5½ m. north of Brixen is the great fortress of Franzensfeste, built 1833-1838, to guard the route over the Brenner and the way to the east up the Pusterthal.

(W. A. B. C.)

BRIXHAM, a seaport and market town in the Torquay parliamentary division of Devonshire, England, 33 m. S. of Exeter, on a branch of the Great Western railway. Pop. of urban district (1901) 8092. The town is irregularly built on the cliffs to the south of Torbay, and its harbour is sheltered by a breakwater. Early in the 19th century it was an important military post, with fortified barracks on Berry Head. It is the headquarters of the Devonshire sea-fisheries, having also a large coasting trade. Shipbuilding and the manufacture of ropes, paint and sails are industries. There is excellent bathing, and Brixham is in favour as a seaside resort. St Mary's, the ancient parish church, has an elaborate 14th-century font and some monuments of interest. At the British Seamen's Orphans' home boys are fed, clothed and trained as apprentices for the merchant service. A statue commemorates the landing, in 1688, of William of Orange.

Brixham Cave, called also Windmill Hill Cavern, is a well-known ossiferous cave situated near Brixham, on the brow of a hill composed of Devonian limestone. It was discovered by chance in 1858, having been until then hermetically sealed by a mass of limestone breccia. Dr Hugh Falconer with the assistance of a committee of geologists excavated it. The succession of beds in descending order is as follows:—(1) Shingle consisting of pebbles of limestone, slate and other local rocks, with fragments of stalagmite and containing a few bones and worked flints. The thickness varies from five to sixteen feet. (2) Red cave earth with angular fragments of limestone, bones and worked flints, and having a thickness of 3 to 4 ft. (3) Remnants (*in situ*) of an old stalagmitic floor about nine inches thick. (4) Black peaty soil varying in thickness, the maximum being about a foot. (5) Angular debris fallen from above varying in thickness from one to ten feet. (6) Stalagmite with a few bones and antlers of reindeer, the thickness varying from one to fifteen inches. Of particular interest is the presence of patches or ledges of an old stalagmitic floor, three to four feet above the present floor. On the under-side, there are found attached fragments of limestone and quartz, showing that the shingle bed once extended up to it, and that it then formed the original floor. The shingle therefore stood some feet higher than it does now, and it is supposed that a shock or jar, such as that of an earthquake, broke up the stalagmite, and the pebbles and sand composing the shingle sunk deeper into the fissures in the limestone. This addition to the size of the cave was partially filled up by the cave earth. At a later period the fall of angular fragments at the entrance finally closed the cave, and it ceased to be accessible except to a few burrowing animals, whose remains are found above the second and newer stalagmite floor.

The fauna of Brixham cavern closely resembles that of Kent's Hole. The bones of the bear, horse, rhinoceros, lion, elephant, hyena and of many birds and small rodents were unearthed. Altogether 1621 bones, nearly all broken and gnawed, were found; of these 691 belonged to birds and small rodents of more recent times. The implements are of a roughly-chipped type resembling those of the Mousterian period. From these structural and palaeontological evidences, geologists suppose that the formation of the cave was carried on simultaneously with the excavation of the valley; that the small streams, flowing down the upper ramifications of the valley, entered the western opening of the cave, and traversing the fissures in the limestone, escaped by the lower openings in the chief valley; and that the rounded pebbles found in the shingle bed were carried in by these streams. It would be only at times of drought that the cave was frequented by animals, a theory which explains the small quantity of animal remains in the shingle. The implements of man are relatively more common, seventeen chipped flints having been found. As the excavation of the valley proceeded, the level of the stream was lowered and its course diverted; the cave consequently became drier and was far more frequently inhabited by predatory animals. It was now essentially an animal den, the occasional visits of man being indicated by the rare occurrence of flint-implements. Finally, the cave became a resort of bears; the remains of 334 specimens, in all stages of growth, including even sucking cubs, being discovered.

See Sir Joseph Prestwich, *Geology* (1888); Sir John Evans, *Ancient Stone Implements of Great Britain*, p. 512; Report on the Cave, *Phil. Trans.* (Royal Society, 1873).

BRIXTON, a district in the south of London, England, included in the metropolitan borough of Lambeth (*q.v.*).

BRIZEUX, JULIEN AUGUSTE PÉLAGE (1803-1858), French poet, was born at Lorient (Morbihan) on the 12th of September 1803. He belonged to a family of Irish origin, long settled in Brittany, and was educated for the law, but in 1827 he produced at the Théâtre Français a one-act verse comedy, *Racine*, in collaboration with Philippe Busoni. A journey to Italy in company

with Auguste Barbier made a great impression on him, and a second visit (1834) resulted in 1841 in the publication of a complete translation of the *Divina Commedia* in *terza rima*. With *Primel el Nola* (1852) he included poems written under Italian influence, entitled *Les Ternaires* (1841), but in the rustic idyl of *Marie* (1836) turned to Breton country life; in *Les Bretons* (1845) he found his inspiration in the folklore and legends of his native province, and in *Telen-Aroor* (1844) he used the Breton dialect. His *Histoires poétiques* (1855) was crowned by the French Academy. His work is small in bulk, but is characterized by simplicity and sincerity. Brizeux was an ardent student of the philology and archaeology of Brittany, and had collected materials for a dictionary of Breton place-names He died at Montpellier on the 3rd of May 1858.

His *Œuvres complètes* (2 vols., 1860) were edited with a notice of the author by Saint-René Taillandier. Another edition appeared in 1880-1884 (4 vols.). A long list of articles on his work may be consulted in an exhaustive monograph, *Brizeux; sa vie et ses œuvres* (1898), by the abbé C. Lecigne.

BRIZO, an ancient goddess worshipped in Delos. She delivered oracles in dreams to those who consulted her about fishery and seafaring. The women of Delos offered her presents consisting of
[v.04 p.0620] little boats filled with all kinds of eatables (with the exception of fish) in order to obtain her protection for those engaged on the sea (Athenaeus viii. p. 335).

BROACH, or BHARUCH, an ancient city and modern district of British India, in the northern division of Bombay. The city is on the right bank of the Nerbudda, about 30 m. from the sea, and 203 m. N. of Bombay. The area, including suburbs, occupies 2-1/6 sq. m. Pop. (1901) 42,896. The sea-borne trade is confined to a few coasting vessels. Handloom-weaving is almost extinct, but several cotton mills have been opened. There are also large flour-mills. Broach is the Barakacheva of the Chinese traveller Hsüan Tsang and the Barygaza of Ptolemy and Arrian. Upon the conquest of Gujarat by the Mahommedans, and the formation of the state of that name, Broach formed part of the new kingdom. On its overthrow by Akbar in 1572, it was annexed to the Mogul empire and governed by a Nawab. The Mahrattas became its masters in 1685, from which period it was held in subordination to the peshwa until 1772, when it was captured by a force under General Wedderburn (brother to Lord Loughborough), who was killed in the assault. In 1783 it was ceded by the British to Sindhia in acknowledgment of certain services. It was stormed in 1803 by a detachment commanded by Colonel Woodington, and was finally ceded to the East India Company by Sindhia under the treaty of Sarji Anjangaom.

The DISTRICT OF BROACH contains an area of 1467 sq. m. Consisting chiefly of the alluvial plain at the mouth of the river Nerbudda, the land is rich and highly cultivated, and though it is without forests it is not wanting in trees. The district is well supplied with rivers, having in addition to the Nerbudda the Mahi in the north and the Kim in the south. The population comprises several distinct races or castes, who, while speaking a common dialect, Gujarati, inhabit separate villages. Thus there are Koli, Kunbi or Voro (Bora) villages, and others whose lands are almost entirely held and cultivated by high castes, such as Rajputs, Brahmans or Parsees. In 1901 the population was 291,763, showing a decrease of 15%, compared with an increase of 5% in the preceding decade. The principal crops are cotton, millet, wheat and pulse. Dealing in cotton is the chief industry, the dealers being organized in a gild. Besides the cotton mills in Broach city there are several factories for ginning and pressing cotton, some of them on a very large scale. The district is traversed throughout its length by the Bombay & Baroda railway, which crosses the Nerbudda opposite Broach city on an iron-girder bridge of 67 spans. The district suffered severely from the famine of 1899-1900.

BROACH (Fr. *broche*, a pointed instrument, Med. Lat. *brocca*, cf. the Latin adjective *brochus* or *broccus*, projecting, used of teeth), a word, of which the doublet "brooch" (*q.v.*) has a special meaning, for many forms of pointed instruments, such as a bodkin, a wooden needle used in tapestry-making, a spit for roasting meat, and a tool, also called a "rimer," used with a wrench for enlarging or smoothing holes (see TOOL). From the use of a similar instrument to tap casks, comes "to broach" or "tap" a cask. A particular use in architecture is that of "broach-spire," a term employed to designate a particular form of spire, found only in England, which takes its name from the stone roof of the lower portion. The stone spire being octagonal and the tower square on plan, there remained four angles to be covered over. This was done with a stone roof of slight pitch, compared with that of the spire, and it is the intersection of this roof with the octagonal faces of the spire which forms the broach.

BROADSIDE, sometimes termed BROADSHEET, a single sheet of paper containing printed matter on one side only. The broadside seems to have been employed from the very beginning of printing for royal proclamations, papal indulgences and similar documents. England appears to have been its chief home, where it was used chiefly for ballads, particularly in the 16th century, but also as a means of political agitation and for personal statements of all kinds, especially for the dissemination of the dying speeches and confessions of criminals. It is prominent in the history of literature because, particularly during the later part of the 17th century, several important poems, by Dryden, Butler and others, originally appeared printed on the "broad side" of a sheet. The term is also used of the simultaneous discharge of the guns on one side of a ship of war.

BROADSTAIRS, a watering-place, in the Isle of Thanet parliamentary division of Kent, England, 3 m. S.E. of Margate, on the South-Eastern & Chatham railway. Pop. of urban district, Broadstairs and St Peter's (1901) 6466. From 1837 to 1851 Broadstairs was a favourite summer resort of Charles Dickens, who, in a sketch called "Our English Watering-Place," described it as a

place "left high and dry by the tide of years." This seaside village, with its "semicircular sweep of houses," grew into a considerable town owing to the influx of summer visitors, for whose entertainment there are, besides the "Albion" mentioned by Dickens, numerous hotels and boarding-houses, libraries, a bathing establishment and a fine promenade. Dickens' residence was called Fort House, but it became known as Bleak House, through association with his novel of that name, though this was written after his last visit to Broadstairs in 1851. Broadstairs has a small pier for fishing-boats, first built in the reign of Henry VIII. An archway leading down to the shore bears an inscription showing that it was erected by George Culmer in 1540, and not far off is the site of a chapel of the Virgin, to which ships were accustomed to lower their top-sails as they passed. St Peter's parish, lying on the landward side of Broadstairs, and included in the urban district, has a church dating from the 12th to the end of the 16th century. Kingsgate, on the North Foreland, north of Broadstairs on the coast, changed its name from St Bartholomew's Gate in honour of Charles II.'s landing here with the duke of York in 1683 on his way from London to Dover. Stonehouse, close by, now a preparatory school for boys, was the residence of Archbishop Tait, whose wife established the orphanage here.

BROCA, PAUL (1824-1880), French surgeon and anthropologist, was born at Sainte-Foy la Grande, Gironde, on the 28th of June 1824. He early developed a taste for higher mathematics, but circumstances decided him in adopting medicine as his profession. Beginning his studies at Paris in 1841, he made rapid progress, becoming house-surgeon in 1844, assistant anatomical lecturer in 1846, and three years later professor of surgical anatomy. He had already gained a reputation by his pathological researches. In 1853 he was named fellow of the Faculty of Medicine, and in 1867 became member of the Academy of Medicine and professor of surgical pathology to the Faculty. During the years occupied in winning his way to the head of his profession he had published treatises of much value on cancer, aneurism and other subjects. It was in 1861 that he announced his discovery of the seat of articulate speech in the left side of the frontal region of the brain, since known as the convolution of Broca. But famous as he was as a surgeon, his name is associated most closely with the modern school of anthropology. Establishing the Anthropological Society of Paris in 1859, of which he was secretary till his death, he was practically the inventor of the modern science of craniology. He rendered distinguished service in the Franco-German War, and during the Commune by his organization and administration of the public hospitals. He founded *La Revue d'Anthropologie* in 1872, and it was in its pages that the larger portion of his writings appeared. In his last years Broca turned from his labours in the region of craniology to the exclusive study of the brain, in which his greatest triumphs were achieved (see APHASIA). He was decorated with the Legion of Honour in 1868, and was honorary fellow of the leading anatomical, biological and anthropological societies of the world. He died on the 9th of July 1880. A statue of him by Choppin was erected in 1887 in front of the Faculty of Medicine in Paris.

BROCADE, the name usually given to a class of richly decorative shuttle-woven fabrics, often made in coloured silks and with or without gold and silver threads. Ornamental features in brocade are emphasized and wrought as additions to the main fabric, sometimes stiffening it, though more frequently producing on its face the effect of low relief. These additions present a
[v.04 p.0621] distinctive appearance on the back of the stuff where the weft or floating threads of the brocaded or broached parts hang in loose groups or are clipped away.

FIG. 1.—Brocade woven in red and olive green silks and gold thread on a cream-coloured ground. Along the top is the Kufic inscription "Arrahmān" (The Merciful) several times repeated in olive green on a gold-thread ground. Pairs of seated animals, *addorsed regardant* and geese *vis-à-vis* are worked within the lozenge-shaped compartments of the trellis framework which regulates the pattern. Both animals and birds are separated by conventional trees, and the latter are enclosed in inscriptions of Kufic characters. *Siculo-Saracenic*; 11th or 12th century. 5½ in. sq.

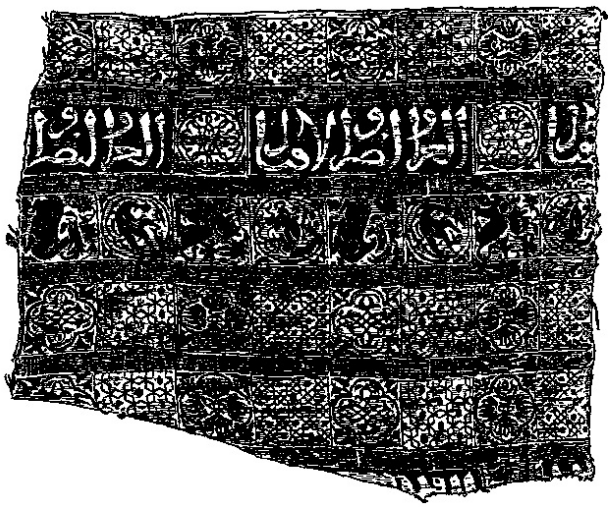


FIG. 2.—Part of a Siculo-Saracenic brocade woven in the 12th century. l6½ in. wide.

The Latin word *broccus* is related equally to the Italian *brocato*, the Spanish *brocar* and the French *brocarts* and *brocher*, and implies a form of stitching or broaching, so that textile fabrics woven with an appearance of stitching or broaching have consequently come to be termed "brocades." A Spanish document dated 1375 distinguishes between *los draps d'or é d'argent o de seda* and *brocats d'or é d'argent*, a difference which is readily perceived, upon comparing for instance cloths of gold, Indian kincobs, with Lyons silks that are *brochés* with threads of gold, silk or other material. Notwithstanding this, many Indian kincobs and dainty gold and coloured silk-weavings of Persian workmanship, both without floating threads, are often called brocades, although in neither is the ornamentation really *broché* or brocaded. Contemporary in use with the Spanish *brocats* is the word *brocado*. In addition to *brocarts* the French now use the word *brocher* in connexion with certain silk stuffs which however are not brocades in the same sense as the *brocarts*. A wardrobe account of King Edward IV. (1480) has an entry of "satyn broched with gold"—a description that fairly applies to such an enriched satin as that for instance shown in fig. 4. But some three centuries earlier than the date of that specimen, decorative stuffs were partly *brochés* with gold threads by oriental weavers, especially those of Persia, Syria and parts of southern Europe and northern Africa under the domination of the Saracens, to whom the earlier germs, so to speak, of brocading may be traced. Of such is the 11th or 12th century Siculo-Saracenic specimen in fig. 1, in which the heads only of the pairs of animals and birds are broched with gold thread. Another sort of brocaded material is indicated in fig. 2, taken from a part of a sumptuous Siculo-Saracenic weaving produced in coloured silks and gold threads at the famous Hotel des Tiraz in Palermo for an official robe of Henry IV. (1165-1197) as emperor of the Holy Roman Empire, and still preserved in the cathedral of Regensburg. Fig. 3 is a further variety of textile that would be classed as *brocat*. This is of the 12th or 13th century manufacture, possibly by German or Rhenish-Byzantine weavers, or even by Spanish weavers, many of whom at Almeria, Malaga, Grenada and Seville rivalled those at Palermo. In the 14th century the making of satins heavily brocaded with gold threads was associated conspicuously with such Italian towns as Lucca, Genoa, Venice and Florence. Fig. 4 is from a piece of 14th-century dark-blue satin broached in relief with gold thread in a design the like of which appears in the background of Orcagna's "Coronation of the Virgin," now in the National Gallery, London. During the 17th century Genoa, Florence and Lyons vied with each other in making brocades in which the enrichments were as frequently of coloured silks as of gold intermixed with silken threads. Fig. 5 is from a piece of crimson silk damask flatly brocaded with flowers, scroll forms, fruit and birds in gold. This is probably of Florentine workmanship. Rather more closely allied to modern brocades is the Lyons specimen given in fig. 6, in which the brocading is done not only with silver but also with coloured silks. Early in the 18th century Spitalfields was busy as a competitor with Lyons in manufacturing many sorts of brocades, specified in a collection of designs preserved in the national art library of the Victoria and Albert Museum, under such trade titles as "brocade lutstring, brocade tabby, brocade tissue, brocade damask, brocade satin, Venetian brocade, and India figured brocade." Brocading in China seems to be of considerable antiquity, and Dr Bushell in his valuable handbook on Chinese art cites a notice of five rolls of brocade with dragons woven upon a crimson ground, presented by the emperor Ming Ti of the Wei dynasty, in the year A.D. 238, to the reigning empress of Japan; and varieties of brocade patterns are recorded as being in use during the Sung dynasty (960-1279). The first edition of an illustrated work upon tillage and weaving was published in China in 1210, and contains an engraving of a loom constructed to weave flowered-silk brocades such as are woven at the present time at Suchow and Hangchow and elsewhere. On the other hand, although they are described usually as brocades, certain specimens of imperial Chinese robes sumptuous in ornament, sheen of coloured silks and the glisten of golden threads, are woven in the tapestry-weaving manner and without any floating threads. It seems reasonable to infer that Persians and Syrians derived the art of weaving brocades from the Chinese, and as has been indicated, passed it on to Saracens as well as Europeans.

FIG. 3.—Piece of stuff woven or brocaded with red silk and gold thread, with an ogival framing enclosing alternately, pairs of parrots, *addorsed regardant*, and a well-known Persian (or Sassanian) leaf-shaped fruit device. Probably of Rhenish-Byzantine manufacture in the 12th or 13th century. 9 in. long.

[v.04 p.0622]

(A. S. C.)

FIG. 4.—Piece of blue satin brocaded with gold threads. The unit of the pattern is a symmetrical arrangement of fantastic birds, vine leaves and curving stems. The bird shapes are remotely related to, if not derived from, the Chinese mystical "fonghoang." North Italian weaving of the 14th century; about 11 in. square.

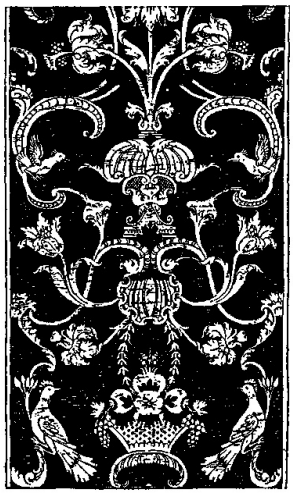


FIG. 5.—Piece of crimson silk damask brocaded in gold thread with symmetrically arranged flowers, scrolls, birds, &c. Italian (?Florentine). Late 17th century; about 2 ft. 6 in. long.

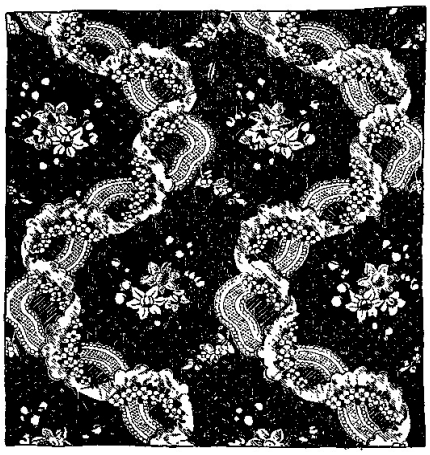


FIG. 6.—Piece of pink silk brocaded in silver and white and coloured silks. French middle 18th century; about 15 in. square.

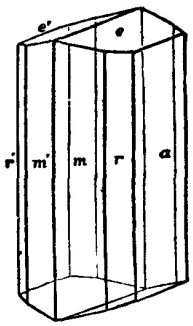
BROCCHI, GIOVANNI BATTISTA (1772-1826), Italian mineralogist and geologist, was born at Bassano on the 18th of February 1772. He studied at the university of Pisa, where his attention was turned to mineralogy and botany. In 1802 he was appointed professor of botany in the new lyceum of Brescia; but he more especially devoted himself to geological researches in the adjacent districts. The fruits of these labours appeared in different publications, particularly in his *Trattato mineralogico e chemico sulle miniere di ferro del dipartimento del Mella* (1808)—treatise on the iron mines of Mella. These researches procured him the office of inspector of mines in the recently established kingdom of Italy, and enabled him to extend his investigations over great part of the country. In 1811 he produced a valuable essay entitled *Memoria mineralogica sulla Valle di Fassa in Tirolo*; but his most important work is the *Conchiologia fossile subapennina con osservazioni geologiche sugli Apennini, e sul suolo adiacente* (2 vols., 4to, Milan, 1814), containing accurate details of the structure of the Apennine range, and an account of the fossils of the Italian Tertiary strata compared with existing species. These subjects were further illustrated by his geognostic map, and his *Catalogo ragionato di una raccolta di rocce, disposto con ordine geografico, per servire alla geognosia dell' Italia* (Milan, 1817). His work *Dello stato fisico del suolo di Roma* (1820), with its accompanying map, is likewise noteworthy. In it he corrected the erroneous views of Breislak, who conceived that Rome occupies the site of a volcano, to which he ascribed the volcanic materials that cover the seven hills. Brocchi pointed out that these materials were derived either from Mont Albano, an extinct volcano, 12 m. from the city, or from Mont Cimini, still farther to the north. Several papers by him, on mineralogical subjects, appeared in the *Biblioteca Italiana* from 1816 to 1823. In the latter year Brocchi sailed for Egypt, in order to explore the geology of that country and report on its mineral resources. Every facility was granted by Mehemet Ali, who in 1823 appointed him one of a commission to examine the district of Sennaar; but Brocchi, unfortunately for science, fell a victim to the climate, and died at Khartum on the 25th of September 1826.

[v.04 p.0623]

BROCHANT DE VILLIERS, ANDRÉ JEAN FRANÇOIS MARIE (1772-1840), French mineralogist and geologist, was born at Villiers, near Nantes, on the 6th of August 1772. After studying at the École Polytechnique, he was in 1794 the first pupil admitted to the École des Mines. In 1804 he was appointed professor of geology and mineralogy in the École des Mines, which had been temporarily transferred to Pezay in Savoy, and he returned with the school to Paris in 1815. Later on he became inspector general of mines and a member of the Academy of Sciences. He investigated the transition strata of the Tarantaise, wrote on the position of the granite rocks of Mont Blanc, and on the lead minerals of Derbyshire and Cumberland. He was charged with the superintendence of the construction of the geological map of France, undertaken by his pupils Dufrénoy and Elie de Beaumont. He died in Paris on the 16th of May 1840. His publications include *Traité élémentaire de minéralogie* (2 vols., 1801-1802; 2nd ed., 1808), and *Traité abrégé de cristallographie* (Paris, 1818).

BROCHANTITE, a mineral species consisting of a basic copper sulphate $Cu_4(OH)_6SO_4$, crystallizing in the orthorhombic system. The crystals are usually small and are prismatic or acicular in habit; they have a perfect cleavage parallel to the face lettered a in the adjoining figure. They are transparent to translucent, with a vitreous lustre, and are of an emerald-green to blackish-green colour. Specific gravity 3.907; hardness 3½-4. The mineral was first found associated with malachite and native copper in the copper mines of the Urals, and was named by A. Lévy in 1824 after A.J.M. Brochant de Villiers. Several varieties, differing somewhat in crystalline form, have been distinguished, some of them having originally been described as distinct species, but afterwards proved to be essentially identical with brochantite; these are königine from the Urals, brongniartine from Mexico, krisuvigite from Iceland, and warringtonite

from Cornwall. Of other localities, mention may be made of Roughten Gill, Caldbeck Fells, Cumberland, where small brilliant crystals are associated with malachite and chrysocolla in a quartzose rock; Rézbánya in the Bihar Mountains, Hungary; Atacama in Chile, with atacamite, which closely resembles brochantite in general appearance; the Tintic district in Utah. A microscopical examination of the green copper ores of secondary origin in the Clifton and Morenci district of Arizona proves brochantite to be of extremely common occurrence mostly intergrown with malachite which effectually masks its presence: it is not unlikely that the malachite of other localities will on examination be found to be intergrown with brochantite.



Mention may be here made of another orthorhombic basic copper sulphate not unlike brochantite in general characters, but differing from it in containing water of crystallization and in its fine blue colour; this is the Cornish mineral langite, which has the composition $CuSO_4 \cdot 3Cu(OH)_2 + H_2O$.

(L. J. S.)

BROCK, SIR ISAAC (1769-1812), British soldier and administrator, was born at St Peter Port, Guernsey, on the 6th of October 1769. Joining the army at the age of fifteen as an ensign of the 8th regiment, he became a lieutenant-colonel in 1797, after less than thirteen years' service. He commanded the 49th regiment in the expedition to North Holland in 1799, was wounded at the battle of Egmont-op-Zee, and subsequently served on board the British fleet at the battle of Copenhagen. From 1802 to 1805 he was with his regiment in Canada, returning thither in 1806 in view of the imminence of war between Great Britain and the United States. From September 1806 till August 1810 he was in charge of the garrison at Quebec; in the latter year he assumed the command of the troops in Upper Canada, and soon afterwards took over the civil administration of that province as provisional lieutenant-governor. On the outbreak of the war of 1812 Brock had to defend Upper Canada against invasion by the United States. In the face of many difficulties and not a little disaffection, he organized the militia of the province, drove back the invaders, and on the 16th of August 1812, with about 730 men and 600 Indians commanded by their chief Tecumseh, compelled the American force of 2500 men under General William Hull (1753-1825) to surrender at Detroit, an achievement which gained him a knighthood of the Bath and the popular title of "the hero of Upper Canada" From Detroit he hurried to the Niagara frontier, but on the 13th of October in the same year was killed at the battle of Queenston Heights. The House of Commons voted a public monument to his memory, which was erected in Saint Paul's cathedral, London. On the 13th of October 1824, the twelfth anniversary of his death, his remains were removed from the bastions of Fort George, where they had been originally interred, and placed beneath a monument on Queenston Heights, erected by the provincial legislature. This was blown up by a fanatic in 1840, but as the result of a mass-meeting of over 8000 citizens held on the spot, a new and more stately monument was erected.

His *Life and Correspondence* by his nephew, Ferdinand Brock Tupper (2nd edition, London, 1847), still remains the best; later lives are by D.R. Read (Toronto, 1894), and by Lady Edgar (Toronto and London,1905).

(W. L. G.)

BROCK, THOMAS (1847-), English sculptor, was the chief pupil of Foley, and later became influenced by the new romantic movement. His group "The Moment of Peril" was followed by "The Genius of Poetry," "Eve," and other ideal works that mark his development. His busts, such as those of Lord Leighton and Queen Victoria; his statues, such as "Sir Richard Owen" and "Dr Philpott, bishop of Worcester"; his sepulchral monuments, such as that to Lord Leighton in St Paul's cathedral, a work of singular significance, refinement and beauty; and his memorial statues of Queen Victoria, at Hove and elsewhere, are examples of his power as a portraitist, sympathetic in feeling, sound and restrained in execution, and dignified and decorative in arrangement. The colossal equestrian statue of "Edward the Black Prince" was set up in the City Square in Leeds in 1901, the year in which the sculptor was awarded the commission to execute the vast Imperial Memorial to Queen Victoria in front of Buckingham Palace. Brock was elected an associate of the Royal Academy in 1883 and full member in 1891.

BROCKEN, a mountain of Germany, in Prussian Saxony, the highest point (3733 ft.) of the Harz. It is a huge, bare, granite-strewn, dome-shaped mass and, owing to its being the greatest elevation in north Germany, commands magnificent views in all directions. From it Magdeburg and the Elbe, the towers of Leipzig and the Thuringian forest are distinctly visible in clear weather. Access to the summit is attained by a mountain railway (12 m.) from Dreiannen-Hohne, a station on the normal gauge line Wernigerode-Nordhausen, and by two carriage roads from the Bodetal and Ilsenburg respectively. In the folklore of north Germany the Brocken holds an important place, and to it cling many legends. Long after Christianity had penetrated to these regions, the Brocken remained a place of heathen worship. Annually, on Walpurgis night (1st of May), curious rites were here enacted, which, condemned by the priests of the Christian church, led to the belief that the devil and witches here held their orgies. Even to this day, this superstition possesses the minds of many country people around, who believe the mountain to be haunted on this night. In literature it is represented by the famous "Brocken scene" in Goethe's *Faust*.

[v.04 p.0624]

See Jacobs, *Der Brocken in Geschichte und Sage* (Halle, 1878); and Pröhle, *Brockensagen*

(Magdeburg, 1888).

BROCKEN, SPECTRE OF THE (so named from having been first observed in 1780 on the Brocken), an enormously magnified shadow of an observer cast upon a bank of cloud when the sun is low in high mountain regions, reproducing every motion of the observer in the form of a gigantic but misty image of himself.

BROCKES, BARTHOLD HEINRICH (1680-1747), German poet, was born at Hamburg on the 22nd of September 1680. He studied jurisprudence at Halle, and after extensive travels in Italy, France and Holland, settled in his native town in 1704. In 1720 he was appointed a member of the Hamburg senate, and entrusted with several important offices. Six years (from 1735 to 1741) he spent as *Amtmann* (magistrate) at Ritzebtütel. He died in Hamburg on the 16th of January 1747. Brockes' poetic works were published in a series of nine volumes under the fantastic title *Irdisches Vergnügen in Gott* (1721-1748); he also translated Marini's *La Strage degli innocenti* (1715), Pope's *Essay on Man* (1740) and Thomson's *Seasons* (1745). His poetry has small intrinsic value, but it is symptomatic of the change which came over German literature at the beginning of the 18th century. He was one of the first German poets to substitute for the bombastic imitations of Marini, to which he himself had begun by contributing, a clear and simple diction. He was also a pioneer in directing the attention of his countrymen to the new poetry of nature which originated in England. His verses, artificial and crude as they often are, express a reverential attitude towards nature and a religious interpretation of natural phenomena which was new to German poetry and prepared the way for Klopstock.

Brockes' autobiography was published by J.M. Lappenberg in the *Zeitschrift des Vereins für Hamburger Geschichte,* ii. pp. 167 ff. (1847). See also A. Brandl, *B. H. Brockes* (1878), and D.F. Strauss, *Brockes und H.S. Reimarus* (*Gesammelte Schriften*, ii.). A short selection of his poetry will be found in vol. 39 (1883) of Kürschner's *Deutsche Nationalliteratur*.

BROCKHAUS, FRIEDRICH ARNOLD (1772-1823), German publisher, was born at Dortmund, on the 4th of May 1772. He was educated at the gymnasium of his native place, and from 1788 to 1793 served an apprenticeship in a mercantile house at Düsseldorf. He then devoted two years at Leipzig to the study of modern languages and literature, after which he set up at Dortmund an emporium for English goods. In 1801 he transferred this business to Arnheim, and in the following year to Amsterdam. In 1805, having given up his first line of trade, he began business as a publisher. Two journals projected by him were not allowed by the government to survive for any length of time, and in 1810 the complications in the affairs of Holland induced him to return homewards. In 1811 he settled at Altenburg. About three years previously he had purchased the copyright of the *Konversations-Lexikon*, started in 1796, and in 1810-1811 he completed the first edition of this celebrated work (14th ed. 1901-4). A second edition under his own editorship was begun in 1812, and was received with universal favour. His business extended rapidly, and in 1818 Brockhaus removed to Leipzig, where he established a large printing-house. Among the more extensive of his many literary undertakings were the critical periodicals—*Hermes*, the *Literarisches Konversationsblatt* (afterwards the *Blätter für literarische Unterhaltung*), and the *Zeitgenossen*, and some large historical and bibliographical works, such as Raumer's *Geschichte der Hohenstaufen*, and Ebert's *Allgemeines bibliographisches Lexikon*. F.A. Brockhaus died at Leipzig on the 20th of August 1823. The business was carried on by his sons, Friedrich Brockhaus (1800-1865) who retired in 1850, and Heinrich Brockhaus (1804-1874), under whom it was considerably extended. The latter especially rendered great services to literature and science, which the university of Jena recognized by making him, in 1858, honorary doctor of philosophy. In the years 1842-1848, Heinrich Brockhaus was member of the Saxon second chamber, as representative for Leipzig, was made honorary citizen of that city in 1872, and died there on the 15th of November 1874.

See H. E. Brockhaus, *Friedrich A. Brockhaus, sein Leben und Wirken nach Briefen und andern Aufzeichnungen* (3 vols., Leipzig, 1872-1881); also by the same author, *Die Firma F. A. Brockhaus von der Begrundung bis zum hundertjahrigen Jubilaum* (1805-1905, Leipzig, 1905).

Another of Friedrich's sons, HERMANN BROCKHAUS (1806-1877), German Orientalist, was born at Amsterdam on the 28th of January 1806. While his two brothers carried on the business he devoted himself to an academic career. He was appointed extraordinary professor in Jena in 1838, and in 1841 received a call in a similar capacity to Leipzig, where in 1848 he was made ordinary professor of ancient Semitic. He died at Leipzig on the 5th of January 1877. Brockhaus was an Oriental scholar in the old sense of the word, devoting his attention, not to one language only, but to acquiring a familiarity with the principal languages and literature of the East. He studied Hebrew, Arabic and Persian, and was able to lecture on Sanskrit, afterwards his specialty, Pali, Zend and even on Chinese. His most important work was the *editio princeps* of the *Katha-sarit-sagara*, "The Ocean of the Streams of Story," the large collection of Sanskrit stories made by Soma Deva in the 12th century. By this publication he gave the first impetus to a really scientific study of the origin and spreading of popular tales, and enabled Prof. Benfey and others to trace the great bulk of Eastern and Western stories to an Indian, and more especially to a Buddhistic source. Among Prof. Brockhaus's other publications were his edition of the curious philosophical play *Prabodhachandrodaya*, "The Rise of the Moon of Intelligence," his critical edition of the "Songs of Hafiz," and his publication in Latin letters of the text of the "Zend-Avesta."

BROCKLESBY, RICHARD (1722-1797), English physician, was born at Minehead, Somersetshire, on the 11th of August 1722. He was educated at Ballitore, in Ireland, where

Edmund Burke was one of his schoolfellows, studied medicine at Edinburgh, and finally graduated at Leiden in 1745. Appointed physician to the army in 1758, he served in Germany during part of the Seven Years' War, and on his return settled down to practise in London. In 1764 he published *Economical and Medical Observations*, which contained suggestions for improving the hygiene of army hospitals. In his latter years he withdrew altogether into private life. The circle of his friends included some of the most distinguished literary men of the age. He was warmly attached to Dr Johnson, to whom about 1784 he offered an annuity of £100 for life, and whom he attended on his death-bed, while in 1788 he presented Burke, of whom he was an intimate friend, with £1000, and offered to repeat the gift "every year until your merit is rewarded as it ought to be at court." He died on the 11th of December 1797, leaving his house and part of his fortune to his grand-nephew, Dr Thomas Young.

BROCKTON, a city of Plymouth county, Massachusetts, U.S.A., about 20 m. S. of Boston, and containing an area of 21 sq. m. of rolling surface. Pop. (1870) 8007; (1880)13,608; (1890) 27,294; (1900) 40,063, of whom 9484 were foreign-born, including 2667 Irish, 2199 English Canadians and 1973 Swedes; (1910, census) 56,878. It is served by the New York, New Haven & Hartford railway. Brockton has a public library, with 54,000 volumes, in 1908. By popular vote, beginning in 1886 (except in 1898), the liquor traffic was prohibited annually. The death-rate, 13.18 in 1907, is very low for a manufacturing city of its size. Brockton is the industrial centre of a large population surrounding it (East and West Bridgewater, North Easton, Avon, Randolph, Holbrook and Whitman), and is an important manufacturing place. Both in 1900 and in 1905 it ranked first among the cities of the United States in the manufacture of boots and shoes. The city's total factory product in 1900 was valued at $24,855,362, and in 1905 at $37,790,982, an increase during the five years of 52%. The boot and shoe product in 1905 was valued at $30,073,014 [v.04 p.0625] (9.4% of the value of the total boot and shoe product of the United States), the boot and shoe cut stock at $1,344,977, and the boot and shoe findings at $2,435,137—the three combined representing 89.6% of the city's total manufactured product. In 1908 there were 35 shoe factories, including the W.L. Douglas, the Ralston, the Walkover, the Eaton, the Keith and the Packard establishments, and, in 1905, 14,000,000 (in 1907 about 17,000,000) pairs of shoes were produced in the city. Among the other products are lasts, blacking, paper and wooden packing boxes, nails and spikes, and shoe fittings and tools. The assessed valuation of the city rose from $6,876,427 in 1881 to $37,408,332 in 1907. Brockton was a part of Bridgewater until 1821, when it was incorporated as the township of North Bridgewater. Its present name was adopted in 1874, and it was chartered as a city in 1881. Brockton was the first city in Massachusetts to abolish all grade crossings (1896) within its limits.

BROCKVILLE, a town and port of entry of Ontario, Canada, and capital of Leeds county, named after General Sir Isaac Brock, situated 119 m. S.W. of Montreal, on the left bank of the St Lawrence, and on the Grand Trunk, and Brockville & Westport railways. A branch line connects it with the Canadian Pacific. It has steamer communication with the St Lawrence and Lake Ontario ports, and is a summer resort. The principal manufactures are hardware, furnaces, agricultural implements, carriages and chemicals. It is the centre of one of the chief dairy districts of Canada, and ships large quantities of cheese and butter. Pop. (1881) 7609; (1901) 8940.

BROD, a town of Croatia-Slavonia, in the county of Pozega, on the left bank of the river Save, 124 m. by rail S.E. by E. of Agram. Pop. (1900) 7310. The principal Bosnian railway here crosses the river, to meet the Hungarian system. Brod has thus a considerable transit trade, especially in cereals, wine, spirits, prunes and wood. It is sometimes called Slavonisch-Brod, to distinguish it from Bosna-Brod, or Bosnisch-Brod, across the river. The town owes its name to a ford (Servian *brod*) of the Save, and dates at least from the 15th century. Brod was frequently captured and recaptured in the wars between Turkey and Austria; and it was here that the Austrian army mustered, in 1879, for the occupation of Bosnia.

BRODERIP, WILLIAM JOHN (1789-1859), English naturalist, was born in Bristol on the 21st of November 1789. After graduating at Oxford he was called to the bar in 1817, and for some years was engaged in law-reporting. In 1822 he was appointed a metropolitan police magistrate, and filled that office until 1856, first at the Thames police court and then at Westminster. His leisure was devoted to natural history, and his writings did much to further the study of zoology in England. The zoological articles in the *Penny Cyclopaedia* were written by him, and a series of articles contributed to *Fraser's Magazine* were reprinted in 1848 as *Zoological Recreations*, and were followed in 1852 by *Leaves from the Note-book of a Naturalist*. He was one of the founders of the Zoological Society of London, and a large collection of shells which he formed was ultimately bought by the British Museum. He died in London on the 27th of February 1859.

BRODHEAD, JOHN ROMEYN (1814-1873), American historical scholar, was born in Philadelphia, Pennsylvania, on the 2nd of January 1814, the son of Jacob Brodhead (1782-1855), a prominent clergyman of the Dutch Reformed Church. He graduated at Rutgers College in 1831, and in 1835 was admitted to the bar in New York City. After 1837, however, he devoted himself principally to the study of American colonial history, and in order to have access to the records of the early Dutch settlements in America he obtained in 1839 an appointment as attaché of the American legation at the Hague. His investigations here soon proved that the Dutch archives were rich in material on the early history of New York, and led the state legislature to appropriate funds for the systematic gathering from various European archives of transcripts of documents relating to New York. Brodhead was appointed (1841) by Governor William H. Seward to undertake the work, and within several years gathered from England, France and Holland some eighty manuscript volumes of transcriptions, largely of documents which had not hitherto

been used by historians. These transcriptions were subsequently edited by Edward O'Callaghan (vols. i.-xi. incl.) and by Berthold Fernow (vols. xii.-xv., incl.), and published by the state under the title *Documents relating to the Colonial History of New York* (15 vols., 1853-1883). From 1846 to 1849, while George Bancroft was minister to Great Britain, Brodhead held under him the post of secretary of legation. In 1853-1857 he was naval officer of the port of New York. He published several addresses and a scholarly *History of the State of New York* (2 vols., 1853-1871), generally considered the best for the brief period covered (1609-1690). He died in New York City on the 6th of May 1873.

BRODIE, SIR BENJAMIN COLLINS, 1st Bart. (1783-1862), English physiologist and surgeon, was born in 1783 at Winterslow, Wiltshire. He received his early education from his father; then choosing medicine as his profession he went to London in 1801, and attended the lectures of John Abernethy. Two years later he became a pupil of Sir Everard Home at St George's hospital, and in 1808 was appointed assistant surgeon at that institution, on the staff of which he served for over thirty years. In 1810 he was elected a fellow of the Royal Society, to which in the next four or five years he contributed several papers describing original investigations in physiology. At this period also he rapidly obtained a large and lucrative practice, and from time to time he wrote on surgical questions, contributing numerous papers to the Medical and Chirurgical Society, and to the medical journals. Probably his most important work is that entitled *Pathological and Surgical Observations on the Diseases of the Joints*, in which he attempts to trace the beginnings of disease in the different tissues that form a joint, and to give an exact value to the symptom of pain as evidence of organic disease. This volume led to the adoption by surgeons of measures of a conservative nature in the treatment of diseases of the joints, with consequent reduction in the number of amputations and the saving of many limbs and lives. He also wrote on diseases of the urinary organs, and on local nervous affections of a surgical character. In 1854 he published anonymously a volume of *Psychological Inquiries*; to a second volume which appeared in 1862 his name was attached. He received many honours during his career. He attended George IV., was sergeant-surgeon to William IV. and Queen Victoria, and was made a baronet in 1834. He became a corresponding member of the French Institute in 1844, D.C.L. of Oxford in 1855, and president of the Royal Society in 1858, and he was the first president of the general medical council. He died at Broome Park, Surrey, on the 21st of October 1862. His collected works, with autobiography, were published in 1865 under the editorship of Charles Hawkins.

His eldest son, Sir Benjamin Collins Brodie, 2nd Bart. (1817-1880), was appointed professor of chemistry at Oxford in 1865, and is chiefly known for his investigations on the allotropic states of carbon and for his discovery of graphitic acid.

BRODIE, PETER BELLINGER (1815-1897), English geologist, son of P.B. Brodie, barrister, and nephew of Sir Benjamin C. Brodie, was born in London in 1815. While still residing with his father at Lincoln's Inn Fields, he gained some knowledge of natural history and an interest in fossils from visits to the museum of the Royal College of Surgeons, at a time when W. Clift was curator. Through the influence of Clift he was elected a fellow of the Geological Society early in 1834. Proceeding afterwards to Emmanuel College, Cambridge, he came under the spell of Sedgwick, and henceforth devoted all his leisure time to geology. Entering the church in 1838, he was curate at Wylye in Wiltshire, and for a short time at Steeple Claydon in Buckinghamshire, becoming later rector of Down Hatherley in Gloucestershire, and finally (1855) vicar of Rowington in Warwickshire, and rural dean. Records of geological observations in all these districts were published by him. At Cambridge he obtained fossil shells from the Pleistocene deposit at Barn well; in the Vale of Wardour he discovered in Purbeck Beds the isopod named by Milne-Edwards *Archaeoniscus Brodiei*; in Buckinghamshire he described the outliers of Purbeck
[v.04 p.0626] and Portland Beds; and in the Vale of Gloucester the Lias and Oolites claimed his attention. Fossil insects, however, formed the subject of his special studies (*History of the Fossil Insects of the Secondary Rocks of England*, 1845), and many of his published papers relate to them. He was an active member of the Cotteswold Naturalists' Club and of the Warwickshire Natural History and Archaeological Society, and in 1854 he was chief founder of the Warwickshire Naturalists' and Archaeologists' Field Club. In 1887 the Murchison medal was awarded to him by the Geological Society of London. He died at Rowington, on the 1st of November 1897.

See Memoir by H. B. Woodward in *Geological Magazine*, 1897, p. 481 (with portrait).

BRODY, a town of Austria, in Galicia, 62 m. E. of Lemberg by rail. Pop. (1900) 17,360, of which about two-thirds are Jews. It is situated near the Russian frontier, and has been one of the most important commercial centres in Galicia, especially for the trade with Russia. But since 1879, when its charter as a free commercial city was withdrawn, its trade has also greatly diminished. Brody was created a town in 1684, and was raised to the rank of a free commercial city in 1779.

BROEKHUIZEN, JAN VAN [Janus Broukhusius], (1649-1707), Dutch classical scholar and poet, was born on the 20th of November 1649, at Amsterdam. Having lost his father when very young, he was placed with an apothecary, with whom he lived several years. Not liking this employment, he entered the army, and in 1674 was sent with his regiment to America, in the fleet under Admiral de Ruyter, but returned to Holland the same year. In 1678 he was sent to the garrison at Utrecht, where he contracted a friendship with the celebrated Graevius; here he had the misfortune to be so deeply implicated in a duel that, according to the laws of Holland, his life was forfeited. Graevius, however, wrote immediately to Nicholas Heinsius, who obtained his pardon. Not long afterwards he became a captain of one of the companies then at Amsterdam. After the peace of Ryswick, 1697, his company was disbanded, and he retired on a pension to a country house near Amsterdam and pursued his classical and literary studies at leisure. His Dutch poems,

in which he followed the model of Pieter Hooft, were first published in 1677; a later edition, with a biography by D. van Hoogstraten, appeared in 1712, the last edition, 1883, was edited by R.A. Kollewijn. His classical reputation rests on his editions of Propertius (1702) and Tibullus (1707). His Latin poems (*Carmina*) appeared in 1684; a later edition(*Poemata*) by D. van Hoogstraten appeared in 1711. The *Select Letters* (*Jani Browkhusii Epistolae Selectae*, 1889 and 1893) were edited by J.A. Worp, who also wrote his biography, 1891. Broekhuizen died on the 15th of December 1707.

BRÖGGER, WALDEMAR CHRISTOFER (1851-), Norwegian geologist, was born in Christiania on the 10th of November 1851, and educated in that city. In 1876 he was appointed curator of the geological museum in his native city, and assistant on the Geological Survey. He was professor of mineralogy and geology from 1881 to 1890 in the university of Stockholm, and from 1890 in the university of Christiania. He also became rector and president of the senate of the royal university of Christiania. His observations on the igneous rocks of south Tirol compared with those of Christiania afford much information on the relations of the granitic and basic rocks. The subject of the differentiation of rock-types in the process of solidification as plutonic or volcanic rocks from a particular magma received much attention from him. He dealt also with the Palaeozoic rocks of Norway, and with the late glacial and post-glacial changes of level in the Christiania region. The honorary degree of Ph.D. was conferred upon him by the university of Heidelberg and that of LL.D. by the university of Glasgow. The Murchison medal of the Geological Society of London was awarded to him in 1891.

BROGLIE, DE, the name of a noble French family which, originally Piedmontese, emigrated to France in the year 1643. The head of the family, François Marie (1611-1656), then took the title of comte de Broglie. He had already distinguished himself as a soldier, and died, as a lieutenant-general, at the siege of Valenza on the 2nd of July 1656. His son, Victor Maurice, Comte de Broglie (1647-1727), served under Condé, Turenne and other great commanders of the age of Louis XIV., becoming *maréchal de camp* in 1676, lieutenant-general in 1688, and finally marshal of France in 1724.

The eldest son of Victor Marie, François Marie, afterwards Duc de Broglie (1671-1745), entered the army at an early age, and had a varied career of active service before he was made, at the age of twenty-three, lieutenant-colonel of the king's regiment of cavalry. He served continuously in the War of the Spanish Succession and was present at Malplaquet. He was made lieutenant-general in 1710, and served with Villars in the last campaign of the war and at the battle of Denain. During the peace he continued in military employment, and in 1719 he was made director-general of cavalry and dragoons. He was also employed in diplomatic missions, and was ambassador in England in 1724. The war in Italy called him into the field again in 1733, and in the following year he was made marshal of France. In the campaign of 1734 he was one of the chief commanders on the French side, and he fought the battles of Parma and Guastalla. A famous episode was his narrow personal escape when his quarters on the Secchia were raided by the enemy on the night of the 14th of September 1734. In 1735 he directed a war of positions with credit, but he was soon replaced by Marshal de Noailles. He was governor-general of Alsace when Frederick the Great paid a secret visit to Strassburg (1740). In 1742 de Broglie was appointed to command the French army in Germany, but such powers as he had possessed were failing him, and he had always been the "man of small means," safe and cautious, but lacking in elasticity and daring. The only success obtained was in the action of Sahay (25th May 1742), for which he was made a duke. He returned to France in 1743, and died two years later.

His son, Victor François, Duc de Broglie (1718-1804), served with his father at Parma and Guastalla, and in 1734 obtained a colonelcy. In the German War he took part in the storming of Prague in 1742, and was made a brigadier. In 1744 and 1745 he saw further service on the Rhine, and in 1756 he was made *maréchal de camp*. He subsequently served with Marshal Saxe in the low countries, and was present at Roucoux, Val and Maastricht. At the end of the war he was made a lieutenant-general. During the Seven Years' War he served successively under d'Estrées, Soubise and Contades, being present at all the battles from Hastenbeck onwards. His victory over Prince Ferdinand at Bergen (1759) won him the rank of marshal of France from his own sovereign and that of prince of the empire from the emperor Francis I. In 1760 he won an action at Corbach, but was defeated at Vellinghausen in 1761. After the war he fell into disgrace and was not recalled to active employment until 1778, when he was given command of the troops designed to operate against England. He played a prominent part in the Revolution, which he opposed with determination. After his emigration, de Broglie commanded the "army of the princes" for a short time (1792). He died at Münster in 1804.

Another son of the first duke, Charles François, Comte de Broglie (1719-1781), served for some years in the army, and afterwards became one of the foremost diplomatists in the service of Louis XV. He is chiefly remembered in connexion with the *Secret du Roi*, the private, as distinct from the official, diplomatic service of Louis, of which he was the ablest and most important member. The son of Victor François, Victor Claude, Prince de Broglie (1757-1794), served in the army, attaining the rank of *maréchal de camp*. He adopted revolutionary opinions, served with Lafayette and Rochambeau in America, was a member of the Jacobin Club, and sat in the Constituent Assembly, constantly voting on the Liberal side. He served as chief of the staff to the Republican army on the Rhine; but in the Terror he was denounced, arrested and executed at Paris on the 27th of June 1794. His dying admonition to his little son was to remain faithful to the principles of the Revolution, however unjust and ungrateful.

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Achille Charles Léonce Victor, Duc de Broglie (1785-1870), statesman and diplomatist, son of the

last-named, was born at Paris on the 28th of November 1785. His mother had shared her husband's imprisonment, but managed to escape to Switzerland, where she remained till the fall of Robespierre. She now returned to Paris with her children and lived there quietly until 1796, when she married a M. d'Argenson, grandson of Louis XV.'s minister of war. Under the care of his step-father young de Broglie received a careful and liberal education and made his entrée into the aristocratic and literary society of Paris under the Empire. In 1809, he was appointed a member of the council of state, over which Napoleon presided in person; and was sent by the emperor on diplomatic missions, as attaché, to various countries. Though he had never been in sympathy with the principles of the Empire, de Broglie was not one of those who rejoiced at its downfall. In common with all men of experience and sense he realized the danger to France of the rise to power of the forces of violent reaction. With Decazes and Richelieu he saw that the only hope for a calm future lay in "the reconciliation of the Restoration with the Revolution." By the influence of his uncle, Prince Amédée de Broglie, his right to a peerage had been recognized; and to his own great surprise he received, in June 1814, a summons from Louis XVIII. to the Chamber of Peers. There, after the Hundred Days, he distinguished himself by his courageous defence of Marshal Ney, for whose acquittal he, alone of all the peers, both spoke and voted. After this defiant act of opposition it was perhaps fortunate that his impending marriage gave him an excuse for leaving the country. On the 15th of February 1816, he was married at Leghorn to the daughter of Madame de Staël. He returned to Paris at the end of the year, but took no part in politics until the elections of September 1817 broke the power of the "ultra-royalists" and substituted for the *Chambre introuvable* a moderate assembly. De Broglie's political attitude during the years that followed is best summed up in his own words: "From 1812 to 1822 all the efforts of men of sense and character were directed to reconciling the Restoration and the Revolution, the old régime and the new France. From 1822 to 1827 all their efforts were directed to resisting the growing power of the counter-revolution. From 1827 to 1830 all their efforts aimed at moderating and regulating the reaction in a contrary sense." During the last critical years of Charles X.'s reign, de Broglie identified himself with the *doctrinaires*, among whom Royer-Collard and Guizot were the most prominent. The July revolution placed him in a difficult position; he knew nothing of the intrigues which placed Louis Philippe on the throne; but, the revolution once accomplished, he was ready to uphold the *fait accompli* with characteristic loyalty, and on the 9th of August took office in the new government as minister of public worship and education. As he had foreseen, the ministry was short-lived, and on the 2nd of November he was once more out of office. During the critical time that followed he consistently supported the principles which triumphed with the fall of Laffitte and the accession to power of Casimir Périer in March 1832. After the death of the latter and the insurrection of June 1832, de Broglie took office once more as minister for foreign affairs (October 11th). His tenure of the foreign office was coincident with a very critical period in international relations. But for the sympathy of Great Britain under Palmerston, the July monarchy would have been completely isolated in Europe; and this sympathy the aggressive policy of France in Belgium and on the Mediterranean coast of Africa had been in danger of alienating. The Belgian crisis had been settled, so far as the two powers were concerned, before de Broglie took office; but the concerted military and naval action for the coercion of the Dutch, which led to the French occupation of Antwerp, was carried out under his auspices. The good understanding of which this was the symbol characterized also the relations of de Broglie and Palmerston during the crisis of the first war of Mehemet Ali (*q.v.*) with the Porte, and in the affairs of the Spanish peninsula their common sympathy with constitutional liberty led to an agreement for common action, which took shape in the treaty of alliance between Great Britain, France, Spain and Portugal, signed at London on the 22nd of April 1834. De Broglie had retired from office in the March preceding, and did not return to power till March of the following year, when he became head of the cabinet. In 1836, the government having been defeated on a proposal to reduce the five per cents, he once more resigned, and never returned to official life. He had remained in power long enough to prove what honesty of purpose, experience of affairs, and common sense can accomplish when allied with authority. The debt that France and Europe owed him may be measured by comparing the results of his policy with that of his successors under not dissimilar circumstances. He had found France isolated and Europe full of the rumours of war; he left her strong in the English alliance and the respect of Liberal Europe, and Europe freed from the restless apprehensions which were to be stirred into life again by the attitude of Thiers in the Eastern Question and of Guizot in the affair of the "Spanish marriages." From 1836 to 1848 de Broglie held almost completely aloof from politics, to which his scholarly temperament little inclined him, a disinclination strengthened by the death of his wife on the 22nd of September 1838. His friendship for Guizot, however, induced him to accept a temporary mission in 1845, and in 1847 to go as French ambassador to London. The revolution of 1848 was a great blow to him, for he realized that it meant the final ruin of the Liberal monarchy—in his view the political system best suited to France. He took his seat, however, in the republican National Assembly and in the Convention of 1848, and, as a member of the section known as the "Burgraves," did his best to stem the tide of socialism and to avert the reaction in favour of autocracy which he foresaw. He shared with his colleagues the indignity of the *coup d'état* of the 2nd of December 1851, and remained for the remainder of his life one of the bitterest enemies of the imperial regime, though he was heard to remark, with that caustic wit for which he was famous, that the empire was "the government which the poorer classes in France desired and the rich deserved." The last twenty years of his life were devoted chiefly to philosophical and literary pursuits. Having been brought up by his step-father in the sceptical opinions of the time, he gradually arrived at a sincere belief in the Christian religion. "I shall die," said he, "a penitent Christian and an impenitent Liberal." His literary works, though few of them have been published, were rewarded in 1856 by a seat in the French Academy, and he was also a member of another branch of the French Institute, the

Academy of Moral and Political Science. In the labours of those learned bodies he took an active and assiduous part. He died on the 25th of January 1870.

Besides his *Souvenirs*, in 4 vols. (Paris, 1885-1888), the duc de Broglie left numerous works, of which only some have been published. Of these may be mentioned *Écrits et discours* (3 vols., Paris, 1863); *Le Libre Échange et l'impôt* (Paris, 1879); *Vues sur le gouvernement de la France* (Paris, 1861). This last was confiscated before publication by the imperial government. See Guizot, *Le Duc de Broglie* (Paris, 1870), and *Mémoires* (Paris, 1858-1867); and the histories of Thureau-Dangin and Duvergier de Hauranne.

JACQUES VICTOR ALBERT, DUC DE BROGLIE (1821-1901), his eldest son, was born at Paris on the 13th of June 1821. After a brief diplomatic career at Madrid and Rome, the revolution of 1848 caused him to withdraw from public life and devote himself to literature. He had already published a translation of the religious system of Leibnitz (1846). He now at once made his mark by his contributions to the *Revue des deux Mondes* and the Orleanist and clerical organ *Le Correspondant*, which were afterwards collected under the titles of *Études morales et littéraires* (1853) and *Questions de religion et d'histoire* (1860). These were supplemented in 1869 by a volume of *Nouvelles études de littérature et de morale*. His *L'Église et l'empire romain au IVe siècle* (1856-1866) brought him the succession to Lacordaire's seat in the Academy in 1862. In 1870 he succeeded his father in the dukedom, having previously been known as the prince de
[v.04 p.0628] Broglie. In the following year he was elected to the National Assembly for the department of the Eure, and a few days later (on the 19th of February) was appointed ambassador in London; but in March 1872, in consequence of criticisms upon his negotiations concerning the commercial treaties between England and France, he resigned his post and took his seat in the National Assembly, where he became the leading spirit of the monarchical campaign against Thiers. On the replacement of the latter by Marshal MacMahon, the duc de Broglie became president of the council and minister for foreign affairs (May 1873), but in the reconstruction of the ministry on the 26th of November, after the passing of the septennate, transferred himself to the ministry of the interior. His tenure of office was marked by an extreme conservatism, which roused the bitter hatred of the Republicans, while he alienated the Legitimist party by his friendly relations with the Bonapartists, and the Bonapartists by an attempt to effect a compromise between the rival claimants to the monarchy. The result was the fall of the cabinet on the 16th of May 1874. Three years later (on the 16th of May 1877) he was entrusted with the formation of a new cabinet, with the object of appealing to the country and securing a new chamber more favourable to the reactionaries than its predecessor had been. The result, however, was a decisive Republican majority. The duc de Broglie was defeated in his own district, and resigned office on the 20th of November. Not being re-elected in 1885, he abandoned politics and reverted to his historical work, publishing a series of historical studies and biographies written in a most pleasing style, and especially valuable for their extensive documentation. He died in Paris on the 19th of January 1901.

Besides editing the *Souvenirs* of his father (1886, &c.), the *Mémoires* of Talleyrand (1891, &c.), and the *Letters* of the Duchess Albertine de Broglie (1896), he published *Le Secret du roi, Correspondance secrète de Louis XV avec ses agents diplomatiques, 1752-1774* (1878); *Frédéric II et Marie Thérèse* (1883); *Frédéric II et Louis XV* (1885); *Marie Thérèse Impératrice* (1888); *Le Père Lacordaire* (1889); *Maurice de Saxe et le marquis d'Argenson* (1891); *La Paix d'Aix-la-Chapelle* (1892); *L'Alliance autrichienne* (1895); *La Mission de M. de Gontaut-Biron à Berlin* (1896); *Voltaire avant et pendant la Guerre de Sept Ans* (1898); *Saint Ambroise*, translated by Margaret Maitland in the series of "The Saints" (1899).

BROGUE, (1) A rough shoe of raw leather (from the Gael. *brog*, a shoe) worn in the wilder parts of Ireland and the Scottish Highlands. (2) A dialectical accent or pronunciation (of uncertain origin), especially used of the Irish accent in speaking English.

BROHAN, AUGUSTINE SUSANNE (1807-1887), French actress, was born in Paris on the 22nd of January 1807. She entered the Conservatoire at the age of eleven, and took the second prize for comedy in 1820, and the first in 1821. She served her apprenticeship in the provinces, making her first Paris appearance at the Odéon in 1832 as Dorine in *Tartuffe*. Her success there and elsewhere brought her a summons to the Comédie Française, where she made her *début* on the 15th of February 1834, as Madelon in *Les Précieuses ridicules*, and Suzanne in *Le Mariage de Figaro*. She retired in 1842, and died on the 16th of August 1887.

Her elder daughter, JOSEPHINE FÉLICITÉ AUGUSTINE BROHAN (1824-1893), was admitted to the Conservatoire when very young, twice taking the second prize for comedy. The soubrette part, entrusted for more than 150 years at the Comédie Française to a succession of artists of the first rank, was at the moment without a representative, and Mdlle Augustine Brohan made her *début* there on the 19th of May 1841, as Dorine in *Tartuffe*, and Lise in *Rivaux d'eux-mêmes*. She was immediately admitted *pensionnaire*, and at the end of eighteen months unanimously elected *sociétaire*. She soon became a great favourite, not only in the plays of Molière and de Regnard, but also in those of Marivaux. On her retirement from the stage in 1866, she made an unhappy marriage with Edmond David de Gheest (d. 1885), secretary to the Belgian legation in Paris.

Susanne Brohan's second daughter, ÉMILIE MADELEINE BROHAN (1833-1900), also took first prize for comedy at the Conservatoire (1850). She was engaged at once by the Comédie Française, but instead of making her *début* in some play of the *répertoire* of the theatre, the management put on for her benefit a new comedy by Scribe and Legouvé, *Les Contes de la reine de Navarre*, in which she created the part of Marguerite on the 1st of September 1850. Her talents and beauty made

her a success from the first, and in less than two years from her *début* she was elected *sociétaire*. In 1853 she married Mario Uchard, from whom she was soon separated, and in 1858 she returned to the Comédie Française in leading parts, until her retirement in 1886. Her name is associated with a great number of plays, besides those in the classical *répertoire*, notably *Le Monde où l'on s'ennuie*, *Par droit de conquête*, *Les Deux Veuves*, and *Le Lion amoureux*, in which, as the "marquise de Maupas", she had one of her greatest successes.

BROKE, or BROOKE, **ARTHUR** (d. 1563), English author, wrote the first English version of the story of Romeo and Juliet. *The Tragicall Historye of Romeus and Julieit* (1562) is a rhymed account of the story, taken, not directly from Bandello's collection of novels (1554), but from the French translation (*Histoires tragiques*) of Pierre Boaistuau or Boisteau, surnamed Launay, and François de Belleforest. Broke adds some detail to the story as told by Boisteau. As the poem contains many scenes which are not known to exist elsewhere, but which were adopted by Shakespeare in *Romeo and Juliet*, there is no reasonable doubt that it may be regarded as the main source of the play. Broke perished by shipwreck in 1563, on his way from Newhaven to join the English troops fighting on the Huguenot side in France.

The genesis of the Juliet story, and a close comparison of Shakespeare's play with Broke's version, are to be found in a reprint of the poem and of William Paynter's prose translation from the *Palace of Pleasure*, edited by Mr P. A. Daniel for the New Shakespere Society (1875).

BROKE, SIR PHILIP BOWES VERE, BART. (1776-1841), British rear-admiral, was born at Broke Hall, near Ipswich, on the 9th of September 1776, a member of an old Suffolk family. Entering the navy in June 1792, he saw active service in the Mediterranean from 1793 to 1795, and was with the British fleet at the battle of Cape St Vincent, 1797. In 1798 he was present at the defeat and capture of the French squadron off the north coast of Ireland. From 1799 to 1801 he served with the North Sea fleet, and in the latter year was made captain. Unemployed for the next four years, he commanded in 1805 a frigate in the English and Irish Channels. In 1806 he was appointed to the command of the "Shannon", 38-gun frigate, remaining afloat, principally in the Bay of Biscay, till 1811. The "Shannon" was then ordered to Halifax, Nova Scotia. For a year after the declaration of war between Great Britain and the United States in 1812, the frigate saw no important service, though she captured several prizes. Broke utilized this period of comparative inactivity to train his men thoroughly. He paid particular attention to gunnery, and the "Shannon" ere long gained a unique reputation for excellence of shooting. Broke's opportunity came in 1813. In May of that year the "Shannon" was cruising off Boston, watching the "Chesapeake", an American frigate of the same nominal force but heavier armament. On the 1st of June Broke, finding his water supply getting low, wrote to Lawrence, the commander of the "Chesapeake", asking for a meeting between the two ships, stating the "Shannon's" force, and guaranteeing that no other British ship should take part in the engagement. Before this letter could be delivered, however, the "Chesapeake", under full sail, ran out of Boston harbour, crowds of pleasure-boats accompanying her to witness the engagement. Broke briefly addressed his men. "Don't cheer," he concluded, "go quietly to your quarters. I feel sure you will all do your duty." As the "Chesapeake" rounded to on the "Shannon's" weather quarter, at a distance of about fifty yards, the British frigate received her with a broadside. A hundred of the "Chesapeake's" crew were struck down at once, Lawrence himself being mortally wounded. A second broadside, equally well-aimed, increased the confusion, and, her tiller-ropes being shot away, the American frigate drifted foul of the "Shannon". Broke sprang on board with some sixty of his men following
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him. After a brief struggle the fight was over. Within fifteen minutes of the firing of the first shot, the "Chesapeake" struck her flag, but Broke himself was seriously wounded. For his services he was rewarded with a baronetcy, and subsequently was made a K.C.B. His exploit captivated the public fancy, and his popular title of "Brave Broke" gives the standard by which his action was judged. Its true significance, however, lies deeper. Broke's victory was due not so much to courage as to forethought. "The 'Shannon,'" said Admiral Jurien de La Gravière, "captured the 'Chesapeake' on the 1st of June 1813; but on the 14th of September 1806, when he took command of his frigate, Captain Broke had begun to prepare the glorious termination to this bloody affair." Broke's wound incapacitated him from further service, and for the rest of his life caused him serious suffering. He died in London on the 2nd of January 1841.

BROKEN HILL, a silver-mining town of Yancowinna county, New South Wales, Australia, 925 m. directly W. by N. of Sydney, and connected with Adelaide by rail. Pop. (1901) 27,518. One of the neighbouring mines, the Proprietary, is the richest in the world; gold is associated with the silver; large quantities of lead, good copper lodes, zinc and tin are also found. The problem of the profitable treatment of the sulphide ores has been practically solved here. In addition Broken Hill is the centre of one of the largest pastoral districts in Australia. The town is the seat of the Roman Catholic bishop of Wilcannia.

BROKER (according to the *New English Dictionary*, from Lat. *brocca*, spit, spike, *broccare*, to "broach"—another Eng. form of the same word; hence O. Fr. *vendre à broche*, to retail, e.g. wine, from the tap, and thus the general sense of dealing; see also for a discussion of the etymology and early history of the use of the word, J.R. Dos Passos, *Law of Stockbrokers*, chap. i., New York, 1905). In the primary sense of the word, a broker is a mercantile agent, of the class known as general agents, whose office is to bring together intending buyers and sellers and make a contract between them, for a remuneration called brokerage or commission; e.g. cotton brokers, wool brokers or produce brokers. Originally the only contracts negotiated by brokers were for the sale or purchase of commodities; but the word in its present use includes other classes of mercantile agents, such as stockbrokers, insurance-brokers, ship-brokers or bill-brokers.

Pawnbrokers are not brokers in any proper sense of the word; they deal as principals and do not act as agents. In discussing the chief questions of modern legal interest in connexion with brokers, we shall deal with them, firstly, in the original sense of agents for the purchase and sale of goods.

Relations between Broker and Principal.—A broker has not, like a factor, possession of his principal's goods, and, unless expressly authorized, cannot buy or sell in his own name; his business is to bring into privity of contract his principal and the third party. When the contract is made, ordinarily he drops out altogether. Brokers very frequently act as factors also, but, when they do so, their rights and duties as factors must be distinguished from their rights and duties as brokers. It is a broker's duty to carry out his principal's instructions with diligence, skill and perfect good faith. He must see that the terms of the bargain accord with his principal's orders from a commercial point of view, e.g. as to quality, quantity and price; he must ensure that the contract of sale effected by him be legally enforceable by his principal against the third party; and he must not accept any commission from the third party, or put himself in any position in which his own interest may become opposed to his principal's. As soon as he has made the contract which he was employed to make, in most respects his duty to, and his authority from, his principal alike cease; and consequently the law of brokers relates principally to the formation of contracts by them.

The most important formality in English law, in making contracts for the sale of goods, with which a broker must comply, in order to make the contract legally enforceable by his principal against the third party, is contained in section 4 of the Sale of Goods Act 1893, which (in substance re-enacting section 17 of the Statute of Frauds) provides as follows:—"A contract for the sale of any goods of the value of ten pounds or upwards shall not be enforceable by action unless the buyer shall accept part of the goods as sold, and actually receive the same, or give something in earnest to bind the contract, or in part payment, or *unless some note or memorandum in writing of the contract be made and signed by the party to be charged or his agent in that behalf*."

From the reign of James I. till 1884 brokers in London were admitted and licensed by the corporation, and regulated by statute; and it was common to employ one broker only, who acted as intermediary between, and was the agent of both buyer and seller. When the Statute of Frauds was passed in the reign of Charles II., it became the practice for the broker, acting for both parties, to insert in a formal book, kept for the purpose, a memorandum of each contract effected by him, and to sign such memorandum on behalf of both parties, in order that there might be a written memorandum of the contract of sale, signed by the agent of the parties as required by the statute. He would then send to the buyer a copy of this memorandum, called the "bought note", and to the seller a "sold note", which would run as follows:—

"I have this day bought for you from A B [or "my principal"] ..."
[signed] "M, *Broker*."

"I have this day sold for you to A B [or "my principal"] ..."
[signed] "M, *Broker*."

There was in the earlier part of the 19th century considerable discussion in the courts as to whether the entry in a broker's book, or the bought and sold notes (singly or together), constituted the statutory memorandum; and judicial opinion was not unanimous on the point. But at the present day brokers are no longer regulated by statute, either in London or elsewhere, and keep no formal book; and as an entry made in a private book kept by the broker for another purpose, even if signed, would probably not be regarded as a memorandum signed by the agent of the parties in that behalf, the old discussion is now of little practical interest.

Under modern conditions of business the written memorandum of the contract of sale effected by the broker is usually to be found in a "contract note"; but the question whether, in the particular circumstances of each case, the contract note affords a sufficient memorandum in writing, depends upon a variety of considerations—e.g. whether the transaction is effected through one or through two brokers; whether the contract notes are rendered by one broker only, or by both; and, if the latter, whether exchanged between the brokers, or rendered by each broker to his own client; for under present practice any one of these methods may obtain, according to the trade in which the transaction is effected, and the nature of the particular transaction.

Where one and the same broker is employed by both seller and buyer, bought and sold notes rendered in the old form provide the necessary memorandum of the contract. Where two brokers are employed, one by the seller and one by the buyer, sometimes one drops out as soon as the terms are negotiated, and the other makes out, signs and sends to the parties the bought and sold notes. The latter then becomes the agent of both parties for the purpose of signing the statutory memorandum, and the position is the same as if one broker only had been employed. On the other hand, if one broker does not drop out of the transaction, each broker remains to the end the agent of his own principal only, and neither becomes the agent of the other party for the purpose of signing the memorandum. In such a case it is the usual practice for the buyer's broker to send to the seller's broker a note of the contract,—"I, acting on account of A. B. [or, "of my principal,"], have this day bought *from* you, acting on account of C. D. [or, "of your principal"],"—and to receive a corresponding note from the seller's broker. Thus each of the parties receives through his own agent a memorandum signed by the other party's agent. These contract notes are usually known as, and serve the purpose of, "bought" and "sold" notes. In all the above three

cases the broker's duty of compliance with all formalities necessary to make the contract of sale legally enforceable is performed, and both parties obtain a written memorandum of the contract upon which they can sue.

The broker, on performing his duty in accordance with the terms upon which he is employed, is entitled to be paid his "brokerage." This usually takes the form of a percentage, varying according to the nature and conditions of the business, upon the total price of the goods bought or sold through him. When he guarantees the solvency of the other party, he is said to be employed upon *del credere* terms, and is entitled to a higher rate of remuneration. In some trades it is the custom for the selling broker to receive payment from the buyer or his broker; and in such case it is his duty to account to his principal for the purchase money. A broker who properly expends money or incurs liability on his principal's behalf in the course of his employment, is entitled to be reimbursed the money, and indemnified against the liability. Not having, like a factor, possession of the goods, a broker has no lien by which to enforce his rights against his principal. If he fails to perform his duty, he loses his right to remuneration, reimbursement and indemnity, and further becomes liable to an action for damages for breach of his contract of employment, at the suit of his principal.

Relations between Broker and Third Party.—A broker who signs a contract note *as broker* on behalf of a principal, whether named or not, is not personally liable on the contract to the third party. But if he makes the contract in such a way as to make himself a party to it, the third party may sue either the broker or his principal, subject to the limitation that the third party, by his election to treat one as the party to the contract, may preclude himself from suing the other. In this respect the ordinary rules of the law of agency apply to a broker. Generally, a broker has not authority to receive payment, but in trades in which it is customary for him to do so, if the buyer pays the seller's broker, and is then sued by the seller for the price by reason of the broker having become insolvent or absconded, he may set up the payment to the broker as a defence to the action by the broker's principal. Brokers may render themselves liable for damages in tort for the conversion of the goods at the suit of the true owner if they negotiate a sale of the goods for a selling principal who has no title to the goods.

The Influence of Exchanges.—The relations between brokers and their principals, and also between brokers and third parties as above defined, have been to some extent modified in practice by the institution since the middle of the 19th century in important commercial centres of "Exchanges," where persons interested in a particular trade, whether as merchants or as brokers, meet for the transaction of business. By the contract of membership of the association in whose hands is vested the control of the exchange, every person on becoming a member agrees to be bound by the rules of the association, and to make his contracts on the market in accordance with them. A governing body or committee elected by the members enforces observance of the rules, and members who fail to meet their engagements on the market, or to conform to the rules, are liable to suspension or expulsion by the committee. All disputes between members on their contracts are submitted to an arbitration tribunal composed of members; and the arbitrators in deciding the questions submitted to them are guided by the rules. A printed book of rules is available for reference; and various printed forms of contract suited to the various requirements of the business are specified by the rules and supplied by the association for the use of members. In order to simplify the settlement of accounts between members, particularly in respect of "futures," i.e. contracts for future delivery, a weekly or other periodical settlement is effected by means of a clearing-house; each member paying or receiving in respect of all his contracts which are still open, the balance of his weekly "differences," i.e. the difference between the contract price and the market price fixed for the settlement, or between the last and the present settlement prices.

As all contracts on the market are made subject to the rules, it follows that so far as the rules alter the rights and liabilities attached by law, the ordinary law is modified. The most important modification in the position of brokers effected by membership of such an exchange is due to the rule that as, between themselves, all members are principals, on the market no agents are recognized; a broker employed by a non-member to buy for him on the market is treated by the rules as buying for himself, and is, therefore, personally liable on the contract. If it be a contract in futures, he is required to conform to the weekly settlement rules. If his principal fails to take delivery, the engagement is his and he is required to make good to the member who sold to him any difference between the contract and market price at the date of delivery. But whilst this practice alters directly the relations of the broker to the third party, it also affects or tends to affect indirectly the relations of the broker to his own principal. The terms of the contract of employment being a matter of negotiation and agreement between them, it is open to a broker, if he chooses, to stipulate for particular terms; and it is the usual practice of exchanges to supply printed contract forms for the use of members in their dealings with non-members who employ them as brokers, containing a stipulation that the contract is made subject to the rules of the exchange; and frequently also a clause that the contract is made with the broker as *principal*. In addition to these express terms, there is in the contract of employment the term, implied by law in all trade contracts, that the parties consent to be bound by such trade usages as are consistent with the express terms of the contract, and reasonable. On executing an order the broker sends to his client a contract-note either in the form of the old bought and sold notes "I have this day [bought / sold] for you," or, when the principal clause is inserted, "I have this day [sold to / bought] from you." These are not bought and sold notes proper, for the broker is not the agent of the third party for the purpose of signing them as statutory memoranda of the sale. But they purport to record the terms of the contract of employment, and the principal may treat himself as

bound by their provisions. Sometimes they are accompanied by a detachable form, known as the "client's return contract note," to be filled in, signed and returned by the client; but even the "client's return contract note" is retained by the client's own broker, and is only a memorandum of the terms of employment. The following is a form of contract note rendered by a broker to his client for American cotton, bought on the Liverpool Cotton Exchange for future delivery. The client's contract note is attached to it, and is in precisely corresponding form.

AMERICAN COTTON

Delivery Contract Note.

Liverpool,.....

M.....

DEAR SIRS,

We have this day..... to/from you ..... lb American Cotton, net weight, to be contained in ..... American Bales, more or less, to be delivered in Liverpool, during ..... on the basis of ..... per lb for ..... on the terms of the rules, bye-laws, and Clearing House regulations of the Liverpool Cotton Association, Limited, whether endorsed hereon or not.

The contract, of which this is a note, is made between ourselves and yourselves, and not by or with any person, whether disclosed or not, on whose instructions or for whose benefit the same may have been entered into. Yours faithfully,

.....

The contract, of which the above is a note, was made on the date specified, within the business hours fixed by the Liverpool Cotton Association, Limited.

..... per cent to us.

Please confirm by signing and returning the contract attached.

The above form of contract note illustrates the tendency of exchanges to alter the relations between the broker and his principal. The object of inserting in the printed form the provision [v.04 p.0631] that the contract is made subject to the rules of the Liverpool Cotton Association is to make those rules binding upon the principal, and if he employs his broker upon the basis of the printed form, he does bind himself to any modification of the relations between himself and his broker which those rules may effect. The object of the principal clause in the above and similar printed forms is apparently to entitle the broker to sell to or buy from his principal on his own account and not as agent at all, thus disregarding the duty incumbent upon him as broker of making for his principal a contract with a third party.

It is not possible, except very generally, to state how far exchanges have succeeded in imposing their own rules and usages on non-members, but it is probably correct to say that in most cases if the question came before the courts, the outside client would be held to have accepted the rules of the exchange so far as they did not alter the fundamental duties to him of his broker. On the other hand, provisions purporting to entitle the broker in disregard of his duties as broker himself to act as principal, would be rejected by the courts as radically inconsistent with the primary object of the contract of brokerage and, therefore, meaningless. But it is undoubtedly too often the practice of brokers who are members of exchanges to consider themselves entitled to act as principals and sell on their own account to their own clients, particularly in futures. The causes of this opinion, erroneously, though quite honestly held, are probably to be looked for partly in the habit of acting as principal on the market in accordance with the rules, partly in the forms of contract notes containing "principal clauses" which they send to their clients, and perhaps, also, in the occasional difficulty of effecting actual contracts on the market at the time when they are instructed so to do.

A *stockbroker* is a broker who contracts for the sale of stocks and shares. Stockbrokers differ from brokers proper chiefly in that stocks and shares are not "goods," and the requirement of a memorandum in writing, enacted by the Sale of Goods Act 1893, does not apply. Hence actions may be brought by the principals to a contract for the sale of stocks and shares although no memorandum in writing exists. For instance, the jobber, on failing to recover from the buyer's broker the price of shares sold, by reason of the broker having failed and been declared a defaulter, may sue the buyer whose "name was passed" by the broker. The employment of a stockbroker is subject to the rules and customs of the Stock Exchange, in accordance with the principles discussed above, which apply to the employment of brokers proper. A custom which is illegal, such as the Stock Exchange practice of disregarding Leeman's Act (1867), which enacts that contracts for the sale of joint-stock bank shares shall be void unless the registered numbers of the shares are stated therein, is not binding on the client to the extent of making the contract of sale valid. But if a client choose to instruct his broker to buy bank shares in accordance with that practice, the broker is entitled to be indemnified by his client for money which he pays on his behalf, even though the contract of sale so made is unenforceable. For further information the reader is referred to the article STOCK EXCHANGE and to the treatises on stock exchange law.

An *insurance broker* is an agent whose business is to effect policies of marine insurance. He is employed by the person who has an interest to insure, pays the premiums to the underwriter,

takes up the policy, and receives from the underwriter payment in the event of a loss under the policy. By the custom of the trade the underwriter looks solely to the broker for payment of premiums, and has no right of action against the assured; and, on the other hand, the broker is paid his commission by the underwriter, although he is employed by the assured. Usually the broker keeps a current account with the underwriter, and premiums and losses are dealt with in account. It is only in the event of the underwriter refusing to pay on a loss, that the broker drops out and the assured sues the underwriter direct. Agents who effect life, fire or other policies, are not known as insurance brokers.

Ship-brokers are, firstly, "commission agents," and, secondly, very often also ships' managers. Their office is to act as agents for owners of ships to procure purchasers for ships, or ships for intending purchasers, in precisely the same manner as house-agents act in respect of houses. They also act as agents for ship-owners in finding charterers for their ships, or for charterers in finding ships available for charter, and in either case they effect the charter-party (see AFFREIGHTMENT).

Chartering brokers are customarily paid by the ship-owner, when the charter-party is effected, whether originally employed by him or by the charterer. Charter-parties effected through brokers often contain a provision—"*2½% on estimated amount of freight to be paid to A B, broker, on the signing of this charter-party, and the ship to be consigned to him for ship's business at the port of X* [inserting the name of the port where A B carries on business]." The broker cannot sue on the charter-party contract because he is not a party to it, but the insertion of the clause practically prevents his right from being disputed by the ship-owner. When the broker does the ship's business in port, it is his duty to clear her at the customs and generally to act as "ship's husband."

A *bill-broker* was originally an agent who, for a commission, procured for country bankers the discounting of their bills in London. But the practice arose of the broker guaranteeing the London banker or financier; and finally the brokers ceased to deposit with the London bankers the bills they received, and at the present day a bill-broker, as a rule, buys bills on his own account at a discount, borrows money on his own account and upon his own security at interest, and makes his profit out of the difference between the discount and the interest. When acting thus the bill-broker is not a broker at all, as he deals as principal and does not act as agent.

AUTHORITIES.—Story, *Commentaries on the Law of Agency* (Boston, 1882); Brodhurst, *Law and Practice of the Stock Exchange* (London, 1897); Gow, *Handbook of Marine Insurance* (London, 1900); Arnould, *On Marine Insurance*, edited by Messrs Hart & Simey (1901); J.R. Dos Passos, *Law of Stock-Brokers and Stock Exchanges* (New York, 1905).

(L. F. S.)

BROMBERG, a town of Germany, in the Prussian province of Posen, 32 m. by rail W.N.W. from the fortress of Thorn, 7 m. W. from the bank of the Vistula, and at the centre of an important network of railways, connecting it with the strategical points on the Prusso-Russian frontier. Pop. (1900) 52,082; (1905) 54,229. Its public buildings comprise two Roman Catholic and three Protestant churches, a Jewish synagogue, a seminary, high grade schools and a theatre. The town also possesses a bronze statue of the emperor William I., a monument of the war of 1870-71, and a statue of Benkenhoff, the constructor of the Bromberg Canal. This engineering work, constructed in 1773-1774, by command of Frederick II., connects the Brahe with the Netze, and thus establishes communication between the Vistula, the Oder and the Elbe. The principal industrial works are iron foundries and machine shops, paper factories and flour mills; the town has, moreover, an active trade in agricultural and other products. In view of its strategical position, a large garrison is concentrated in and about the town. Bromberg is mentioned as early as 1252. It fell soon afterwards into the hands of the Poles, from whom it was taken in 1327 by the Teutonic Order, which held it till 1343, when the Poles recaptured it. Destroyed in the course of these struggles, it was restored by Casimir of Poland in 1346, and down to the close of the 16th century it continued to be a flourishing commercial city. It afterwards suffered so much from war and pestilence that about 1772, when the Prussians took possession, it contained only from five to six hundred inhabitants. By the treaty of Tilsit it was transferred to the duchy of Warsaw; in 1813 it was occupied by the Russians, and in 1815 was restored to Prussia.

BROME, ALEXANDER (1620-1666), English poet, was by profession an attorney, and was the author of many drinking songs and of satirical verses in favour of the Royalists and against the Rump. He published in 1661 *Songs and other Poems*, containing songs on various subjects, followed by a series of political songs; ballads, epistles, elegies and epitaphs; epigrams and translations. Izaak Walton wrote an introductory eclogue for this volume in praise of the writer, and his gaiety and wit won for him the title of the "English Anacreon" in Edward Phillips's *Theatrum Poetarum*. Brome published in 1666 a translation of Horace by himself and others, and was the author of a comedy entitled *The Cunning Lovers* (1654). He also edited two volumes of Richard Brome's plays.

BROME, RICHARD (d. 1652), English dramatist, was originally a servant of Ben Jonson, and owed much to his master. The development of his plots, the strongly marked characters and the amount of curious information to be found in his work, all show Jonson's influence. The relation of master and servant developed into friendship, and our knowledge of Brome's personal character is chiefly drawn from Ben Jonson's lines to him, prefixed to *The Northern Lasse* (1632), the play which made Brome's reputation. Brome's genius lay entirely in comedy. He has left

fifteen pieces. *Five New Playes* (ed. by Alex. Brome, 1652?) contained *Madd Couple Well Matcht* (acted 1639?); *Novella* (acted 1632); *Court Begger* (acted 1632); *City Witt; The Damoiselle or the New Ordinary. Five New Playes* (1659) included *The English Moor, or The Mock Marriage; The Love-Sick Court, or The Ambitious Politique; Covent Garden Weeded; The New Academy, or The New Exchange*; and *The Queen and Concubine*. *The Antipodes* (acted 1638, pr. 1640); *The Sparagus Garden* (acted 1635, pr. 1640); *A Joviall Crew, or the Merry Beggars* (acted 1641, pr. 1652, revised in 1731 as an "opera"), and *The Queenes Exchange* (pr. 1657), were published separately. He collaborated with Thomas Heywood in *The late Lancashire Witches* (pr. 1634).

See A.W. Ward, *History of English Dramatic Literature*, vol. iii. pp. 125-131 (1899). *The Dramatic Works of Richard Brome ...* were published in 1873.

BROMELIACEAE, in botany, a natural order of Monocotyledons, confined to tropical and sub-tropical America. It includes the pine-apple (fig. 1) and the so-called Spanish moss (fig. 2), a rootless plant, which hangs in long grey lichen-like festoons from the branches of trees, a native of Mexico and the southern United States; the water required for food is absorbed from the moisture in the air by peculiar hairs which cover the surface of the shoots. The plants are generally herbs with a much shortened stem bearing a rosette of leaves and a spike or panicle of flowers. They are eminently dry-country plants (xerophytes); the narrow leaves are protected from loss of water by a thick cuticle, and have a well-developed sheath which embraces the stem and forms, with the sheaths of the other leaves of the rosette, a basin in which water collects, with fragments of rotting leaves and the like. Peculiar hairs are developed on the inner surface of the sheath by which the water and dissolved substances are absorbed, thus helping to feed the plant. The leaf-margins are often spiny, and the leaf-spines of *Puya chilensis* are used by the natives as fish-hooks. Several species are grown as hot-house plants for the bright colour of their flowers or flower-bracts, e.g. species of *Tillandsia*, *Billbergia*, *Aechmea* and others.

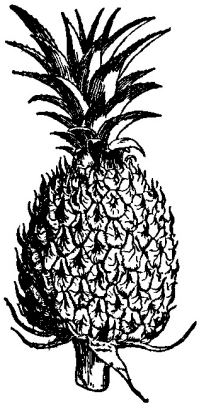


FIG. 1.—Fruit of the pine-apple (*Ananas sativa*), consisting of numerous flowers and bracts united together so as to form a collective or anthocarpous fruit. The crown of the pine-apple, c, consists of a series of empty bracts prolonged beyond the fruit.

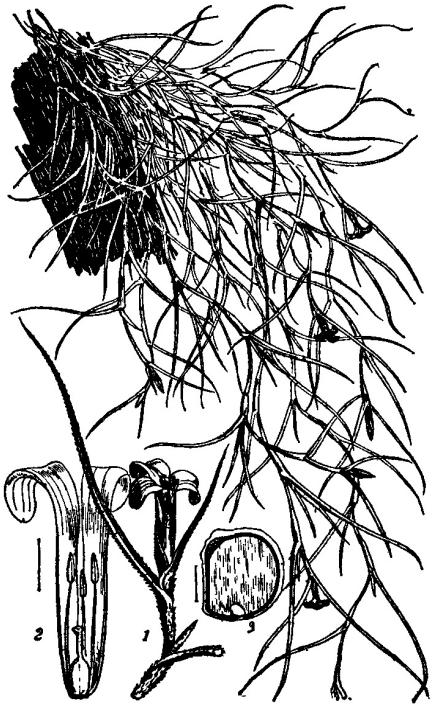


FIG. 2.—*Tillandsia usneoides*, Spanish moss, slightly reduced. 1, Small branch with flower; 2, flower cut vertically; 3, section of seed of *Bromelia*.

(From *The Botanical Magazine*, by permission of Lovell, Reeve & Co)

BROMINE (symbol Br, atomic weight 79.96), a chemical element of the halogen group, which takes its name from its pungent unpleasant smell (βρῶμος, a stench). It was first isolated by A.J. Balard in 1826 from the salts in the waters of the Mediterranean. He established its elementary character, and his researches were amplified by K.J. Löwig (1803-1890) in *Das Brom und seine chemischen Verhaltnisse* (1829). Bromine does not occur in nature in the uncombined condition, but in combination with various metals is very widely but sparingly distributed. Potassium, sodium and magnesium bromides are found in mineral waters, in river and sea-water, and occasionally in marine plants and animals. Its chief commercial sources are the salt deposits at Stassfurt in Prussian Saxony, in which magnesium bromide is found associated with various chlorides, and the brines of Michigan, Ohio, Pennsylvania and West Virginia, U.S.A.; small quantities are obtained from the mother liquors of Chile saltpetre and kelp. In combination with silver it is found as the mineral bromargyrite (bromite).

Manufacture.—The chief centres of the bromine industry are Stassfurt and the central district of Michigan. It is manufactured from the magnesium bromide contained in "bittern" (the mother liquor of the salt industry), by two processes, the continuous and the periodic. The continuous process depends upon the decomposition of the bromide by chlorine, which is generated in special stills. A regular current of chlorine mixed with steam is led in at the bottom of a tall tower filled with broken bricks, and there meets a descending stream of hot bittern: bromine is liberated and is swept out of the tower together with some chlorine, by the current of steam, and then condensed in a worm. Any uncondensed bromine vapour is absorbed by moist iron borings, and the resulting iron bromide is used for the manufacture of potassium bromide. The periodic process depends on the interaction between manganese dioxide (pyrolusite), sulphuric acid, and a bromide, and the operation is carried out in sandstone stills heated to 60° C., the product being condensed as in the continuous process. The substitution of potassium chlorate for pyrolusite is recommended when calcium chloride is present in the bittern. The crude bromine is purified by repeated shaking with potassium, sodium or ferrous bromide and subsequent redistillation. Commercial bromine is rarely pure, the chief impurities present in it being chlorine, hydrobromic acid, and bromoform (M. Hermann, *Annalen*, 1855, 95, p. 211). E. Gessner (*Berichte*, 1876, 9, p.

1507) removes chlorine by repeated shaking with water, followed by distillation over sulphuric acid; hydrobromic acid is removed by distillation with pure manganese dioxide, or mercuric oxide, and the product dried over sulphuric acid. J.S. Stas, in his stoichiometric researches, prepared chemically pure bromine from potassium bromide, by converting it into the bromate which was purified by repeated crystallization. By heating the bromate it was partially converted into the bromide, and the resulting mixture was distilled with sulphuric acid. The distillate was further purified by digestion with milk of lime, precipitation with water, and further digestion with calcium bromide and barium oxide, and was finally redistilled.

Characters.—Bromine at ordinary temperatures is a mobile liquid of fine red colour, which appears almost black in thick layers. It boils at 59° C. According to Sir W. Ramsay and S. Young, bromine, when dried over sulphuric acid, boils at 57.65° C., and when dried over phosphorus pentoxide, boils at 58.85° C. (under a pressure of 755.8 mm.), forming a deep red vapour, which exerts an irritating and directly poisonous action on the respiratory organs. It solidifies at -21° C. (Quincke) to a dark brown solid. Its specific gravity is 3.18828 (0/4°), latent heat of fusion 16.185 calories, latent heat of vaporization 45.6 calories, specific heat 0.1071. The specific heat of bromine vapour, at constant pressure, is 0.05504 and at constant volume is 0.04251 (K. Strecker). Bromine is soluble in water, to the extent of 3.226 grammes of bromine per 100 grammes of solution at 15° C., the solubility being slightly increased by the presence of potassium bromide. The solution is of an orange-red colour, and is quite permanent in the dark, but on exposure to light, gradually becomes colourless, owing to decomposition into hydrobromic acid and oxygen. By cooling the aqueous solution, hyacinth-red octahedra of a crystalline hydrate of composition $Br{\cdot}4H_2O$ or $Br_2{\cdot}8H_2O$ are obtained (Bakhuis Roozeboom, *Zeits. phys. Chem.*, 1888, 2. p. 449). Bromine is readily soluble in chloroform, alcohol and ether.

Its chemical properties are in general intermediate between those of chlorine and iodine; thus it requires the presence of a catalytic agent, or a fairly high temperature, to bring about its union with hydrogen. It does not combine directly with oxygen, nitrogen or carbon. With the other elements it unites to form bromides, often with explosive violence; phosphorus detonates in liquid bromine and inflames in the vapour; iron is occasionally used to absorb bromine vapour, potassium reacts energetically, but sodium requires to be heated to 200° C. The chief use of bromine in analytical chemistry is based upon the oxidizing action of bromine water. Bromine
[v.04 p.0633] and bromine water both bleach organic colouring matters. The use of bromine in the extraction of gold (*q.v.*) was proposed by R. Wagner (*Dingler's Journal*, 218, p. 253) and others, but its cost has restricted its general application. Bromine is used extensively in organic chemistry as a substituting and oxidizing agent and also for the preparation of addition compounds. Reactions in which it is used in the liquid form, in vapour, in solution, and in the presence of the so-called "bromine carriers," have been studied. Sunlight affects the action of bromine vapour on organic compounds in various ways, sometimes retarding or accelerating the reaction, while in some cases the products are different (J. Schramm, *Monatshefte fur Chemie*, 1887, 8, p. 101). Some reactions, which are only possible by the aid of nascent bromine, are carried out by using solutions of sodium bromide and bromate, with the amount of sulphuric acid calculated according to the equation $5NaBr + NaBrO_3 + 6H_2SO_4 = 6NaHSO_4 + 3H_2O + 6Br$. (German Patent, 26642.) The diluents in which bromine is employed are usually ether, chloroform, acetic acid, hydrochloric acid, carbon bisulphide and water, and, less commonly, alcohol, potassium bromide and hydrobromic acid; the excess of bromine being removed by heating, by sulphurous acid or by shaking with mercury. The choice of solvent is important, for the velocity of the reaction and the nature of the product may vary according to the solvent used, thus A. Baeyer and F. Blom found that on brominating orthoacetamido-acetophenone in presence of water or acetic acid, the bromine goes into the benzene nucleus, whilst in chloroform or sulphuric acid or by use of bromine vapour it goes into the side chain as well. The action of bromine is sometimes accelerated by the use of compounds which behave catalytically, the more important of these substances being iodine, iron, ferric chloride, ferric bromide, aluminium bromide and phosphorus. For oxidizing purposes bromine is generally employed in aqueous and in alkaline solutions, one of its most important applications being by Emil Fischer (*Berichte*, 1889, 22, p. 362) in his researches on the sugars. The atomic weight of bromine has been determined by J.S. Stas and C. Marignac from the analysis of potassium bromide, and of silver bromide. G.P. Baxter (*Zeit. anorg. Chem.* 1906, 50, p. 389) determined the ratios Ag: AgBr, and AgCl: Ag Br.

Hydrobromic Acid.—This acid, HBr, the only compound of hydrogen and bromine, is in many respects similar to hydrochloric acid, but is rather less stable. It may be prepared by passing hydrogen gas and bromine vapour through a tube containing a heated platinum spiral. It cannot be prepared with any degree of purity by the action of concentrated sulphuric acid on bromides, since secondary reactions take place, leading to the liberation of free bromine and formation of sulphur dioxide. The usual method employed for the preparation of the gas consists in dropping bromine on to a mixture of amorphous phosphorus and water, when a violent reaction takes place and the gas is rapidly liberated. It can be obtained also, although in a somewhat impure condition, by the direct action of bromine on various saturated hydrocarbons (e.g. paraffin-wax), while an aqueous solution may be obtained by passing sulphuretted hydrogen through bromine water. Alexander Scott (*Journal of Chem. Soc.*, 1900, 77, p. 648) prepares pure hydrobromic acid by covering bromine, which is contained in a large flask, with a layer of water, and passing sulphur dioxide into the water above the surface of the bromine, until the whole is of a pale yellow colour; the resulting solution is then distilled in a slow current of air and finally purified by distillation over barium bromide. At ordinary temperatures hydrobromic acid is a colourless gas which fumes strongly in moist air, and has an acid taste and reaction. It can be condensed to a

liquid, which boils at -64.9° C. (under a pressure of 738.2 mm.), and, by still further cooling, gives colourless crystals which melt at -88.5° C. It is readily soluble in water, forming the aqueous acid, which when saturated at 0° C. has a specific gravity of 1.78. When boiled, the aqueous acid loses either acid or water until a solution of constant boiling point is obtained, containing 48% of the acid and boiling at 126° C. under atmospheric pressure; should the pressure, however, vary, the strength of the solution boiling at a constant temperature varies also. Hydrobromic acid is one of the "strong" acids, being ionized to a very large extent even in concentrated solution, as shown by the molecular conductivity increasing by only a small amount over a wide range of dilution.

Bromides.—Hydrobromic acid reacts with metallic oxides, hydroxides and carbonates to form bromides, which can in many cases be obtained also by the direct union of the metals with bromine. As a class, the metallic bromides are solids at ordinary temperatures, which fuse readily and volatilize on heating. The majority are soluble in water, the chief exceptions being silver bromide, mercurous bromide, palladious bromide and lead bromide; the last is, however, soluble in hot water. They are decomposed by chlorine, with liberation of bromine and formation of metallic chlorides; concentrated sulphuric acid also decomposes them, with formation of a metallic sulphate and liberation of bromine and sulphur dioxide. The non-metallic bromides are usually liquids, which are readily decomposed by water. Hydrobromic acid and its salts can be readily detected by the addition of chlorine water to their aqueous solutions, when bromine is liberated; or by warming with concentrated sulphuric acid and manganese dioxide, the same result being obtained. Silver nitrate in the presence of nitric acid gives with bromides a pale yellow precipitate of silver bromide, AgBr, which is sparingly soluble in ammonia. For their quantitative determination they are precipitated in nitric acid solution by means of silver nitrate, and the silver bromide well washed, dried and weighed.

No oxides of bromine have as yet been isolated, but three oxy-acids are known, namely hypobromous acid, HBrO, bromous acid, $HBrO_2$, and bromic acid, $HBrO_3$. Hypobromous acid is obtained by shaking together bromine water and precipitated mercuric oxide, followed by distillation of the dilute solution *in vacuo* at low temperature (about 40° C.). It is a very unstable compound, breaking up, on heating, into bromine and oxygen. The aqueous solution is light yellow in colour, and possesses strong bleaching properties. Bromous acid is formed by adding bromine to a saturated solution of silver nitrate (A. H. Richards, *J. Soc Chem. Ind.*, 1906, 25, p. 4). Bromic acid is obtained by the addition of the calculated amount of sulphuric acid (previously diluted with water) to the barium salt; by the action of bromine on the silver salt, in the presence of water, $5AgBrO_3 + 3Br_2 + 3H_2O = 5AgBr + 6HBrO_3$, or by passing chlorine through a solution of bromine in water. The acid is only known in the form of its aqueous solution; this is, however, very unstable, decomposing on being heated to 100° C. into water, oxygen and bromine. By reducing agents such, for example, as sulphuretted hydrogen and sulphur-dioxide, it is rapidly converted into hydrobromic acid. Hydrobromic acid decomposes it according to the equation $HBrO_3 + 5HBr = 3H_2O + 3Br_2$. Its salts are known as bromates, and are as a general rule difficultly soluble in water, and decomposed by heat, with evolution of oxygen.

Applications.—The salts of bromine are widely used in photography, especially bromide of silver. For antiseptic purposes it has been prepared as "bromum solidificatum," which consists of kieselguhr or similar substance impregnated with about 75% of its weight of bromine. In medicine it is largely employed in the form of bromides of potassium, sodium and ammonium, as well as in combination with alkaloids and other substances.

Medicinal Use.—Bromide of potassium is the safest and most generally applicable sedative of the nervous system. Whilst very weak, its action is perfectly balanced throughout all nervous tissue, so much so that Sir Thomas Lauder Brunton has suggested its action to be due to its replacement of sodium chloride (common salt) in the fluids of the nervous system. Hence bromide of potassium—or bromide of sodium, which is possibly somewhat safer still though not quite so certain in its action—is used as a hypnotic, as the standard anaphrodisiac, as a sedative in mania and all forms of morbid mental excitement, and in hyperaesthesia of all kinds. Its most striking success is in epilepsy, for which it is the specific remedy. It may be given in doses of from ten to fifty grains or more, and may be continued without ill effect for long periods in grave cases of epilepsy (*grand mal*). Of the three bromides in common use the potassium salt is the most rapid and certain in its action, but may depress the heart in morbid states of that organ; in such cases the sodium salt—of which the base is inert—may be employed. In whooping-cough, when a sedative is required but a stimulant is also indicated, ammonium bromide is often invaluable. The conditions in which bromides are most frequently used are insomnia, epilepsy, whooping-cough, delirium tremens, asthma, migraine, laryngismus stridulus, the symptoms often attendant upon the climacteric in women, hysteria, neuralgia, certain nervous disorders of the heart, strychnine poisoning, nymphomania and spermatorrhoea. Hydrobromic acid is often used to relieve or prevent the headache and singing in the ears that may follow the administration of quinine and of salicylic acid or salicylates.

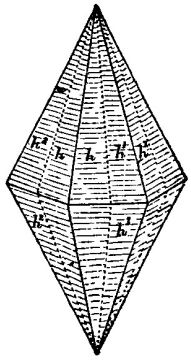
BROMLEY, SIR THOMAS (1530-1587), English lord chancellor, was born in Staffordshire in 1530. He was educated at Oxford University and called to the bar at the Middle Temple. Through family influence as well as the patronage of Sir Nicholas Bacon, the lord keeper, he quickly made progress in his profession. In 1566 he was appointed recorder of London, and in 1569 he became solicitor-general. He sat in parliament successively for Bridgnorth, Wigan and Guildford. On the death of Sir Nicholas Bacon in 1579 he was appointed lord chancellor. As an equity judge he showed great and profound knowledge, and his judgment in Shelley's case (*q.v.*) is a landmark in the history of English real property law. He presided over the commission which tried Mary,

queen of Scots, in 1586, but the strain of the trial, coupled with the responsibility which her execution involved upon him, proved too much for his strength, and he died on the 12th of April 1587. He was buried in Westminster Abbey.

See Foss, *Lives of the Judges*; Campbell, *Lives of the Lord Chancellors*.

BROMLEY, a municipal borough in the Sevenoaks parliamentary division of Kent, England, 10½ m. S.E. by S. of London by the South Eastern & Chatham railway. Pop. (1901) 27,354. It lies on high ground north of the small river Ravensbourne, in a well-wooded district, and has become a favourite residential locality for those whose business lies in London. The former palace of the [v.04 p.0634] bishops of Rochester was erected in 1777 in room of an older structure. The manor belonged to this see as early as the reign of Ethelbert. In the gardens is a chalybeate spring known as St Blaize's Well, which was in high repute before the Reformation. The church of St Peter and St Paul, mainly Perpendicular, retains a Norman font and other remains of an earlier building. Here is the gravestone of the wife of Dr Johnson. Bromley College, founded by Bishop Warner in 1666 for "twenty poor widows of loyal and orthodox clergymen," has been much enlarged, and forty widows are in receipt of support. Sheppard College (1840) is an affiliated foundation for unmarried daughters of these widows. In the vicinity of Bromley, Bickley is a similar residential township, Hayes Common is a favourite place of excursion, and at Holwood Hill near Keston are remains of a large encampment known as Caesar's Camp. Bromley was incorporated in 1903, and is governed by a mayor, 6 aldermen and 18 councillors. Area, 4703 acres.

BROMLITE, a member of the aragonite group of minerals. It consists of an isomorphous mixture of calcium and barium carbonates in various proportions, (Ca, Ba) CO_3, and thus differs chemically from barytocalcite (*q.v.*) which is a double salt of these carbonates in equal molecular proportions. Being isomorphous with aragonite, it crystallizes in the orthorhombic system, but simple crystals are not known. The crystals are invariably complex twins, and have the form of doubly terminated pseudo-hexagonal pyramids, like those of witherite but more acute; the faces are horizontally striated and are divided down their centre by a twin-suture, as represented in the adjoining figure. The examination in polarized light of a transverse section shows that each compound crystal is built up of six differently orientated individuals arranged in twelve segments. The crystals are translucent and white, sometimes with a shade of pink. Sp. gr. 3.706; hardness 4-4½. The mineral has been found at only two localities, both of which are in the north of England. At the Fallowfield lead mine, near Hexham in Northumberland, it is associated with witherite; and at Bromley Hill, near Alston in Cumberland, it occurs in veins with galena. The species was named bromlite by T. Thomson in 1837, and alstonite by A. Breithaupt in 1841, both of which names, derived from the locality, have been in common use.



(L. J. S.)

BROMPTON, a western district of London, England, in the south-east of the metropolitan borough of Kensington. Brompton Road, leading south-west from Knightsbridge, is continued as Old Brompton Road and Richmond Road, to join Lillie Road, at which point are the District and West London railway stations of West Brompton. The Oratory of St Philip Neri, commonly called Brompton Oratory, close by the Victoria and Albert Museum, the Brompton consumption hospital and the West London or Brompton cemetery are included in this district, which is mainly occupied by residences of the better class. (See KENSINGTON.)

BROMSGROVE, a market town in the Eastern parliamentary division of Worcestershire, England, 12 m. N.N.E. of Worcester, with a station 1 m. from the town on the Bristol-Birmingham line of the Midland railway. Pop. of urban district (1901) 8418. It lies in a pleasant undulating district near the foot of the Lickey Hills, to surmount which the railway towards Birmingham here ascends for 2 m. one of the steepest gradients in England over such a distance. There remain several picturesque half-timbered houses, dating from 1572 and later. The church of St John is a fine building, Perpendicular and earlier in date, picturesquely placed on an elevation above the town, with a lofty tower and spire. There are a well-known grammar-school, founded by Edward VI., with university scholarships; a college school, a literary institute, and a school of art. Birmingham Sanatorium stands in the parish. Cloth was formerly a staple of trade, but manufactures of nails and buttons are now pre-eminent, while the river Salwarpe works a number of mills in the neighbourhood, and near the town are carriage works belonging to the Midland railway.

BRONCHIECTASIS (Gr. βρόγχια, bronchial tubes, and ἔκτασις, extension), dilatation of the bronchi, a condition occurring in connexion with many diseases of the lungs. Bronchitis both acute and chronic, chronic pneumonia and phthisis, acute pneumonia and broncho-pneumonia, may all leave after them a bronchiectasis whose position is determined by the primary lesion. Other causes, acting mechanically, are tracheal and bronchial obstruction, as from the pressure of an aneurism, new growth, &c. It used to be considered a disease of middle age, but of late years Dr Walter Carr has shown that the condition is a fairly common one among debilitated children after measles, whooping cough, &c. The dilatation is commonly cylindrical, more rarely saccular, and it is the medium and smaller sized tubes that are generally affected, except where the cause is mechanical. The affection is usually of one lung only. Emphysema is a very common accompaniment. Though at first the symptoms somewhat resemble those of bronchitis, later they are quite distinctive. Cough is very markedly paroxysmal in character, and though severe is

intermittent, the patient being entirely free for many hours at the time. The effect of posture is very marked. If the patient lie on the affected side, he may be free from cough the whole night, but if he turn to the sound side, or if he rises and bends forward, he brings up large quantities of bronchial secretion. The expectoration is characterized by its abundance and manner of expulsion. Where the dilatation is of the saccular variety, it may come up in such quantities and with so much suddenness as to gush from the mouth. It is very commonly foetid, as it is retained and decomposed *in situ*. Dyspnoea and haemoptysis occasionally occur, but are by no means the rule. If pyrexia is present, it is a serious symptom, as it is a sign of septic absorption in the bronchi, and may be the forerunner of gangrene. If gangrene does set in, it will be accompanied by severe attacks of shivering and sweating. Where the disease has lasted long, clubbing of fingers and toes is very common. The diagnosis from putrid bronchitis is usually fairly easily made, but at times it may be a matter of extreme difficulty to distinguish between this condition and a tuberculous cavity in the lung. Nothing can be done directly to cure this disease, but the patient's condition can be greatly alleviated. Creosote vapour baths are eminently satisfactory. A mechanical treatment much recommended by some of the German physicians is that of forced expiration.

BRONCHITIS, the name given to inflammation of the mucous membrane of the bronchial tubes (see Respiratory System: *Pathology*). Two main varieties are described, specific and non-specific bronchitis. The bronchitis which occurs in infectious or specific disorders, as diphtheria, influenza, measles, pneumonia, &c., due to the micro-organisms observed in these diseases, is known as specific; whereas that which results from extension from above, or from chemical or mechanical irritation, is known as non-specific. It is convenient to describe it, however, under the chemical divisions of *acute* and *chronic* bronchitis.

Acute bronchitis, like other inflammatory affections of the chest, generally arises as the result of exposure to cold, particularly if accompanied with damp, or of sudden change from a heated to a cool atmosphere. The symptoms vary according to the severity of the attack, and more especially according to the extent to which the inflammatory action spreads in the bronchial tubes. The disease usually manifests itself at first in the form of a catarrh, or common cold; but the accompanying feverishness and general constitutional disturbance proclaim the attack to be something more severe, and symptoms denoting the onset of bronchitis soon present themselves. A short, painful, dry cough, accompanied with rapid and wheezing respiration, a feeling of rawness and pain in the throat and behind the breast bone, and of oppression or tightness throughout the chest, mark the early stages of the disease. In some cases, from the first, symptoms of the form of asthma (*q.v.*) known as the *bronchitic* are superadded, and greatly aggravate the patient's suffering.

[v.04 p.0635] After a few days expectoration begins to come with the cough, at first scanty and viscid or frothy, but soon becoming copious and of purulent character. In general, after free expectoration has been established the more urgent and painful symptoms abate; and while the cough may persist for a length of time, often extending to three or four weeks, in the majority of instances convalescence advances, and the patient is ultimately restored to health, although there is not unfrequently left a tendency to a recurrence of the disease on exposure to its exciting causes.

When the ear or the stethoscope is applied to the chest of a person suffering from such an attack as that now described, there are heard in the earlier stages snoring or cooing sounds, mixed up with others of wheezing or fine whistling quality, accompanying respiration. These are denominated dry sounds, and they are occasionally so abundant and distinct, as to convey their vibrations to the hand applied to the chest, as well as to be audible to a bystander at some distance. As the disease progresses these sounds become to a large extent replaced by others of crackling or bubbling character, which are termed moist sounds or râles. Both these kinds of abnormal sounds are readily explained by a reference to the pathological condition of the parts. One of the first effects of inflammation upon the bronchial mucous membrane is to cause some degree of swelling, which, together with the presence of a tough secretion closely adhering to it, tends to diminish the calibre of the tubes. The respired air as it passes over this surface gives rise to the dry or sonorous breath sounds, the coarser being generated in the large, and the finer or wheezing sounds in the small divisions of the bronchi. Before long, however, the discharge from the bronchial mucous membrane becomes more abundant and less glutinous, and accumulates in the tubes till dislodged by coughing. The respired air, as it passes through this fluid, causes the moist râles above described. In most instances both moist and dry sounds are heard abundantly in the same case, since different portions of the bronchial tubes are affected at different times in the course of the disease.

Such are briefly the main characteristics presented by an ordinary attack of acute bronchitis running a favourable course. The case is, however, very different when the inflammation spreads into, or when it primarily affects, the minute ramifications of the bronchial tubes which are in immediate relation to the air-cells of the lungs, giving rise to that form of the disease known as *capillary bronchitis* or *broncho-pneumonia* (see Respiratory System: *Pathology*; and Pneumonia). When this takes place all the symptoms already detailed become greatly intensified, and the patient's life is placed in imminent peril in consequence of the interruption to the entrance of air into the lungs, and thus to the due aeration of the blood. The feverishness and restlessness increase, the cough becomes incessant, the respiration extremely rapid and laboured, the nostrils dilating with each effort, and evidence of impending suffocation appears. The surface of the body is pale or dusky, the lips are livid, while breathing becomes increasingly difficult, and is attended with suffocative paroxysms which render the recumbent posture impossible. Unless speedy relief

is obtained by successful efforts to clear the chest by coughing and expectoration, the patient's strength gives way, somnolence and delirium set in and death ensues. All this may be brought about in the space of a few days, and such cases, particularly among the very young, sometimes prove fatal within forty-eight hours.

Acute bronchitis must at all times be looked upon as a severe and even serious ailment, but there are certain circumstances under which its occurrence is a matter of special anxiety to the physician. It is pre-eminently dangerous at the extremes of life, and mortality statistics show it to be one of the most fatal of the diseases of those periods. This is to be explained not only by the well-recognized fact that all acute diseases tell with great severity on the feeble frames alike of infants and aged people, but more particularly by the tendency which bronchitis undoubtedly has in attacking them to assume the capillary form, and when it does so to prove quickly fatal. The importance, therefore, of early attention to the slightest evidence of bronchitis among the very young or the aged can scarcely be overrated.

Bronchitis is also apt to be very severe when it occurs in persons who are addicted to intemperance. Again, in those who suffer from any disease affecting directly or indirectly the respiratory functions, such as consumption or heart disease, the supervention of an attack of acute bronchitis is an alarming complication, increasing, as it necessarily does, the embarrassment of breathing. The same remark is applicable to those numerous instances of its occurrence in children who are or have been suffering from such diseases as have always associated with them a certain degree of bronchial irritation, such as measles and whooping-cough.

One other source of danger of a special character in bronchitis remains to be mentioned, viz. collapse of the lung. Occasionally a branch of a bronchial tube becomes plugged up with secretion, so that the area of the lung to which this branch conducts ceases to be inflated on inspiration. The small quantity of air imprisoned in the portion of lung gradually escapes, but no fresh air enters, and the part collapses and becomes of solid consistence. Increased difficulty of breathing is the result, and where a large portion of lung is affected by the plugging up of a large bronchus, a fatal result may rapidly follow, the danger being specially great in the case of children. Fortunately, the obstruction may sometimes be removed by vigorous coughing, and relief is then obtained.

With respect to the treatment of acute bronchitis, in those mild cases which are more of the nature of a simple catarrh, little else will be found necessary than confinement in a warm room, or in bed, for a few days, and the use of light diet, together with warm diluent drinks. Additional measures are however called for when the disease is more markedly developed. Medicines to allay fever and promote perspiration are highly serviceable in the earlier stages. Later, with the view of soothing the pain of the cough, and favouring expectoration, mixtures of tolu, with the addition of some opiate, such as the ordinary paregorics, may be advantageously employed. The use of opium, however, in any form should not be resorted to in the case of young children without medical advice, since its action on them is much more potent and less under control than it is in adults. Not a few of the so-called "soothing mixtures" have been found to contain opium in quantity sufficient to prove dangerous when administered to children, and caution is necessary in using them.

From the outset of the attack the employment of fomentations, or especially a turpentine stupe, gives great relief, and occasionally in the non-specific form this treatment, combined with a good dose of calomel and salts, may render the attack abortive. Some relief is always obtained by inhalations, and theoretically, an acute specific bronchitis should be successfully treated by inhalation of antiseptic and soothing remedies. In practice, however, it is found that the strength cannot be sufficiently strong to destroy the bacteria in the bronchial tubes. However, much relief is obtained from the use of steam atomizers filled with an aqueous solution of compound tincture of benzoin, creosote or guaiacol. A still more practicable means of introducing volatile antiseptic oils is the globe nebulizer, which throws oleaginous solutions in the form of a fine fog, that can be deeply inhaled. Menthol, eucalyptol and white pine extract are some of the remedies that may be tried dissolved in benzoinol, to which cocaine or opium may be added if the cough is troublesome.

When the bronchitis is of the capillary form, the great object is to maintain the patient's strength, and to endeavour to secure the expulsion of the morbid secretion from the fine bronchi. In addition to the remedies already alluded to, stimulants are called for from the first; and should the cough be ineffectual in relieving the bronchial tubes, the administration of an emetic dose of sulphate of zinc may produce a good effect.

During the whole course of any attack of bronchitis attention must be paid to the due nourishment of the patient; and during the subsequent convalescence, which, particularly in elderly persons, is apt to be slow, tonics and stimulants may have to be prescribed.

[v.04 p.0636] *Chronic bronchitis* may arise as the result of repeated attacks of the acute form, or it may exist altogether independently. It occurs more frequently among persons advanced in life than among the young, although no age is exempt from it. The usual history of this form of bronchitis is that of a cough recurring during the colder seasons of the year, and in its earlier stages, departing entirely in summer, so that it is frequently called "winter cough." In many persons subject to it, however, attacks are apt to be excited at any time by very slight causes, such as changes in the weather; and in advanced cases of the disease the cough is seldom altogether absent. The symptoms and auscultatory signs of chronic bronchitis are on the whole similar to those pertaining to the acute form, except that the febrile disturbance and pain are much less marked.

The cough is usually more troublesome in the morning than during the day. There is usually free and copious expectoration, and occasionally this is so abundant as to constitute what is termed *bronchorrhoea*.

Chronic bronchitis leads to alterations of structure in the affected bronchial tubes, their mucous membrane becoming thickened or even ulcerated, while occasionally permanent dilatation of the bronchi takes place, often accompanied with profuse foetid expectoration. In long-standing cases of chronic bronchitis the nutrition of the lungs becomes impaired, and dilatation of the air-tubes (*emphysema*) and other complications result, giving rise to more or less constant breathlessness.

Chronic bronchitis may arise secondarily to some other ailment. This is especially the case in Bright's disease of the kidneys and in heart disease, of both of which maladies it often proves a serious complication, also in gout and syphilis. The influence of occupation is seen in the frequency in which persons following certain employments suffer from chronic bronchitis. Hirt has shown that the inhalation of vegetable dust is very liable to produce bronchitis through the irritation produced by the dust particles and the growth of organisms carried in with the dust. Consequently, millers and grain-shovellers are especially liable to it, while next in order come weavers and workers in cotton factories.

The treatment to be adopted in chronic bronchitis depends upon the severity of the case, the age of the patient and the presence or absence of complications. Attention to the general health is a matter of prime importance in all cases of the disease, more particularly among persons whose avocations entail exposure, and tonics with cod-liver oil will be found highly advantageous. The use of a respirator in very cold or damp weather is a valuable means of protection. In those aggravated forms of chronic bronchitis, where the slightest exposure to cold air brings on fresh attacks, it may become necessary, where circumstances permit, to enjoin confinement to a warm room or removal to a more genial climate during the winter months.

BRONCHOTOMY (Gr. βρόγχος, wind-pipe, and τέμνειν, to cut), a medical term used to describe a surgical incision into the throat; now largely superseded by the terms laryngotomy, thyrotomy and tracheotomy, which indicate more accurately the place of incision.

BRONCO, usually incorrectly spelt Broncho (a Spanish word meaning rough, rude), an unbroken or untamed horse, especially in the United States, a mustang; the word entered America by way of Mexico.

BRÖNDSTED, PETER OLUF (1780-1842), Danish archaeologist and traveller, was born at Fruering in Jutland on the 17th of November 1780. After studying at the university of Copenhagen he visited Paris in 1806 with his friend Georg Koes. After remaining there two years, they went together to Italy. Both were zealously attached to the study of antiquities; and congeniality of tastes and pursuits induced them, in 1810, to join an expedition to Greece, where they excavated the temples of Zeus in Aegina and of Apollo at Bassae in Arcadia. After three years of active researches in Greece, Bröndsted returned to Copenhagen, where, as a reward for his labours, he was appointed professor of Greek in the university. He then began to arrange and prepare for publication the vast materials he had collected during his travels; but finding that Copenhagen did not afford him the desired facilities, he exchanged his professorship for the office of Danish envoy at the papal court in 1818, and took up his abode at Rome. In 1820 and 1821 he visited Sicily and the Ionian Isles to collect additional materials for his great work. In 1826 he went to London, chiefly with a view of studying the Elgin marbles and other remains of antiquity in the British Museum, and became acquainted with the principal archaeologists of England. From 1828-1832 he resided in Paris, to superintend the publication of his *Travels*, and then returned to Copenhagen on being appointed director of the museum of antiquities and the collection of coins and medals. In 1842 he became rector of the university; but a fall from his horse caused his death on the 26th of June. His principal work was the *Travels and Archaeological Researches in Greece* (in German and French, 1826-1830), of which only two volumes were published, dealing with the island of Ceos and the metopes of the Parthenon.

BRONGNIART, ADOLPHE THÉODORE (1801-1876), French botanist, son of the geologist Alexandre Brongniart, was born in Paris on the 14th of January 1801. He soon showed an inclination towards the study of natural science, devoting himself at first more particularly to geology, and later to botany, thus equipping himself for what was to be the main occupation of his life—the investigation of fossil plants. In 1826 he graduated as doctor of medicine with a dissertation on the Rhamnaceae; but the career which he adopted was botanical, not medical. In 1831 he became assistant to R.L. Desfontaines at the Musée d'Histoire Naturelle, and two years later succeeded him as professor, a position which he continued to hold until his death in Paris on the 18th of February 1876.

Brongniart was an indefatigable investigator and a prolific writer, so that he left behind him, as the fruit of his labours, a large number of books and memoirs. As early as 1822 he published a paper on the classification and distribution of fossil plants (*Mém. Mus. Hist. Nat.* viii.). This was followed by several papers chiefly bearing upon the relation between extinct and existing forms—a line of research which culminated in the publication of the *Histoire des végétaux fossiles*, which has earned for him the title of "father of palaeobotany." This great work was heralded by a small but most important "Prodrome" (contributed to the *Grand Dictionnaire d'Hist. Nat.*, 1828, t. lvii.) which brought order into chaos by a classification in which the fossil plants were arranged, with remarkably correct insight, along with their nearest living allies, and which forms the basis of all subsequent progress in this direction. It is of especial botanical interest, because, in accordance

with Robert Brown's discoveries, the Cycadeae and Coniferae were placed in the new group *Phanérogames gymnospermes*. In this book attention was also directed to the succession of forms in the various geological periods, with the important result (stated in modern terms) that in the Palaeozoic period the Pteridophyta are found to predominate; in the Mesozoic, the Gymnosperms; in the Cainozoic, the Angiosperms, a result subsequently more fully stated in his "Tableau des genres de végétaux fossiles" (D'Orbigny, *Dict. Univ. d'Hist. Nat.*, 1849). But the great *Histoire* itself was not destined to be more than a colossal fragment; the publication of successive parts proceeded regularly from 1828 to 1837, when the first volume was completed, but after that only three parts of the second volume appeared. Brongniart, no doubt, was overwhelmed with the continually increasing magnitude of the task that he had undertaken. Apart from his more comprehensive works, his most important palaeontological contributions are perhaps his observations on the structure of *Sigillaria* (*Arch. Mus. Hist. Nat.* i., 1839) and his researches (almost the last he undertook) on fossil seeds, of which a full account was published posthumously in 1880. His activity was by no means confined to palaeobotany, but extended into all branches of botany, more particularly anatomy and phanerogamic taxonomy. Among his achievements in these directions the most notable is the memoir "Sur la génération et le développement de l'embryon des Phanérogames" (*Ann. Sci. Nat.* xii., 1827). This is remarkable in
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that it contains the first account of any value of the development of the pollen; as also a description of the structure of the pollen-grain, the confirmation of G. B. Amici's (1823) discovery of the pollen-tube, the confirmation of R. Brown's views as to the structure of the unimpregnated ovule (with the introduction of the term "sac embryonnaire"); and in that it shows how nearly Brongniart anticipated Amici's subsequent (1846) discovery of the entrance of the pollen-tube into the micropyle, fertilizing the female cell which then develops into the embryo. Of his anatomical works, those of the greatest value are probably the "*Recherches sur la structure et les fonctions des feuilles*" (*Ann. Sci. Nat.* xxi., 1830), and the "Nouvelles Recherches sur l'Épiderme" (*Ann. Sci. Nat.* i., 1834), in which, among other important observations, the discovery of the cuticle is recorded; and, further, the "Recherches sur l'organisation des tiges des Cycadées" (*Ann. Sci. Nat.* xvi., 1829), giving the results of the first investigation of the anatomy of those plants. His systematic work is represented by a large number of papers and monographs, many of which relate to the flora of New Caledonia; and by his *Énumération des genres de plantes cultivées au Musée d'Histoire Naturelle de Paris* (1843), which is an interesting landmark in the history of classification in that it forms the starting-point of the system, modified successively by A. Braun, A.W. Eichler and A. Engler, which is now adopted in Germany. In addition to his scientific and professorial labours, Brongniart held various important official posts in connexion with the department of education, and interested himself greatly in agricultural and horticultural matters. With J.V. Audouin and J.B.A. Dumas, his future brothers-in-law, he established the *Annales des Sciences Naturelles* in 1824; he also founded the Société Botanique de France in 1854, and was its first president.

For accounts of his life and work see *Bull. de la Soc. Géol. de France*, 1876, and *La Nature*, 1876; the *Bulletin de la Soc. Bot. de France* for 1876, vol. xxiii., contains a list of his works and the orations pronounced at his funeral.

(S. H. V.*)

BRONGNIART, ALEXANDRE (1770-1847), French mineralogist and geologist, son of the eminent architect who designed the Bourse and other public buildings of Paris, was born in that city on the 5th of February 1770. At an early age he studied chemistry, under Lavoisier, and after passing through the École des Mines he took honours at the École de Médecine; subsequently he joined the army of the Pyrenees as *pharmacien*; but having committed some slight political offence, he was thrown into prison and detained there for some time. Soon after his release he was appointed professor of natural history in the Collège des Quatre Nations. In 1800 he was made director of the Sèvres porcelain factory, a post which he retained to his death, and in which he achieved his greatest work. In his hands Sèvres became the leading porcelain factory in Europe, and the researches of an able band of assistants enabled him to lay the foundations of ceramic chemistry. In addition to his work at Sèvres, quite enough to engross the entire energy of any ordinary man, he continued his more purely scientific work. He succeeded Haüy as professor of mineralogy in the Museum of Natural History; but he did not confine himself to mineralogy, for it is to him that we owe the division of Reptiles into the four orders of Saurians, Batrachians, Chelonians and Ophidians. Fossil as well as living animals engaged his attention, and in his studies of the strata around Paris he was instrumental in establishing the Tertiary formations. In 1816 he was elected to the Academy; and in the following year he visited the Alps of Switzerland and Italy, and afterwards Sweden and Norway. The result of his observations was published from time to time in the *Journal des Mines* and other scientific journals. Wide as was the range of his interests his most famous work was accomplished at Sèvres, and his most enduring monument is his classic *Traité des arts céramiques* (1844). He died in Paris on the 7th of October 1847.

His other principal works are :—*Traité élémentaire de minéralogie, avec des applications aux arts* (2 vols., Paris, 1807); *Histoire naturelle des crustacés fossiles* (Paris, 1822); *Classification et caractères minéralogiques des roches homogènes et hétérogènes* (Paris, 1827); the *Tableau des terrains qui composent l'écorce du globe, ou Essai sur la structure de la partie connue de la terre* (Paris, 1829); and the *Traité des arts céramiques* (1844). Brongniart was also the coadjutor of Cuvier in the admirable *Essai sur la géographie minéralogique des environs de Paris* (Paris, 1811); originally published in *Ann. Mus. Hist. Nat.* (Paris, xi. 1808).

BRONN, HEINRICH GEORG (1800-1862), German geologist, was born on the 3rd of March 1800 at Ziegelhausen near Heidelberg. Studying at the university at Heidelberg he took his doctor's degree in the faculty of medicine in 1821, and in the following year was appointed professor of natural history. He now devoted himself to palaeontological studies, and to fieldwork in various parts of Germany, Italy and France. From its commencement in 1830 to 1862 he assisted in editing the *Jahrbuch für Mineralogie*, &c., continued as *Neues Jahrbuch.* His principal work, *Lethaea Geognostica* (2 vols., Stuttgart, 1834-1838; 3rd ed. with F. Römer, 3 vols., 1851-1856), has been regarded as one of the foundations of German stratigraphical geology. His *Handbuch einer Geschichte der Natur*, of which the first part was issued in 1841, gave a general account of the physical history of the earth, while the second part dealt with the life-history, species being regarded as direct acts of creation. The third part included his famous *Index Palaeontologicus*, and was issued in 3 vols., 1848-1849, with the assistance of H. von Meyer and H. R. Göppert. This record of fossils has proved of inestimable value to all palaeontologists. An important work on recent and fossil zoology, *Die Klassen und Ordnungen des Thier-Reichs*, was commenced by Bronn. He wrote the volumes dealing with Amorphozoa, Actinozoa, and Malacozoa, published 1859-1862; the work was continued by other naturalists. In 1861 Bronn was awarded the Wollaston medal by the Geological Society of London. He died at Heidelberg on the 5th of July 1862.

BRONSART VON SCHELLENDORF, PAUL (1832-1891), Prussian general, was born at Danzig in 1832. He entered the Prussian Guards in 1849, and was appointed to the general staff in 1861 as a captain; after three years of staff service he returned to regimental duty, but was soon reappointed to the staff, and lectured at the war academy, becoming major in 1865 and lieut.-colonel in 1869. During the war of 1870 he was chief of a section on the Great General Staff, and conducted the preliminary negotiations for the surrender of the French at Sedan. After the war Bronsart was made a colonel and chief of staff of the Guard army corps, becoming major-general in 1876 and lieut.-general (with a division command) in 1881. Two years later he became war minister, and during his tenure of the post (1883-1889) many important reforms were carried out in the Prussian army, in particular the introduction of the magazine rifle. He was appointed in 1889 to command the I. army corps at Königsberg. He died on the 23rd of June 1891 at his estate near Braunsberg. Bronsart's military writings include two works of great importance—*Ein Rückblick auf die taktischen Ruckblicke* (2nd ed., Berlin, 1870), a pamphlet written in reply to Captain May's *Tactical Retrospect of 1866*; and *Der Dienst des Generalstabes* (1st ed., Berlin, 1876; 3rd ed. revised by General Meckel, 1893; new ed. by the author's son, Major Bronsart von Schellendorf, Berlin, 1904), a comprehensive treatise on the duties of the general staff. The third edition of this work was soon after its publication translated into English and issued officially to the British army as *The Duties of the General Staff*. Major Bronsart's new edition of 1904 was reissued in English by the General Staff, under the same title, in 1905.

BRONTË, CHARLOTTE (1816-1855), **EMILY** (1818-1848), and **ANNE** (1820-1849), English novelists, were three of the six children of Patrick Brontë, a clergyman of the Church of England, who for the last forty-one years of his life was perpetual incumbent of the parish of Haworth in the West Riding of Yorkshire. Patrick Brontë was born at Emsdale, Co. Down, Ireland, on the 17th of March 1777. His parents were of the peasant class, their original name of Brunty apparently having been changed by their son on his entry at St John's College, Cambridge, in 1802. In the intervening years he had been successively a weaver and schoolmaster in his native
[v.04 p.0638] country. From Cambridge he became a curate, first at Wethersfield in Essex, in 1806, then for a few months at Wellington, Salop, in 1809. At the end of 1809 he accepted a curacy at Dewsbury, Yorkshire, following up this by one at Hartshead-cum-Clifton in the same county. At Hartshead Patrick Brontë married in 1812 Maria Branwell, a Cornishwoman, and there two children were born to him, Maria (1813-1825) and Elizabeth (1814-1825). Thence Patrick Brontë removed to Thornton, some 3 m. from Bradford, and here his wife gave birth to four children, Charlotte, Patrick Branwell (1817-1848), Emily Jane, and Anne, three of whom were to attain literary distinction.

In April 1820, three months after the birth of Anne Brontë, her father accepted the living of Haworth, a village near Keighley in Yorkshire, which will always be associated with the romantic story of the Brontës. In September of the following year his wife died. Maria Brontë lives for us in her daughter's biography only as the writer of certain letters to her "dear saucy Pat," as she calls her lover, and as the author of a recently published manuscript, an essay entitled *The Advantages of Poverty in Religious Concerns*, full of a sententiousness much affected at the time.

Upon the death of Mrs Brontë her husband invited his sister-in-law, Elizabeth Branwell, to leave Penzance and to take up her residence with his family at Haworth. Miss Branwell accepted the trust and would seem to have watched over her nephew and five nieces with conscientious care. The two eldest of those nieces were not long in following their mother. Maria and Elizabeth, Charlotte and Emily, were all sent to the Clergy Daughters' school at Cowan Bridge in 1824, and Maria and Elizabeth returned home in the following year to die. How far the bad food and drastic discipline were responsible cannot be accurately demonstrated. Charlotte gibbeted the school long years afterwards in *Jane Eyre*, under the thin disguise of "Lowood," and the principal, the Rev. William Carus Wilson (1792-1859), has been universally accepted as the counterpart of Mr Naomi Brocklehurst in the same novel. But congenital disease more probably accounts for the tragedy from which happily Charlotte and Emily escaped, both returning in 1825 to a prolonged home life at Haworth. Here the four surviving children amused themselves in intervals of study under their aunt's guidance with precocious literary aspirations. The many tiny booklets upon which they laboured in the succeeding years have been happily preserved. We find stories, verses

and essays, all in the minutest handwriting, none giving any indication of the genius which in the case of two of the four children was to add to the indisputably permanent in literature.

At sixteen years of age—in 1831—Charlotte Brontë became a pupil at the school of Miss Margaret Wooler (1792-1885) at Roe Head, Dewsbury. She left in the following year to assist in the education of the younger sisters, bringing with her much additional proficiency in drawing, French and composition; she took with her also the devoted friendship of two out of her ten fellow-pupils—Mary Taylor (1817-1893) and Ellen Nussey (1817-1897). With Miss Taylor and Miss Nussey she corresponded for the remainder of her life, and her letters to the latter make up no small part of what has been revealed to us of her life story. Her next three years at Haworth were varied by occasional visits to one or other of these friends. In 1835 she returned to Miss Wooler's school at Roe Head as a governess, her sister Emily accompanying her as a pupil, but remaining only three months, and Anne then taking her place. The year following the school was removed to Dewsbury. In 1838 Charlotte went back to Haworth and soon afterwards received her first offer of marriage—from a clergyman, Henry Nussey, the brother of her friend Ellen. This was followed a little later by a second offer from a curate named Bryce. She refused both and took a situation as nursery governess, first with the Sidgwicks of Stonegappe, Yorkshire, and later with the Whites at Rawdon in the same county. A few months of this, however, filled her with an ambition to try and secure greater independence as the possessor of a school of her own, and she planned to acquire more proficiency in "languages" on the continent, as a preliminary step. The aunt advanced some money, and accompanied by her sister Emily she became in February 1842 a pupil at the Pensionnat Héger, Brussels. Here both girls worked hard, and won the goodwill and indeed admiration of the principal teacher, M. Héger, whose wife was at the head of the establishment. But the two girls were hastily called back to England before the year had expired by the announcement of the critical illness of their aunt. Miss Branwell died on the 29th of October 1842. She bequeathed sufficient money to her nieces to enable them to reconsider their plan of life. Instead of a school at Bridlington which had been talked of, they could now remain with their father, utilize their aunt's room as a classroom, and take pupils. But Charlotte was not yet satisfied with what the few months on Belgian soil had done for her, and determined to accept M. Héger's offer that she should return to Brussels as a governess. Hence the year 1843 was passed by her at the Pensionnat Héger in that capacity, and in this period she undoubtedly widened her intellectual sphere by reading the many books in French literature that her friend M. Héger lent her. But life took on a very sombre shade in the lonely environment in which she found herself. She became so depressed that on one occasion she took refuge in the confessional precisely as did her heroine Lucy Snowe in *Villette*. In 1844 she returned to her father's house at Haworth, and the three sisters began immediately to discuss the possibilities of converting the vicarage into a school. Prospectuses were issued, but no pupils were forthcoming.

Matters were complicated by the fact that the only brother, Patrick Branwell, had about this time become a confirmed drunkard. Branwell had been the idol of his aunt and of his sisters. Educated under his father's care, he had early shown artistic leanings, and the slender resources of the family had been strained to provide him with the means of entering at the Royal Academy as a pupil. This was in 1835. Branwell, it would seem, indulged in a glorious month of extravagance in London and then returned home. His art studies were continued for a time at Leeds, but it may be assumed that no commissions came to him, and at last he became tutor to the son of a Mr Postlethwaite at Barrow-in-Furness. Ten months later he was a booking-clerk at Sowerby Bridge station on the Leeds & Manchester railway, and later at Luddenden Foot. Then he became tutor in the family of a clergyman named Robinson at Thorp Green, where his sister Anne was governess. Finally he returned to Haworth to loaf at the village inn, shock his sisters by his excesses, and to fritter his life away in painful sottishness. He died in September 1848, having achieved nothing reputable, and having disappointed all the hopes that had been centred in him. "My poor father naturally thought more of his *only* son than of his daughters," is one of Charlotte's dreary comments on the tragedy. In early years he had himself written both prose and verse; and a foolish story invented long afterwards attributed to him some share in his sisters' novels, particularly in Emily Brontë's *Wuthering Heights*. But Charlotte distinctly tells us that her brother never knew that his sisters had published a line. He was too much under the effects of drink, too besotted and muddled in that last year or two of life, to have any share in their intellectual enthusiasms.

The literary life had, however, opened bravely for the three girls during those years. In 1846 a volume of verse appeared from the shop of Aylott & Jones of Paternoster Row; "*Poems*, by Currer, Ellis and Acton Bell," was on the title-page. These names disguised the identity of Charlotte, Emily and Anne Brontë. The venture cost the sisters about £50 in all, but only two copies were sold. There were nineteen poems by Charlotte, twenty-one by Emily, and the same number by Anne. A consensus of criticism has accepted the fact that Emily's verse alone revealed true poetic genius. This was unrecognized then except by her sister Charlotte. It is obvious now to all.

The failure of the poems did not deter the authors from further effort. They had each a novel to dispose of. Charlotte Brontë's was called *The Master*, which before it was sent off to London was retitled *The Professor*. Emily's story was entitled *Wuthering Heights*, and Anne's *Agnes Gray*. All these stories travelled from publisher to publisher. At last *The Professor* reached the firm of Smith, Elder & Co., of Cornhill. The "reader" for that firm, R. Smith Williams (1800-1875), was impressed, as were also his employers. Charlotte Brontë received in August 1847 a letter informing her that whatever the merits of *The Professor*—and it was hinted that it lacked "varied interest"—it was too short for the three-volume form then counted imperative. The author was further told that a longer novel would be gladly considered. She replied in the same month with

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this longer novel, and *Jane Eyre* appeared in October 1847, to be wildly acclaimed on every hand, although enthusiasm was to receive a counterblast when more than a year later, in December 1848, Miss Rigby, afterwards Lady Eastlake (1809-1893), reviewed it in the *Quarterly*.

Meanwhile the novels of Emily and Anne had been accepted by T. C. Newby. They were published together in three volumes in December 1847, two months later than *Jane Eyre*, although the proof sheets had been passed by the authors before their sister's novel had been sent to the publishers. The dilatoriness of Mr Newby was followed up by considerable energy when he saw the possibility of the novels by Ellis and Acton Bell sailing on the wave of Currer Bell's popularity, and he would seem very quickly to have accepted another manuscript by Anne Brontë, for *The Tenant of Wildfell Hall* was published by Newby in three volumes in June 1848. It was Newby's clever efforts to persuade the public that the books he published were by the author of *Jane Eyre* that led Charlotte and Anne to visit London this summer and interview Charlotte's publishers in Cornhill with a view to establishing their separate identity. Soon after their return home Branwell died (the 24th of September 1848), and less than three months later Emily died also at Haworth (the 19th December 1848). Then Anne became ill and on the 24th of May 1849 Charlotte accompanied her to Scarborough in the hope that the sea air would revive her. Anne died there on the 28th of May, and was buried in Scarborough churchyard. Thus in exactly eight months Charlotte Brontë lost all the three companions of her youth, and returned to sustain her father, fast becoming blind, in the now desolate home at Haworth.

In the interval between the death of Branwell and of Emily, Charlotte had been engaged upon a new novel—*Shirley*. Two-thirds were written, but the story was then laid aside while its author was nursing her sister Anne. She completed the book after Anne's death, and it was published in October 1849. The following winter she visited London as the guest of her publisher, Mr George Smith, and was introduced to Thackerary, to whom she had dedicated *Jane Eyre*. The following year she repeated the visit, sat for her portrait to George Richmond, and was considerably lionized by a host of admirers. In August 1850 she visited the English lakes as the guest of Sir James Kay-Shuttleworth, and met Mrs Gaskell, Miss Martineau, Matthew Arnold and other interesting men and women. During this period her publishers assiduously lent her books, and her criticisms of them contained in many letters to Mr George Smith and Mr Smith Williams make very interesting reading. In 1851 she received a third offer of marriage, this time from Mr James Taylor, who was in the employment of her publishers. A visit to Miss Martineau at Ambleside and also to London to the Great Exhibition made up the events of this year. On her way home she visited Manchester and spent two days with Mrs Gaskell. During the year 1852 she worked hard with a new novel, *Villette*, which was published in January of 1853. In September of that year she received a visit from Mrs Gaskell at Haworth; in May 1854 she returned it, remaining three days at Manchester, and planning with her hostess the details of her marriage, for at this time she had promised to unite herself with her father's curate, Arthur Bell Nicholls (1817-1906), who had long been a pertinacious suitor for her hand but had been discouraged by Mr Brontë. The marriage took place in Haworth church on the 29th of June 1854, the ceremony being performed by the Rev. Sutcliffe Sowden, Miss Wooler and Miss Nussey acting as witnesses. The wedded pair spent their honeymoon in Ireland, returning to Haworth, where they made their home with Mr Brontë, Mr Nicholls having pledged himself to continue in his position as curate to his father-in-law. After less than a year of married life, however, Charlotte Nicholls died of an illness incidental to childbirth, on the 31st of March 1855. She was buried in Haworth church by the side of her mother, Branwell and Emily. The father followed in 1861, and then her husband returned to Ireland, where he remained some years afterwards, dying in 1906.

The bare recital of the Brontë story can give no idea of its undying interest, its exceeding pathos. Their life as told by their biographer Mrs Gaskell is as interesting as any novel. Their achievement, however, will stand on its own merits. Anne Brontë's two novels, it is true, though constantly reprinted, survive principally through the exceeding vitality of the Brontë tradition. As a hymn writer she still has a place in most religious communities. Emily is great alike as a novelist and as a poet. Her "Old Stoic" and "Last Lines" are probably the finest achievement of poetry that any woman has given to English literature. Her novel *Wuthering Heights* stands alone as a monument of intensity owing nothing to tradition, nothing to the achievement of earlier writers. It was a thing apart, passionate, unforgettable, haunting in its grimness, its grey melancholy. Among women writers Emily Brontë has a sure and certain place for all time. As a poet or maker of verse Charlotte Brontë is undistinguished, but there are passages of pure poetry of great magnificence in her four novels, and particularly in *Villette*. The novels *Jane Eyre* and *Villette* will always command attention whatever the future of English fiction, by virtue of their intensity, their independence, their rough individuality.

The *Life of Charlotte Brontë*, by Mrs Gaskell, was first published in 1857. Owing to the many controversial questions it aroused, as to the identity of Lowood in *Jane Eyre* with Cowan Bridge school, as to the relations of Branwell Brontë with his employer's wife, as to the supposed peculiarities of Mr Brontë, and certain other minor points, the third edition was considerably changed. The *Life* has been many times reprinted, but may be read in its most satisfactory form in the Haworth edition (1902), issued by the original publishers, Smith, Elder & Co. To this edition are attached a great number of letters written by Miss Brontë to her publisher, George Smith. The first new material supplied to supplement Mrs Gaskell's *Life* was contained in *Charlotte Brontë: a Monograph*, by T. Wemyss Reid (1877). This book inspired Mr A.C. Swinburne to issue separately a forcible essay on Charlotte and Emily Brontë, under the title of *A Note on Charlotte Brontë* (1877). A further collection of letters written by Miss Brontë was contained in *Charlotte Brontë and her Circle*, by Clement Shorter (1896), and interesting details

can be gathered from the *Life of Charlotte Brontë*, by Augustine Birrell (1887), *The Brontës in Ireland*, by William Wright, D.D. (1893), *Charlotte Brontë and her Sisters*, by Clement Shorter (1906), and the Brontë Society publications, edited by Butler Wood (1895-1907). Miss A. Mary F. Robinson (Madame Duclaux) wrote a separate biography of Emily Brontë in 1883, and an essay in her *Grands Écrivains d'outre-Manche*. *The Brontës: Life and Letters*, by Clement Shorter (1907), contains the whole of C. Brontë's letters in chronological order.

(C. K. S.)

BRONTE, a town of the province of Catania, Sicily, on the western slopes of Mt. Etna, 24 m. N.N.W. of Catania direct, and 34 m. by rail. Pop. (1901) 20,366. It was founded by the emperor Charles V. The town, with an extensive estate which originally belonged to the monastery of Maniacium (Maniace), was granted, as a dukedom, to Nelson by Ferdinand IV. of Naples in 1799.

BRONX, THE, formerly a district comprising several towns in Westchester county, New York, U.S.A., now (since 1898) the northernmost of the five boroughs of New York City (*q.v.*). Several settlements in the Bronx were made by the English and the Dutch between 1640 and 1650.

BRONZE, an alloy formed wholly or chiefly of copper and tin in variable proportions. The word has been etymologically connected with the same root as appears in "brown," but according to M.P.E. Berthelot (*La Chimie au moyen âge*) it is a place-name derived from *aes Brundusianum* (cf. Pliny, *Nat. Hist.* xxxiii. ch. ix. §45, "specula optima apud majores fuerunt Brundusiana, stanno et aere mixtis"). A Greek MS. of about the 11th century in the library of St Mark's, Venice, contains the form βροντήσιον, and gives the composition of the alloy as 1 lb of copper with 2 oz. of tin. The product obtained by adding tin to copper is more fusible than copper and thus better suited for casting; it is also harder and less malleable. A soft bronze or *gun-metal* is formed with 16 parts of copper to 1 of tin, and a harder gun-metal, such as was used for bronze ordnance, when the proportion of tin is about doubled. The *steel bronze* of Colonel Franz Uchatius (1811-1881) consisted of copper alloyed with 8% of tin, the tenacity and hardness being increased by cold-rolling. Bronze containing about 7 parts of copper to 1 of tin is hard, brittle and sonorous, and can be tempered to take a fine edge. *Bell-metal* varies considerably in composition, from about 3 to 5 parts of copper to 1 of tin. In *speculum metal* there are 2 to 2½ parts of copper to 1 of tin. Statuary bronze may contain from 80 to 90% of copper, the residue being tin, or tin with zinc and lead in various proportions. The bronze used for the British and French copper coinage consists of 95% copper, 4% tin and 1% zinc. Many copper-tin alloys employed for machinery-bearings contain a small proportion of zinc, which gives increased hardness. "Anti-friction metals," also used in bearings, are copper-tin alloys in which the amount of copper is small and there is antimony in addition. Of this class an example is "Babbitt's metal," invented by Isaac Babbitt (1799-1862); it originally consisted of 24 parts of tin, 8 parts of antimony and 4 parts of copper, but in later compositions for the same purpose the proportion of tin is often considerably higher. Bronze is improved in quality and strength when fluxed with phosphorus. Alloys prepared in this way, and known as *phosphor bronze*, may contain only about 1% of phosphorus in the ingot, reduced to a mere trace after casting, but their value is nevertheless enhanced for purposes in which a hard strong metal is required, as for pump plungers, valves, the bushes of bearings, &c. Bronze again is improved by the presence of manganese in small quantity, and various grades of *manganese bronze*, in some of which there is little or no tin but a considerable percentage of zinc, are extensively used in mechanical engineering. Alloys of copper with aluminium, though often nearly or completely destitute of tin, are known as *aluminium bronze*, and are valuable for their strength and the resistance they offer to corrosion. By the addition of a small quantity of silicon the tensile strength of copper is much increased; a sample of such *silicon bronze*, used for telegraph wires, on analysis was found to consist of 99.94% of copper, 0.03% of tin, and traces of iron and silicon.

The bronze (Gr. χαλκός, Lat. *aes*) of classical antiquity consisted chiefly of copper, alloyed with one or more of the metals, zinc, tin, lead and silver, in proportions that varied as times changed, or according to the purposes for which the alloy was required. Among bronze remains the copper is found to vary from 67 to 95%. From the analysis of coins it appears that for their bronze coins the Greeks adhered to an alloy of copper and tin till 400 B.C., after which time they used also lead with increasing frequency. Silver is rare in their bronze coins. The Romans also used lead as an alloy in their bronze coins, but gradually reduced the quantity, and under Caligula, Nero, Vespasian and Domitian, coined pure copper coins; afterwards they reverted to the mixture of lead. So far the words χαλκός and *aes* may be translated as bronze. Originally, no doubt, χαλκός was the name for pure copper. It is so employed by Homer, who calls it ἐρυθρός (red), αἴθυψ (glittering), φαεννός (shining), terms which apply only to copper. But instead of its following from this that the process of alloying copper with other metals was not practised in the time of the poet, or was unknown to him, the contrary would seem to be the case from the passage (*Iliad* xviii. 474) where he describes Hephaestus as throwing into his furnace copper, tin, silver and gold to make the shield of Achilles, so that it is not always possible to know whether when he uses the word χαλκός he means copper pure or alloyed. Still more difficult is it to make this distinction when we read of the mythical Dactyls of Ida in Crete or the Telchines or Cyclopes being acquainted with the smelting of χαλκός. It is not, however, likely that later Greek writers, who knew bronze in its true sense, and called it χαλκός, would have employed this word without qualification for objects which they had seen unless they had meant it to be taken as bronze. When Pausanias (iii. 17. 6) speaks of a statue, one of the oldest figures he had seen of this material, made of separate pieces fastened together with nails, we understand him to mean literally bronze, the more readily since there exist very early figures and utensils of bronze so

made.

For the use of bronze in art, see METAL-WORK.

BRONZE AGE, the name given by archaeologists to that stage in human culture, intermediate between the Stone and Iron Ages, when weapons, utensils and implements were, as a general rule, made of bronze. The term has no absolute chronological value, but marks a period of civilization through which it is believed that most races passed at one time or another. The "finds" of stone and bronze, of bronze and iron, and even of stone and iron implements together in tumuli and sepulchral mounds, suggest that in many countries the three stages in man's progress overlapped. From the similarity of types of weapons and implements of the period found throughout Europe a relatively synchronous commencement has been inferred for the Bronze Age in Europe, fixed by most authorities at between 2000 B.C. to 1800 B.C. But it must have been earlier in some countries, and is certainly known to have been later in others; while the Mexicans and Peruvians were still in their bronze age in recent times. Not a few archaeologists have denied that there ever was a distinct Bronze Age. They have found their chief argument in the fact that weapons of these ages have been found side by side in prehistoric burial-places. But when it is admitted that the ages must have overlapped, it is fairly easy to undertand the mixed "finds." The beginning, the prevalence and duration of the Bronze Age in each country would have been ordered by the accessibility of the metals which form the alloy. Thus in some lands bronze may have continued to be a substance of extreme value until the Iron Age was reached, and in tumuli in which more than one body was interred, as was frequently the case, it would only be with the remains of the richer tenants of the tomb that the more valuable objects would be placed. There is, moreover, much reason to believe that sepulchral mounds were opened from age to age and fresh interments made, and in such a practice would be found a simple explanation of the mixing of implements. Another curious fact has been seized on by those who argue against the existence of a Bronze Age. Among all the "finds" examined in Europe there is a most remarkable absence of copper implements. The sources of tin in Europe are practically restricted to Cornwall and Saxony. How then are we to explain on the one hand the apparent stride made by primitive man when from a Stone Age civilization he passed to a comparatively advanced metallurgical skill? On the other, how account for a comparatively synchronous commencement of bronze civilization when one at least of the metals needed for the alloy would have been naturally difficult of access, if not unknown to many races? The answer is that there can be but little doubt that the knowledge of bronze came to the races of Europe from outside. Either by the Phoenicians or by the Greeks metallurgy was taught to men who no sooner recognized the nature and malleable properties of copper than they learnt that by application of heat a substance could be manufactured with tin far better suited to their purposes. Copper would thus have been but seldom used unalloyed; and the relatively synchronous appearance of bronze in Europe, and the scanty "finds" of copper implements, are explained. We may conclude then that there was a Bronze Age in most countries; that it was the direct result of increasing intercommunication of races and the spread of commerce; and that the discovery of metals was due to information brought to Stone-Age man in Europe by races which were already skilful metallurgists.

The Bronze Age in Europe is characterized by weapons, utensils and implements, distinct in design and size from those in use in the preceding or succeeding stage of man's civilization. Moreover—and this has been employed as an argument in favour of the foreign origin of the knowledge of bronze—all the objects in one part of Europe are identical in pattern and size with those found in another part. The implements of the Bronze Age include swords, awls, knives, gouges, hammers, daggers and arrow-heads. A remarkable confirmation of the theory that the Bronze Age culture came from the East is to be found in the patterns of the arms, which are distinctly oriental; while the handles of swords and daggers are so narrow and short as to make it unlikely that they would be made for use by the large-handed races of Europe. The Bronze Age is also characterized by the fact that cremation was the mode of disposal of the dead, whereas in the Stone Age burial was the rule. Barrows and sepulchral mounds strictly of the Bronze Age are smaller and less imposing than those of the Stone Age. Besides varied and beautiful weapons, frequently exhibiting high workmanship, amulets, coronets, diadems of solid gold, and vases of elegant form and ornamentation in gold and bronze are found in the barrows. These latter appear to have been used as tribal or family cemeteries. In Denmark as many as seventy deposits of burnt bones have been found in a single mound, indicating its use through a long succession of years. The ornamentation of the period is as a rule confined to spirals, bosses and concentric circles. What is remarkable is that the swords not only show the design of the cross in the shape of the handle, but also in tracery what is believed to be an imitation of the Svastika, that ancient Aryan symbol which was probably the first to be made with a definite intention and a consecutive meaning. The pottery is all "hand-made," and the bulk of the objects excavated are cinerary urns, usually found full of burnt bones. These vary from 12 to 18 in. in height. Their decoration is confined to a band round the upper part of the pot, or often only a projecting flange lapped round the whole rim. A few have small handles, formed of pierced knobs of clay and sometimes projecting rolls of clay, looped, as it were, all round the urn. The ornamentation consists of dots, zigzags, chevrons or crosses. The lines were frequently made by pressing a twisted thong of skin against the moist clay; the patterns in all cases being stamped into the pot before it was hardened by fire.

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See ARCHAEOLOGY, &c. Also Lord Avebury, *Prehistoric Times* (1900); Sir J. Evans, *Ancient Bronze Implements of Great Britain* (1881); Chartre's *Age du bronze en France*.

BRONZING, a process by which a bronze-like surface is imparted to objects of metal, plaster, wood, &c. On metals a green bronze colour is sometimes produced by the action of such substances as vinegar, dilute nitric acid and sal-ammoniac. An antique appearance may be given to new bronze articles by brushing over the clean bright metal with a solution of sal-ammoniac and salt of sorrel in vinegar, and rubbing the surface dry, the operation being repeated as often as necessary. Another solution for the same purpose is made with sal-ammoniac, cream of tartar, common salt and silver nitrate. With a solution of platinic chloride almost any colour can be produced on copper, iron, brass or new bronze, according to the dilution and the number of applications. Articles of plaster and wood may be bronzed by coating them with size and then covering them with a bronze powder, such as Dutch metal, beaten into fine leaves and powdered. The bronzing of gun-barrels may be effected by the use of a strong solution of antimony trichloride.

BRONZINO, IL, the name given to ANGELO ALLORI (1502-1572), the Florentine painter. He became the favourite pupil of J. da Pontormo. He painted the portraits of some of the most famous men of his day, such as Dante, Petrarch and Boccaccio. Most of his best works are in Florence, but examples are in the National Gallery, London, and elsewhere.

BRONZITE, a member of the pyroxene group of minerals, belonging with enstatite and hypersthene to the orthorhombic series of the group. Rather than a distinct species, it is really a ferriferous variety of enstatite, which owing to partial alteration has acquired a bronze-like sub-metallic lustre on the cleavage surfaces. Enstatite is magnesium metasilicate, $MgSiO_3$, with the magnesia partly replaced by small amounts (up to about 5%) of ferrous oxide; in the bronzite variety, $(Mg,Fe)SiO_3$, the ferrous oxide ranges from about 5 to 14%, and with still more iron there is a passage to hypersthene. The ferriferous varieties are liable to a particular kind of alteration, known as "schillerization," which results in the separation of the iron as very fine films of oxide and hydroxides along the cleavage cracks of the mineral. The cleavage surfaces therefore exhibit a metallic sheen or "schiller," which is even more pronounced in hypersthene than in bronzite. The colour of bronzite is green or brown; its specific gravity is about 3.2-3.3, varying with the amount of iron present. Like enstatite, bronzite is a constituent of many basic igneous rocks, such as norites, gabbros, and especially peridotites, and of the serpentines which have been derived from them. It also occurs in some crystalline schists.

Bronzite is sometimes cut and polished, usually in convex forms, for small ornamental objects, but its use for this purpose is less extensive than that of hypersthene. It often has a more or less distinct fibrous structure, and when this is pronounced the sheen has a certain resemblance to that of cat's-eye. Masses sufficiently large for cutting are found in the norite of the Kupferberg in the Fichtelgebirge, and in the serpentine of Kraubat near Leoben in Styria. In this connexion mention may be made of an altered form of enstatite or bronzite known as *bastite* or *schiller-spar*. Here, in addition to schillerization, the original enstatite has been altered by hydration and the product has approximately the composition of serpentine. In colour bastite is brown or green with the same metallic sheen as bronzite. The typical locality is Baste in the Radauthal, Harz, where patches of pale greyish-green bastite are embedded in a darker-coloured serpentine. This rock when cut and polished makes an effective decorative stone, although little used for that purpose.

(L. J. S.)

BROOCH, or BROACH (from the Fr. *broche*, originally an awl or bodkin; a spit is sometimes called a broach, and hence the phrase "to broach a barrel"; see BROKER), a term now used to denote a clasp or fastener for the dress, provided with a pin, having a hinge or spring at one end, and a catch or loop at the other.

Brooches of the safety-pin type (*fibulae*) were extensively used in antiquity, but only within definite limits of time and place. They seem to have been unknown to the Egyptians, and to the oriental nations untouched by Greek influence. In lands adjacent to Greece, they do not occur in Crete or at Hissarlik. The place of origin cannot as yet be exactly determined, but it would seem to have been in central Europe, towards the close of the Bronze Age, somewhat before 1000 B.C. The earliest form is little more than a pin, bent round for security, with the point caught against the head. One such actual pin has been found. In its next simplest form, very similar to that of the modern safety-pin (in which the coiled spring forces the point against the catch), it occurs in the lower city of Mycenae, and in late deposits of the Mycenaean Age, such as at Enkomi in Cyprus. It occurs also (though rarely) in the "terramare" deposits of the Po valley, in the Swiss lake-dwellings of the later Bronze Age, in central Italy, in Hungary and in Bosnia. (fig. 1).[1]

From the comparatively simple initial form, the fibula developed in different lines of descent, into different shapes, varying according to the structural feature which was emphasized. On account of the number of local variations, the subject is extremely complex, but the main lines of development were approximately as follows.

FIG. 1.—Early type from Peschiera.

Towards the end of the Bronze Age the safety-pin was arched into a bow, so as to include a greater amount of stuff in its compass.

In the older Iron Age or "Hallstatt period" the bow and its accessories are thickened and modified in various directions, so as to give greater rigidity, and prominences or surfaces for decoration. The chief types have been conveniently classed by Montelius in four main groups, according to

the characteristic forms:—

I. The wire of the catch-plate is hammered into a flat disk, on which the pin rests (fig. 2)

II. The bow is thickened towards the middle, so as to assume the "leech" shape, or it is hollowed out underneath, into the "boat" form. The catch-plate is only slightly turned up, but it becomes elongated, in order to mask the end of a long pin (fig. 3).

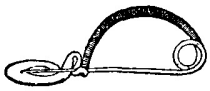

FIG. 2.—Type I. with disk for catch-plate.

III. The catch-plate is flattened out as in group I., but additional convolutions are added to the bow (fig. 4).

IV. The bow is convoluted (but the convolutions are sometimes represented by knobs); the catch-plate develops as in group II. (fig. 5). For further examples of the four types, see *Antiquities of Early Iron Age in British Museum*, p. 32.

Among the special variations of the early form, mention should be made of the fibulae of the geometric age of Greece, with an exaggerated development of the vertical portion of the catch-plate (fig. 6).

The example shown in fig. 7 is an ornate development of type II. above.

In the later Iron Age (or early La Tène period) the prolongation of the catch-plate described in the second and fourth groups above has a terminal knob ornament, which is reflexed upwards, at first slightly (fig. 8), and then to a marked extent, turning back towards the bow.

A far-reaching change in the design was at the same time brought about by a simple improvement in principle, apparently introduced within the area of the La Tène culture. Instead of a unilateral spring—that is, of one coiled on one side only of the bow as commonly in the modern safety-pin—the brooch became bilateral. The spring was coiled on one side of the axis of the bow, and thence the wire was taken to the other side of the axis, and again coiled in a corresponding manner before starting in a straight line to form the pin. Once invented, the bilateral spring became almost universal, and its introduction serves to divide the whole mass of ancient fibulae into an older and a younger group.

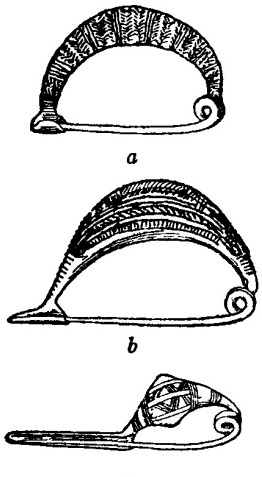

FIG. 3.—Type II. with turned-up and elongated catch-plate. *a*, "Leech" fibula; *b*, "Boat" fibula; *c.* variation of "Boat" fibula.

With the progress of the La Tène period (300-1 B.C.) the reflection of the catch-plate terminal became yet more marked, until it became practically merged in the bow (fig. 9). Meanwhile, the bilateral spring described above was developing into two marked projections on each side of the axis. In order to give the double spring strength and protection it was given a metal core, and a containing tube. When the core had been provided the pin was no longer necessarily a continuation of the bow, and it became in fact a separate member, as in a modern brooch of a non-safety-pin type, and was no longer actuated by its own spring.

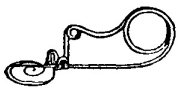

FIG. 4.—Type III with disk for catch-plate, and convoluted bow.

The T-shaped or "cross-bow" fibula was thus developed. During the first centuries of the Empire it attained great size and importance (figs. 10-12). The form is conveniently dated at its highest development by its occurrence on the ivory diptych of Stilicho at Monza (c. A.D. 400).

In the tombs of the Frankish and kindred Teutonic tribes between the 5th and 9th centuries the crossbar of the T becomes a yet more elaborately decorated semicircle, often surrounded by radial knobs and a chased surface. The base of the shaft is flattened out, and is no less ornate (fig. 13). At the beginning of this period the fibula of King Childeric (A.D. 481) has a singularly complicated pin-fastening.

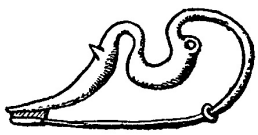

FIG. 5.—Type IV. with turned-up catch-plate and convoluted bow.

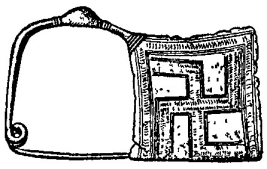

FIG. 6.—Greek geometric fibula.

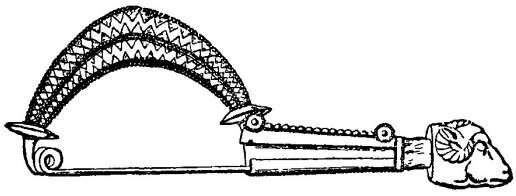

FIG. 7.—Gold fibula from Naples.

So far we have

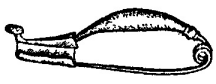

FIG. 8.—Early La Tène period. Reflexed terminal ornament.

traced the history of the safety-pin form of brooch. Concurrently with it, other forms of brooch were developed in which the safety-pin principle is either absent or effectually disguised. One such form is that of the circular medallion brooch. It is found in Etruscan deposits of a fully

developed style, and is commonly represented in Greek and Roman sculptures as a stud to fasten the cloak on the shoulder. In the Roman provinces the circular brooches are very numerous, and are frequently decorated with inlaid stone, paste or enamel. Another kind of brooch, also known from early times, is in the form of an animal. In the early types the animal is a decorative appendage, but in later examples it forms the body of the brooch, to which a pin like the modern brooch-pin is attached underneath. Both of these shapes, namely the medallion and the animal form, are found in Frankish cemeteries, together with the later variations of the T-shaped brooch described above. Such brooches were made in gold, silver or bronze, adorned with precious stones, filigree work, or enamel; but whatever the richness of the material, the pin was nearly always of iron. The Scandinavian or northern group of T-shaped brooches are in their early forms indistinguishable from those of the Frankish tombs, but as time went on they became more massive, and richly decorated with intricate devices (perhaps brought in by Irish missionary influence), into which animal forms were introduced. The period covered is from the 5th to the 8th centuries.

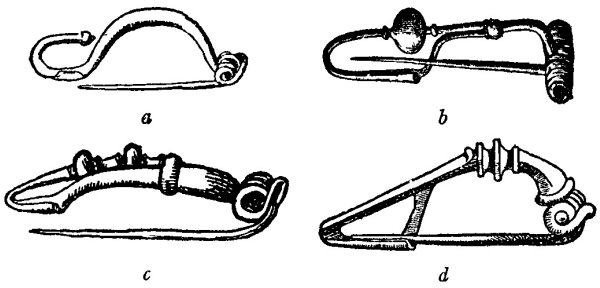

Fig. 9, a-d.—Fibula of the La Tène period, showing the development of the reflexed terminal, and the bilateral spring.

The T-form, the medallion-form, and (occasionally) the animal forms occur in Anglo-Saxon graves in England. In Kent the medallion-form predominates. The [v.04 p.0643] Anglo-Saxon brooches were exquisite works of art, ingeniously and tastefully constructed. They are often of gold, with a central boss, exquisitely decorated, the flat part of the brooch being a mosaic of turquoises, garnets on gold foil, mother of pearl, &c. arranged in geometric patterns, and the gold work enriched with filigree or decorated with dragonesque engravings.

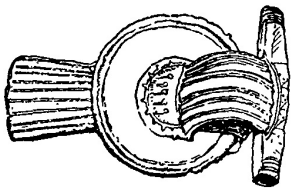

Fig. 10.—Military Fibula. 3rd century A.D.

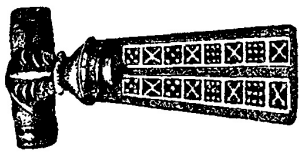

Fig. 11.—Fibula with niello work. 3rd century A.D.

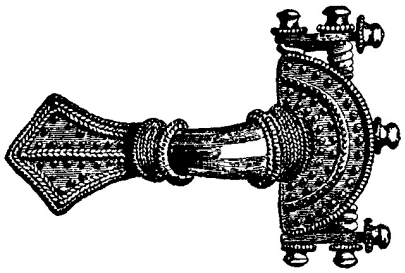

Fig. 12.—Gold Fibula. 4th century A.D.

The Scandinavian brooches of the Viking period (A.D. 800-1050) were oval and convex, somewhat in the form of a tortoise. In their earliest form they occur in the form of a frog-like animal, itself developed from the previous Teutonic T-shaped type. With the introduction of the intricate system of ornament described above, the frog-like animal is gradually superseded by purely decorative lines. The convex bowls are then worked *à jour* with a perforated upper shell of chased work over an under shell of impure bronze, gilt on the convex side. These outer cases are at last decorated with open crown-like ornament and massive projecting bosses. The geographical distribution of these peculiar brooches indicates the extent of the conquests of the Northmen. They occur in northern Scotland, England, Ireland, Iceland, Normandy and Livonia.

The Celtic group is characterized by the penannular form of the ring of the brooch and the greater length of the pin. The penannular ring, inserted through a hole at the head of the long pin, could be partially turned when the pin had been thrust through the material in such a way that the brooch became in effect a buckle. These brooches are usually of bronze or silver, chased or engraved with intricate designs of interlaced or dragonesque work in the style of the illuminated Celtic manuscripts of the 7th, 8th and 9th centuries. The Hunterston brooch, which was found at Hawking Craig in Ayrshire, is a well-known example of this style. Silver brooches of immense size, some having pins 15 in. in length, and the penannular ring of the brooch terminating in large knobs resembling thistle heads, are occasionally found in Viking hoards of this period, consisting of bullion, brooches and Cufic and Anglo-Saxon coins buried on Scottish soil. In medieval times the form of the brooch was usually a simple, flat circular disk, with open centre, the pin being equal in length to the diameter of the brooch. They were often

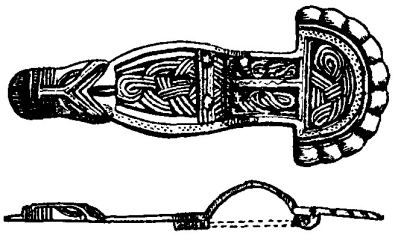

Fig. 13.—Fibula of the Frankish period.

inscribed with religious and talismanic *formulae*. The Highland brooches were commonly of this form, but the disk was broader, and the central opening smaller in proportion to the size of the brooch. They were ornamented in the style so common on Highland powder-horns, with engraved patterns of interlacing work and foliage, arranged in geometrical spaces, and sometimes mingled with figures of animals.

(A. H. Sm.)

[1] The illustrations of this article are from Dr Robert Forrer's *Reallexikon*, by permission of W. Spemann, Berlin and Stuttgart.

BROOKE, FRANCES (1724-1789), English novelist and dramatist, whose maiden name was Moore, was born in 1724. Of her novels, some of which enjoyed considerable popularity in their day, the most important were *The History of Lady Julia Mandeville* (1763), *Emily Montague* (1769) and *The Excursion* (1777). Her dramatic pieces and translations from the French are now forgotten. She died in January 1789.

BROOKE, FULKE GREVILLE, 1ST BARON (1554-1628), English poet, only son of Sir Fulke Greville, was born at Beauchamp Court, Warwickshire. He was sent in 1564, on the same day as his life-long friend, Philip Sidney, to Shrewsbury school. He matriculated at Jesus College, Cambridge, in 1568. Sir Henry Sidney, president of Wales, gave him in 1576 a post connected with the court of the Marches, but he resigned it in 1577 to go to court with Philip Sidney. Young Greville became a great favourite with Queen Elizabeth, who treated him with less than her usual caprice, but he was more than once disgraced for leaving the country against her wishes. Philip Sidney, Sir Edward Dyer and Greville were members of the "Areopagus," the literary clique which, under the leadership of Gabriel Harvey, supported the introduction of classical metres into English verse. Sidney and Greville arranged to sail with Sir Francis Drake in 1585 in his expedition against the Spanish West Indies, but Elizabeth peremptorily forbade Drake to take them with him, and also refused Greville's request to be allowed to join Leicester's army in the Netherlands. Philip Sidney, who took part in the campaign, was killed on the 17th of October 1586, and Greville shared with Dyer the legacy of his books, while in his *Life of the Renowned Sir Philip Sidney* he raised an enduring monument to his friend's memory. About 1591 Greville served for a short time in Normandy under Henry of Navarre. This was his last experience of war. In 1583 he became secretary to the principality of Wales, and he represented Warwickshire in parliament in 1592-1593, 1597, 1601 and 1620. In 1598 he was made treasurer of the navy, and he retained the office through the early years of the reign of James I. In 1614 he became chancellor and under-treasurer of the exchequer, and throughout the reign he was a valued supporter of the king's party, although in 1615 he advocated the summoning of a parliament. In 1618 he became commissioner of the treasury, and in 1621 he was raised to the peerage with the title of Baron Brooke, a title which had belonged to the family of his paternal grandmother, Elizabeth Willoughby. He received from James I. the grant of Warwick Castle, in the restoration of which he is said to have spent £20,000. He died on the 30th of September 1628 in consequence of a wound inflicted by a servant who was disappointed at not being named in his master's will. Brooke was buried in St Mary's church, Warwick, and on his tomb was inscribed the epitaph he had composed for himself: "Folk Grevill Servant to Queene Elizabeth Conceller to King James Frend to Sir Philip Sidney. Trophaeum Peccati."

A rhyming elegy on Brooke, published in Huth's *Inedited Poetical Miscellanies*, brings charges of extreme penuriousness against him, but of his generous treatment of contemporary writers there is abundant testimony. His only works published during his lifetime were four poems, one of which is the elegy on Sidney which appeared in *The Phoenix Nest* (1593), and the *Tragedy of Mustapha*. A volume of his works appeared in 1633, another of *Remains* in 1670, and his biography of Sidney in 1652. He wrote two tragedies on the Senecan model, *Alaham* and *Mustapha*. The scene of Alaham is laid in Ormuz. The development of the piece fully bears out the gloom of the prologue, in which the ghost of a former king of Ormuz reveals the magnitude of the curse about to descend on the doomed family. The theme of *Mustapha* is borrowed from Madeleine de Scudéry's *Ibrahim ou l'illustre Bassa*, and turns on the ambition of the sultana Rossa. The choruses of these plays are really philosophical dissertations, and the connexion with the rest of the drama is often very slight. In *Mustapha*, for instance, the third chorus is a dialogue between Time and Eternity, while the fifth consists of an invective against the evils of superstition, followed by a chorus of priests that does nothing to dispel the impression of scepticism contained in the first part. He tells us himself that the tragedies were not intended for the stage. Charles Lamb says they should rather be called political treatises. Of Brooke Lamb says, "He is nine parts Machiavel and Tacitus, for one of Sophocles and Seneca.... Whether we look into his plays or his most passionate love-poems, we shall find all frozen and made rigid with intellect." He goes on to speak of the obscurity of expression that runs through all Brooke's poetry, an obscurity which is, however, due more to the intensity and subtlety of the thought than to any lack of mere verbal lucidity.

It is by his biography of Sidney that Fulke Greville is best known. The full title expresses the scope of the work. It runs: *The Life of the Renowned Sr. Philip Sidney. With the true Interest of England as it then stood in relation to all Forrain Princes: And particularly for suppressing the power of Spain Stated by Him: His principall Actions, Counsels, Designes, and Death. Together with a short account of the Maximes and Policies used by Queen Elizabeth in her Government*. He includes some autobiographical matter in what amounts to a treatise on government. He had intended to write a history of England under the Tudors, but Robert Cecil refused him access to the necessary state papers.

Brooke left no sons, and his barony passed to his cousin, Robert Greville (*c.* 1608-1643), who thus became 2nd Lord Brooke. This nobleman was imprisoned by Charles I. at York in 1639 for refusing to take the oath to fight for the king, and soon became an active member of the parliamentary party; taking part in the Civil War he defeated the Royalists in a skirmish at Kineton in August 1642. He was soon given a command in the midland counties, and having seized Lichfield he was killed there on the 2nd of March 1643. Brooke, who is eulogized as a friend of toleration by Milton, wrote on philosophical, theological and current political topics. In 1746 his descendant, Francis Greville, the 8th baron (1710-1773), was created earl of Warwick, a title still in his family.

Dr A.B. Grosart edited the complete works of Fulke Greville for the *Fuller Worthies Library* in 1870, and made a small selection, published in the *Elizabethan Library* (1894). Besides the works above mentioned, the volumes include *Poems of Monarchy, A Treatise of Religion, A Treatie of Humane Learning, An Inquisition upon Fame and Honour, A Treatie of Warres, Caelica in CX Sonnets*, a collection of lyrics in various forms, a letter to an "Honourable Lady," a letter to Grevill Varney in France, and a short speech delivered on behalf of Francis Bacon, some minor poems, and an introduction including some of the author's letters. The life of Sidney was reprinted by Sir S. Egerton Brydges in 1816; and with an introduction by N. Smith in the "Tudor and Stuart Library" in 1907; *Caelica* was reprinted in M.F. Crow's "Elizabethan Sonnet Cycles" in 1898. See also an essay in Mrs. C.C. Stopes's *Shakespeare's Warwickshire Contemporaries* (1907).

BROOKE, HENRY (*c.* 1703-1783), Irish author, son of William Brooke, rector of Killinkere, Co. Cavan, was born at Rantavan in the same county, about 1703. His mother was a daughter of Simon Digby, bishop of Elphin. Dr Thomas Sheridan was one of his schoolmasters, and he was entered at Trinity College, Dublin, in 1720; in 1724 he was sent to London to study law. He married his cousin and ward, Catherine Meares, before she was fourteen. Returning to London he published a philosophical poem in six books entitled *Universal Beauty* (1735). He attached himself to the party of the prince of Wales, and took a small house at Twickenham near to Alexander Pope. In 1738 he translated the first and second books of Tasso's *Gerusalemme liberata*, and in the next year he produced a tragedy, *Gustavas Vasa, the Deliverer of his Country*. This play had been rehearsed for five weeks at Drury Lane, but at the last moment the performance was forbidden. The reason of this prohibition was a supposed portrait of Sir Robert Walpole in the part of Trollio. In any case the spirit of fervent patriotism which pervaded the play was probably disliked by the government. The piece was printed and sold largely, being afterwards put on the Irish stage under the title of *The Patriot*. This affair provoked a satirical pamphlet from Samuel Johnson, entitled "A Complete Vindication of the Licensers of the Stage from the malicious and scandalous Aspersions of Mr Brooke" (1739). His wife feared that his connexion with the opposition was imprudent, and induced him to return to Ireland. He interested himself in Irish history and literature, but a projected collection of Irish stories and a history of Ireland from the earliest times were abandoned in consequence of disputes about the ownership of the materials. During the Jacobite rebellion of 1745 Brooke issued his *Farmer's Six Letters to the Protestants of Ireland* (collected 1746) the form of which was suggested by Swift's *Drapier's Letters*. For this service he received from the government the post of barrack-master at Mullingar, which he held till his death. He wrote other pamphlets on the Protestant side, and was secretary to an association for promoting projects of national utility. About 1760 he entered into negotiations with leading Roman Catholics, and in 1761 he wrote a pamphlet advocating alleviation of the penal laws against them. He is said to have been the first editor of the *Freeman's Journal*, established at Dublin in 1763. Meanwhile he had been obliged to mortgage his property in Cavan, and had removed to Co. Kildare. Subsequently a bequest from Colonel Robert Brooke enabled him to purchase an estate near his old home, and he spent large sums in attempting to reclaim the waste-land. His best-known work is the novel entitled *The Fool of Quality; or the History of Henry Earl of Moreland*, the first part of which was published in 1765; and the fifth and last in 1770. The characters of this book, which relates the education of an ideal nobleman by an ideal merchant-prince, are gifted with a "passionate and tearful sensibility," and reflect the real humour and tenderness of the writer. Brooke's religious and philanthropic temper recommended the book to John Wesley, who edited (1780) an abridged edition, and to Charles Kingsley, who published it with a eulogistic notice in 1859. Brooke had a large family, but only two children survived him. His wife's death seriously affected him, and he died at Dublin in a state of mental infirmity on the 10th of October 1783.

His daughter, Charlotte Brooke, published *The Poetical Works of Henry Brooke* in 1792, but was able to supply very little biographical material. Other sources for Brooke's biography are C. H. Wilson, *Brookiana* (2 vols., 1804), and a biographical preface by E. A. Baker prefixed to a new edition (1906) of *The Fool of Quality*. Brooke's other works include several tragedies, only some of which were actually staged. He also wrote: *Jack the Giant Queller* (1748), an operatic satire, the repetition of which was forbidden on account of its political allusions; "Constantia, or the Man of Lawe's Tale" (1741), contributed to George Ogle's *Canterbury Tales modernized; Juliet Grenville; or the History of the Human Heart* (1773), a novel; and some fables contributed to Edward Moore's *Fables for the Female Sex* (1744).

BROOKE, SIR JAMES (1803-1868), English soldier, traveller and raja of Sarawak, was born at Coombe Grove near Bath, on the 29th of April 1803. His father, a member of the civil service of the East India Company, had long lived in Bengal. His mother was a woman of superior mind, and to her care he owed his careful early training. He received the ordinary school education, entered the service of the East India Company, and was sent out to India about 1825. On the outbreak of

the Burmese War he was despatched with his regiment to the valley of the Brahmaputra; and, being dangerously wounded in an engagement near Rungpore, was compelled to return home (1826). After his recovery he travelled on the continent before going to India, and circumstances led him soon after to leave the service of the company. In 1830 he made a voyage to China, and during his passage among the islands of the Indian Archipelago, so rich in natural beauty, magnificence and fertility, but occupied by a population of savage tribes, continually at war with each other, and carrying on a system of piracy on a vast scale and with relentless ferocity, he conceived the great design of rescuing them from barbarism and bringing them within the pale of civilization. His purpose was confirmed by observations made during a second visit to China, and on his return to England he applied himself in earnest to making the necessary preparations. Having succeeded on the death of his father to a large property, he bought and equipped a yacht, the "Royalist," of 140 tons burden, and for three years tested its capacities and trained his crew
[v.04 p.0645] of twenty men, chiefly in the Mediterranean. At length, on the 27th of October 1838, he sailed from the Thames on his great adventure. On reaching Borneo, after various delays, he found the raja Muda Hassim, uncle of the reigning sultan, engaged in war in the province of Sarawak with several of the Dyak tribes, who had revolted against the sultan. He offered his aid to the raja; and with his crew, and some Javanese who had joined them, he took part in a battle with the insurgents, and they were defeated. For his services the title of raja of Sarawak was conferred on him by Muda Hassim, the former raja being deprived in his favour. It was, however, some time before the sultan could be induced to confirm his title (September 1841). During the next five years Raja Brooke was engaged in establishing his power, in making just reforms in administration, preparing a code of laws and introducing just and humane modes of dealing with the degraded subjects of his rule. But this was not all. He looked forward to the development of commerce as the most effective means of putting an end to the worst evils that afflicted the archipelago; and in order to make this possible, the way must first be cleared by the suppression, or a considerable diminution, of the prevailing piracy, which was not only a curse to the savage tribes engaged in it, but a standing danger to European and American traders in those seas. Various expeditions were therefore organized and sent out against the marauders, Dyaks and Malays, and sometimes even Arabs. Captain (afterwards Admiral Sir Harry) Keppel, and other commanders of British ships of war, received permission to co-operate with Raja Brooke in these expeditions. The pirates were attacked in their strongholds, they fought desperately, and the slaughter was immense. Negotiations with the chiefs had been tried, and tried in vain. The capital of the sultan of Borneo was bombarded and stormed, and the sultan with his army routed. He was, however, soon after restored to his dominion. So large was the number of natives, pirates and others, slain in these expeditions, that the "head-money" awarded by the British government to those who had taken part in them amounted to no less than £20,000. In October 1847 Raja Brooke returned to England, where he was well received by the government; and the corporation of London conferred on him the freedom of the city. The island of Labuan, with its dependencies, having been acquired by purchase from the sultan of Borneo, was erected into a British colony, and Raja Brooke was appointed governor and commander-in-chief. He was also named consul-general in Borneo. These appointments had been made before his arrival in England. The university of Oxford conferred on him the honorary degree of D.C.L., and in 1848 he was created K.C.B. He soon after returned to Sarawak, and was carried thither by a British man-of-war. In the summer of 1849 he led an expedition against the Seribas and Sakuran Dyaks, who still persisted in their piratical practices and refused to submit to British authority. Their defeat and wholesale slaughter was a matter of course. At the time of this engagement Sir James Brooke was lying ill with dysentery. He visited twice the capital of the sultan of Sala, and concluded a treaty with him, which had for one of its objects the expulsion of the sea-gypsies and other tribes from his dominions. In 1851 grave charges with respect to the operations in Borneo were brought against Sir James Brooke in the House of Commons by Joseph Hume and other members, especially as to the "head-money" received. To meet these accusations, and to vindicate his proceedings, he came to England. The evidence adduced was so conflicting that the matter was at length referred to a royal commission, to sit at Singapore. As the result of its investigation the charges were declared to be "not proven." Sir James, however, was soon after deprived of the governorship of Labuan, and the head-money was abolished. In 1867 his house in Sarawak was attacked and burnt by Chinese pirates, and he had to fly from the capital, Kuching. With a small force he attacked the Chinese, recovered the town, made a great slaughter of them, and drove away the rest. In the following year he came to England, and remained there for three years. During this time he was attacked by paralysis, a public subscription was raised, and an estate in Devonshire was bought and presented to him. He made two more visits to Sarawak, and on each occasion had a rebellion to suppress. He spent his last days on his estate at Burrator in Devonshire, and died there, on the 11th of June 1868, being succeeded as raja of Sarawak by his nephew. Sir James Brooke was a man of the highest personal character, and he displayed rare courage both in his conflicts in the East and under the charges advanced against him in England.

His *Private Letters* (1838 to 1853) were published in 1853. Portions of his *Journal* were edited by Captains Munday and Keppel. (See also SARAWAK.)

BROOKE, STOPFORD AUGUSTUS (1832-), English divine and man of letters, born at Letterkenny, Donegal, Ireland, in 1832, was educated at Trinity College, Dublin. He was ordained in the Church of England in 1857, and held various charges in London. From 1863 to 1865 he was chaplain to the empress Frederick in Berlin, and in 1872 he became chaplain in ordinary to Queen Victoria. But in 1880 he seceded from the Church, being no longer able to accept its leading dogmas, and officiated as a Unitarian minister for some years at Bedford chapel, Bloomsbury. Bedford chapel was pulled down about 1894, and from that time he had no church

of his own, but his eloquence and powerful religious personality continued to make themselves felt among a wide circle. A man of independent means, he was always keenly interested in literature and art, and a fine critic of both. He published in 1865 his *Life and Letters of F. W. Robertson* (of Brighton), and in 1876 wrote an admirable primer of *English Literature* (new and revised ed., 1900), followed in 1892 by *The History of Early English Literature* (2 vols., 1892) down to the accession of Alfred, and *English Literature from the Beginnings to the Norman Conquest* (1898). His other works include various volumes of sermons; *Poems* (1888); *Dove Cottage* (1890); *Theology in the English Poets—Cowper, Coleridge, Wordsworth, Burns* (1874); *Tennyson, his Art and Relation to Modern Life* (1894); *The Poetry of Robert Browning* (1902); *On Ten Plays of Shakespeare* (1905); and *The Life Superlative* (1906).

BROOK FARM, the name applied to a tract of land in West Roxbury, Massachusetts, on which in 1841-1847 a communistic experiment was unsuccessfully tried. The experiment was one of the practical manifestations of the spirit of "Transcendentalism," in New England, though many of the more prominent transcendentalists took no direct part in it. The project was originated by George Ripley, who also virtually directed it throughout. In his words it was intended "to insure a more natural union between intellectual and manual labour than now exists; to combine the thinker and the worker, as far as possible, in the same individual; to guarantee the highest mental freedom by providing all with labour adapted to their tastes and talents, and securing to them the fruits of their industry; to do away with the necessity of menial services by opening the benefits of education and the profits of labour to all; and thus to prepare a society of liberal, intelligent and cultivated persons whose relations with each other would permit a more simple and wholesome life than can be led amidst the pressure of our competitive institutions." In short, its aim was to bring about the best conditions for an ideal civilization, reducing to a minimum the labour necessary for mere existence, and by this and by the simplicity of its social machinery saving the maximum of time for mental and spiritual education and development. At a time when Ralph Waldo Emerson could write to Thomas Carlyle, "We are all a little wild here with numberless projects of social reform; not a reading man but has a draft of a new community in his waistcoat pocket,"—the Brook Farm project certainly did not appear as impossible a scheme as many others that were in the air. At all events it enlisted the co-operation of men whose subsequent careers show them to have been something more than visionaries. The association bought a tract of land about 10 m. from Boston, and in the summer of 1841 began its enterprise with about twenty members. In September the "Brook Farm Institute of Agriculture and
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Education" was formally organized, the members signing the Articles of Association and forming an unincorporated joint-stock company. The farm was assiduously, if not very skilfully, cultivated, and other industries were established—most of the members paying by labour for their board—but nearly all of the income, and sometimes all of it, was derived from the school, which deservedly took high rank and attracted many pupils. Among these were included George William Curtis and his brother James Burrill Curtis, Father Isaac Thomas Hecker (1819-1888), General Francis C. Barlow (1834-1896), who as attorney-general of New York in 1871-1873 took a leading part in the prosecution of the "Tweed Ring." For three years the undertaking went on quietly and simply, subject to few outward troubles other than financial, the number of associates increasing to seventy or eighty. It was during this period that Nathaniel Hawthorne had his short experience of Brook Farm, of which so many suggestions appear in the *Blithedale Romance*, though his preface to later editions effectually disposed of the idea—which gave him great pain—that he had either drawn his characters from persons there, or had meant to give any actual description of the colony. Emerson refused, in a kind and characteristic letter, to join the undertaking, and though he afterwards wrote of Brook Farm with not uncharitable humour as "a perpetual picnic, a French Revolution in small, an age of reason in a patty-pan," among its founders were many of his near friends. In 1844 the growing need of a more scientific organization, and the influence which F.M.C. Fourier's doctrines, as modified by Albert Brisbane (1809-1890), had gained in the minds of Ripley and many of his associates, combined to change the whole plan of the community. It was transformed, with the strong approval of all its chief members and the consent of the rest, into a Fourierist "phalanx" in 1845. There was an accession of new members, a momentary increase of prosperity, a brilliant new undertaking in the publication of a weekly journal, the *Harbinger*, in which Ripley, Charles A. Dana, Francis G. Shaw and John S. Dwight were the chief writers, and to which James Russell Lowell, J.G. Whittier, George William Curtis, Parke Godwin, T.W. Higginson, Horace Greeley and many more now and then contributed. But the individuality of the old Brook Farm was gone. The association was not rescued even from financial troubles by the change. With increasing difficulty it kept on till the spring of 1846, when a fire which destroyed its nearly completed "phalanstery" brought losses which caused, or certainly gave the final ostensible reason for, its dissolution. The experiment was abandoned in the autumn of 1847. Besides Ripley and Hawthorne, the principal members of the community were Charles A. Dana, John S. Dwight, Minot Pratt (*c.* 1805-1878), the head farmer, who, like George Partridge Bradford (1808-1890), left in 1845, and Warren Burton (1810-1866) a preacher and, later, a writer on educational subjects. Indirectly connected with the experiment, also, as visitors for longer or shorter periods but never as regular members, were Emerson, Amos Bronson Alcott, Orestes A. Brownson, Theodore Parker and William Henry Channing, Margaret Fuller and Elizabeth Palmer Peabody. The estate itself, after passing through various hands, came in 1870 into the possession of the "Association of the Evangelical Lutheran Church for Works of Mercy," which established here an orphanage, known as the "Martin Luther Orphan Home."

The best account of Brook Farm is Lindsay Swift's *Brook Farm, Its Members, Scholars and Visitors* (New York, 1900). *Brook Farm: Historic and Personal Memoirs* (Boston, 1894), is by Dr

J.T. Codman, one of the pupils in the school. See also Morris Hillquit's *History of Socialism in the United States* (New York, 1903).

(E. L. B.)

BROOKITE, one of the three modifications in which titanium dioxide (TiO_2) occurs in nature; the other minerals with the same chemical composition, but with different physical and crystallographic characters, being rutile (*q.v.*) and anatase (*q.v.*) The two latter are tetragonal in crystallization, whilst brookite is orthorhombic. The name was given by A. Lévy in 1825 in honour of the English mineralogist H.J. Brooke (1771-1857). Two types of brookite crystals may be distinguished. The commoner type of crystals are thin and tabular, and often terminated by numerous small and brilliant faces (fig. 1); the faces of the orthopinacoid (*a*) and of the prisms (*m*, *l*) are vertically striated. These crystals are of a rich reddish-brown colour and are often translucent. Crystals of the second type have the appearance of six-sided bipyramids (fig. 2) owing to the equal development of the prism *m* {110} and the pyramid *e* {122}; these crystals are black and opaque, and constitute the variety known as arkansite.

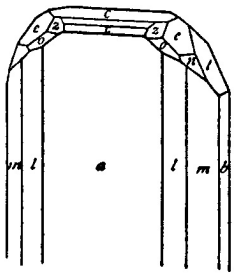

FIG. 1.

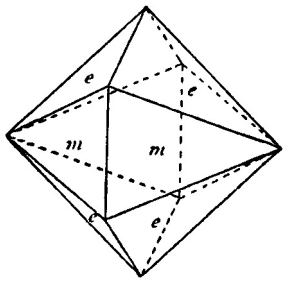

FIG. 2.

The lustre of brookite is metallic-adamantine. There is no distinct cleavage (rutile and anatase have cleavages); hardness 5½-6; sp. gr. 4.0. The optical characters are interesting: the optic axes for red and for blue light lie in planes at right angles to each other, whilst for yellow-green light the crystals are uniaxial. The acute bisectrix of the optic axes is perpendicular to the orthopinacoid (*a*) for all colours, so that this phenomenon of the crossing of the optic axial planes may be readily observed in the thin tabular crystals of the first-mentioned type.

Brookite occurs only as crystals, never in compact masses, and is usually associated with either anatase or rutile. The crystals are found attached to the walls of cavities in decomposed igneous rocks and crystalline schists; it is also found as minute isolated crystals in many sedimentary rocks. The best-known locality is Fronolen near Tremadoc in North Wales, where crystals of the thin tabular habit occur with crystallized quartz, albite and anatase on the walls of crevices in diabase. Similar crystals of relatively large size are found attached to gneiss at several places in the Swiss and Tirolese Alps. Thicker crystals of prismatic, rather than tabular, habit and of a rich red colour combined with considerable transparency and brilliancy are found in the gold-washings of the Sanarka river in the southern Urals. The arkansite variety occurs with rutile in the elaeolite-syenite of Magnet Cove in Hot Spring county, Arkansas. Minute crystals of brookite have been detected with anatase and rutile in the iron-ore of Cleveland in Yorkshire.

Crystals of brookite, as well as of anatase and rutile, have been prepared artificially by the interaction of steam and titanium fluoride, the particular modification of titanium dioxide which results depending on the temperature at which the reaction takes place. Brookite is liable to become altered to rutile: aggregates of rutile needles with the form of brookite (arkansite) are not uncommon at Magnet Cove, Arkansas.

(L. J. S.)

BROOKLIME, known botanically as *Veronica Beccabunga* (natural order Scrophulariaceae), a succulent herb growing on margins of brooks and ditches in the British Isles, and a native of Europe, north Africa and north and western Asia. It has smooth spreading branches, blunt oblong leaves and small bright blue or pink flowers.

BROOKLINE, a township of Norfolk county, Massachusetts, U.S.A., about 3 m. S.W. of Boston, lying immediately S. of the Back Bay district. Pop. (1890) 12,103; (1900) 19,935, of whom 6536 were foreign-born; (1910, census) 27,792. The area of the township in 1906 was 6.75 sq. m. It is served by the Boston & Albany railway, and is connected with Boston by an electric line. Brookline is the wealthiest of the residential suburbs of Boston; and contains a number of beautiful estates and homes. Within its limits are the villages of Cottage Farm, Longwood, and Reservoir Station, or Chestnut Hill—the Chestnut Hill reservoir is just beyond the township. Brookline has an excellent public library. At Clyde Park are the grounds and club-house of the Boston Country Club. Brookline has long been regarded as a model city suburb. It is connected with Boston Common by boulevards of the Metropolitan Park System. The first settlement was probably made about 1635, and it was called Muddy River until 1705, when it was created a township under the name of Brookline. Up to 1793 it belonged to Suffolk county, of which Boston is a part, and since that time it has belonged to Norfolk county; but Boston has in its growth almost surrounded it, and because of its great wealth there has been a long struggle for and against its merger in Boston. Frederick Law Olmsted, the famous landscape gardener, had his home in Brookline, where there are various examples of his work.

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See H.F. Woods, *Historical Sketches of Brookline* (Boston, 1874); C.K. Bolton, *Brookline, The History of a Favored Town* (Brookline, 1897); and J.W. Denehy, *History of Brookline, 1630-1906*(Allston, Mass., 1907).

BROOKLYN, formerly a city of New York state, U.S.A., but since 1898 a borough of New York

City (*q.v.*), situated at the S.W. extremity of Long Island. It is conterminous with Kings county, and is bounded N. by the borough of Queens, from which it is in part separated by Newtown Creek; E. by the borough of Queens and Jamaica Bay; S. by the Atlantic Ocean; W. by Gravesend Bay, the Narrows, Upper New York Bay and East river, which separate it from Staten Island, Jersey City and the borough of Manhattan. It has a water-front of 33 m. and extends over an area of 77.62 sq. m. Pop. (1860) 279,122; (1870) 419,921; (1880) 599,495; (1890, then Kings county) 838,547; (1900) 1,166,582; (1905, state census) 1,358,686; (1910) 1,634.351. In 1900 only 310,501, or 26.6%, were native-born of native white parents; 355,697 were foreign-born, 18,367 were negroes, and 1206 were Chinese. Out of 332,715 males of voting age (21 years and over), 15,415 were illiterate (unable to write), and of these 14,159 were foreign-born.

Brooklyn is connected with Manhattan by three bridges across the East river—the lowest, known as the Brooklyn, opened in 1883; another, known as the Williamsburg or East River bridge, opened in 1903; and a third, the Manhattan, was opened in 1909. And a tunnel directly across from the south terminus of Manhattan was completed in 1907. Ferries ply at frequent intervals between numerous points on its west water-front and points in Manhattan; there is also ferry connexion with Jersey City. Brooklyn is served directly by the Long Island railway; by about fifty regular coast-wise and trans-Atlantic steamship lines; and by elevated or surface car lines on a large number of its streets. Subway lines, begun in 1904, connect Brooklyn with the subway system of Manhattan.

Streets and Buildings.—The surface of Brooklyn in the west section, from the lower course of the East river to Gravesend Bay, varies in elevation from a few inches to nearly 200 ft. above sea-level, the highest points being in Prospect Park; but steep street grades even in this section are rare, and elsewhere the surface is either only slightly undulating or, as in the east and south, flat. Most of the streets are from 60 to 100 ft. wide. The principal business thoroughfare is Fulton Street, which begins at Fulton ferry nearly under the Brooklyn bridge, runs to City Hall Park, and thence across the north central section of the borough. In the City Hall Park are the old city hall (now the borough hall), the hall of records, and the county court-house. Two blocks to the north (on Washington Street) is the post-office, a fine granite Romanesque building. The manufacturing and shipping districts are mostly along the west water-front. Here, on Wallabout Bay at the bend of the East river to the westward, is the New York navy yard, the principal navy yard of the United States, established in 1801, and commonly but incorrectly called the Brooklyn navy yard. It occupies altogether about 144 acres, contains a trophy park, parade grounds, the United States Naval Lyceum (founded 1833), officers' quarters, barracks, and three large dry docks (respectively 564, 465 and 307 ft. long), foundries and machine shops. A naval hospital (having accommodation for about 500 patients) to the east is separated from the navy yard by the largest and most interesting of Brooklyn's markets, the Wallabout (about 45 acres). The buildings of this market are Dutch in style and have a quaint clock tower. A little to the north of the navy yard are immense refineries of sugar. About 2 m. to the south, opposite Governor's Island, is the Atlantic Basin of 40 acres, with a wharfage of about 3 m. and brick and granite warehouses used largely for the storage of grain. A little farther south, on Gowanus Bay, is another basin, the Erie, of 161 acres, protected by a breakwater 1 m. in length, occupied by piers, warehouses, lumber depots and some of the largest dry docks in the United States; it also provides protection during winter to hundreds of canal boats. In this vicinity, too, are several yards for building yachts, launches and other boats. At the lower end of the west water-front, facing the Narrows, are a United States reservation and the harbour defences of Fort Hamilton.

For a considerable portion of its inhabitants Brooklyn is only a place of residence, their business interests being in the borough of Manhattan; hence Brooklyn has been called the "city of homes" and the "dormitory of New York." Residential districts with social lines more or less distinctly drawn are numerous. The oldest is that on Brooklyn (or Columbia) Heights, west of City Hall Park, rising abruptly from the river to a height of from 70 to 100 ft., and commanding a delightful view of the harbour. Here are hotels, large apartment-houses, many private residences and a number of clubs, including the Brooklyn, the Crescent, the Hamilton, the Jefferson and the Germania. On Park Slope, immediately west of Prospect Park, and St Mark's Avenue, in another part of the borough, are also attractive residential districts. The south shore of the borough has various summer pleasure resorts, of which Coney Island is the most popular.

Parks and Cemeteries.—One of the most attractive features of Brooklyn is Prospect Park, occupying about 516 acres of high ground in the west central part of the borough, on a site made memorable by the battle of Long Island. Its large variety of trees and shrubs, including oak, hickory, elm, maple, chestnut, birch, ash, cedar, pine, larch and sumach, its flower gardens, a palm house, ponds, a lake of 61 acres for boating, skating and curling, a parade ground of 40 acres for other athletic sports, a menagerie, and numerous pieces of statuary, are among its objects of interest or beauty. From the southern entrance to this park, Ocean Parkway, a fine boulevard, 210 ft. wide and planted with six rows of trees, extends 5½ m. south to Seaside Park (15 acres), on Brighton Beach, Coney Island. From the same entrance Fort Hamilton Parkway extends 4½ m. south-east to Fort Hamilton, and to Dyker Beach Park (144 acres) which face the lower end of the Narrows; and from Fort Hamilton, Shore Road and Bay Ridge Parkway extend north 4½ m. to Bay Ridge Park overlooking Upper New York Bay. From the northern entrance to Prospect Park, Eastern Parkway, another fine boulevard, 200 ft. wide, extends east 2½ m. to a point from which Rockaway Parkway runs 3 m. south-east to Canarsie Beach Park (40 acres), on Jamaica Bay; and extensions of Eastern Parkway run north-east through Highland Park (55 acres), to Brooklyn Forest Park (535 acres, on the border of the borough of Queens), abounding in beautiful trees and delightful views. Half a mile east of the borough hall is Washington or Fort

Greene Park (30 acres), laid out on the site of earthworks (known as Fort Greene) constructed during the War of Independence, and commanding good views.

Greenwood cemetery, one of the most beautiful cemeteries in the United States, ½ m. east of Prospect Park, occupies about 478 acres. Among the principal monuments are those erected to Roger Williams, S.F.B. Morse, Elias Howe, De Witt Clinton (colossal bronze statue by Henry Kirke Brown), Henry Ward Beecher, Peter Cooper, Horace Greeley, Henry Bergh, Henry George and James Gordon Bennett. At the main entrance is a beautiful gateway (of elaborately wrought brown stone), 142 ft. wide and having a central tower 100 ft. in height. Along the north-east border of the borough are Cypress Hills cemetery (400 acres), adjoining Brooklyn Forest Park, and the cemetery of the Evergreens (about 375 acres), adjoining Highland Park and partly in the borough of Queens.

[v.04 p.0648] In the plaza at the northern entrance to Prospect Park is a soldiers' and sailors' memorial arch (80 ft. in width and 71 ft. in height), adorned with high-reliefs of Lincoln and Grant on horseback (by O'Donovan and Eakins) and with three large bronze groups (by Frederick MacMonnies). Immediately within the park there is a statue (also by MacMonnies) of J.S.T. Stranahan (1808-1898), who did more than any other man for the development of Brooklyn's system of parks and boulevards. On the slope of Lookout Hill (185 ft.) within the park is a shaft erected in 1895 to the memory of the Maryland soldiers who valiantly defended the rear of the American army at the battle of Long Island. A bronze statue of Abraham Lincoln overlooks the lake. In Fort Greene Park is a monument to the memory of the soldiers who died in the British prison ships during the War of Independence, many of them having been buried in a vault below. Facing the borough hall is a statue in bronze (by J.Q.A. Ward) of Henry Ward Beecher, mounted on a granite pedestal with a figure at one side to commemorate Beecher's sympathy for the slave. A fine bronze statue of Alexander Hamilton (by W.O. Partridge, b. 1861) stands at the entrance of the Hamilton Club in Clinton Street and one of U.S. Grant (also by Partridge) stands at the entrance of the Union League Club in Bedford Avenue.

Education.—The Brooklyn Institute of Arts and Sciences embraces twenty-six departments, of which those of music, philology and the fine arts have each more than 1000 members; the total membership of all departments in 1906 was 5894. The museum building of this institution is in Institute Park, which is separated from Prospect Park on the north-east by Flatbush Avenue. It contains, besides paintings and statuary, special collections for service in nearly all of the departments; among its purely art collections the most notable is that of J.J.J. Tissot's water-colour drawings, to illustrate the life of Christ. Since 1890 the Institute has received appropriations from the city, but it is maintained chiefly by private contributions. It is the outgrowth of the Apprentices' Library Association, founded in 1824, of which General Lafayette laid the corner-stone on the 4th of July of that year. In 1888 Franklin W. Hooper (b. 1851), who did much to increase the efficiency of the work of the Institute, became director. Pratt Institute, founded in 1887 by Charles Pratt (1830-1891), and the residuary legatee of his wife, who died in 1907, is one of the most successful manual and industrial training schools in the country, and its kindergarten normal is one of the best known in the United States. The Polytechnic Institute, opened in 1855, is a high-grade school of science and liberal arts. It has two general departments, the college of arts and engineering and the preparatory school, which are conducted independently of one another. In connexion with the college there is provision for graduate study and for night courses, and there are teachers' courses to which women are admitted. The Packer Collegiate Institute, opened as the successor of the Brooklyn Female Academy, in 1854, and endowed by Mrs Harriet L. Packer, an institution for women, has primary, preparatory, academic and collegiate departments. Adelphi College, opened in 1896, is for both sexes and gives special attention to normal training; it is the outgrowth of Adelphi Academy, founded in 1869, now the preparatory department. St Francis' College, opened in 1858, and St John's College, opened in 1870, are institutions maintained by Roman Catholics. Here, too, are the law school of St Lawrence University, the Long Island Hospital Medical College, with a training school for nurses, the Brooklyn College of Pharmacy and several schools of music. Brooklyn's public schools rank especially high; among them there is a commercial high school and a manual training high school. Among the larger libraries of the borough are the Brooklyn public library, those of the Long Island Historical Society, on Brooklyn Heights, of Pratt Institute, and of the King's County Medical Society, and a good law library. The *Brooklyn Daily Eagle*, which occupies an attractive building near the borough hall, has been a newspaper of strong influence in the community. It was established in 1841 as a Democratic organ, and Walt Whitman was its editor for about a year during its early history.

Brooklyn is well provided with charitable institutions, and has long been known as the "city of churches," probably from the famous clergymen who have lived there. Among them were Henry Ward Beecher, pastor of Plymouth church (Congregational) from 1847 to 1887; Lyman Abbott, pastor of the same church from 1887 to 1898; Thomas De Witt Talmage, pastor of the Brooklyn Tabernacle (Presbyterian) from 1869 to 1894; Richard Salter Storrs (1821-1900), pastor of the church of the Pilgrims (Congregational) from 1846 to 1899; and Theodore L. Cuyler (1822-1909), pastor of the Lafayette Avenue Presbyterian church from 1860 to 1890.

Manufactures and Commerce.—The borough of Brooklyn is one of the most important manufacturing centres in the United States, most of the factories being located along or near the East river north of the Brooklyn bridge. The total value of the manufactured products in 1890 was $270,823,754 and in 1900, $342,127,124, an increase during the decade of 26.3%. In 1905 the total value of the borough's manufactured product (under the factory system) was

$373,462,930, or 15% of the total manufactured product of the state of New York. Brooklyn's largest manufacturing industry is the refining of sugar, about one-half of the sugar consumed in the United States being refined here; in 1900 the product of the sugar and molasses refining establishments was valued at $77,942,997. Brooklyn is also an important place for the milling of coffee and spices (the 1905 product was valued at $15,274,092), the building of small boats, and the manufacture of foundry and machine shop products, malt liquors, barrels, shoes, chemicals, paints, cordage, twine, and hosiery and other knitted goods. Of its large commerce, grain is the chief commodity; it is estimated that about four-fifths of that exported from the port of New York is shipped from here, and the borough's grain elevators have an estimated storage capacity of about 20,000,000 bushels.

The water-supply system is owned and operated by the borough; the water is derived from streams flowing southward in the sparsely settled area east of the borough, and also from driven wells in the same region; it is pumped by ten engines at Ridgewood to a reservoir having a capacity of about 300,000,000 gallons, while a part of it is re-pumped to a high service reservoir near the north entrance to Prospect Park for the service of the most elevated part of the borough. Besides this system some towns in the south section recently annexed have their own water-supply.

History.—The first settlement within the present limits of Brooklyn was made in 1636, when some Dutch farmers took up their residence along the shore of Gowanus Bay. About the same time other Dutch farmers founded Flatlands (at first called Amersfoort), on Jamaica Bay, and a few Walloons founded Wallabout, where the navy yard now is. In 1642 a ferry was established across East river from the present foot of Fulton Street, and a settlement grew up here which was known as The Ferry. The next year Lady Deborah Moody with some followers from New England founded Gravesend near the southern extremity of the borough. Finally, in the year 1645, a settlement was established near the site of the present borough hall, and was called Breuckelen (also spelled Breucklyn, Breuckland, Brucklyn, Broucklyn, Brookland and Brookline) until about the close of the 18th century, when its orthography became fixed as Brooklyn. The name, Breuckelen, meaning marsh land, seems to have been suggested by the resemblance of the situation of the settlement to that of Breuckelen, Holland. Of the other towns which were later united to form the borough, New Utrecht was settled about 1650, Flatbush (at first called Medwoud, Midwout or Midwood) about 1651, Bushwick and Williamsburg in 1660. All of the settlements were for a long time chiefly agricultural communities. Flatbush was for a few years immediately preceding 1675 the largest; but Brooklyn was the first (1646) to have a township organization, and within a few years Wallabout, Gowanus, The Ferry, and Bedford—a new settlement to the south-east of Wallabout, established in 1662—were included within its jurisdiction. In 1654 the municipal privileges of Brooklyn as well as of two of the other towns were enlarged, but with Dutch rule there was general discontent, and when, in 1664, Colonel Richard Nicolls came to overthrow it and establish English rule these towns offered no resistance. Nicolls erected the region composed of Long Island, Staten Island and Westchester into a county under the name of Yorkshire, and divided it into three ridings, of which Staten Island, the present county of Kings, and the town of Newtown in Queens, formed one. In 1683 the present county of Kings was organized by the first colonial legislature. During the War of Independence the chief event was the battle of Long Island, fought on the 27th of August 1776. In 1816, when the population of the town of Brooklyn was about 4500, its most populous section was incorporated as a village; and in 1834, when its population had increased to 23,310, the whole town was incorporated as a city. By 1850 its population had increased to 138,882. In 1855 Williamsburg, which had been incorporated as a city in 1851, and the town of Bushwick were annexed. Other annexations followed until the city of Brooklyn was conterminous with Kings county; and finally, on the 1st of January 1898, the city of Brooklyn became a borough of New York City.

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See S.M. Ostrander, *A History of Brooklyn and Kings County* (Brooklyn, 1894); H.W.B. Howard (ed.), *History of the City of Brooklyn* (Brooklyn, 1893); and H. Putnam, *Brooklyn*, in L.P. Powell's *Historic Towns of the Middle States* (New York, 1899).

BROOKS, CHARLES WILLIAM SHIRLEY (1816-1874), English novelist, playwright and journalist, was born on the 29th of April 1816. He was the son of a London architect, and was articled in 1832 to a solicitor for five years. He became parliamentary reporter for the *Morning Chronicle*, and in 1853 was sent by that paper as special commissioner to investigate the subject of labour and the poor in southern Russia, Egypt and Syria; the result of his inquiries appearing first in the form of letters to the editor, and afterwards in a separate volume, under the title of *The Russians of the South* (1856). He wrote, sometimes alone, sometimes in conjunction with others, slight dramatic pieces of the burlesque kind, among which may be mentioned *Anything for a Change* (1848), *The Daughter of the Stars* (1850). Brooks was for many years on the staff of the *Illustrated London News*, contributing the weekly article on the politics of the day, and the two series entitled "Nothing in the Papers" and "By the Way." In 1851 he joined the staff of *Punch*, and noteworthy among his numerous contributions were the weekly satirical summaries of the parliamentary debates, entitled "The Essence of Parliament." His long service as newspaper reporter gave him special aptitude for this playful parody. In 1870, on the death of Mark Lemon, "dear old Shirley," as his friends used to call him, was chosen to succeed to the editorial chair. His first novel, *Aspen Court*, was published in 1855. It was followed by *The Gordian Knot* (1860), *The Silver Cord* (1861) and *Sooner or Later* (1868). Brooks was a great letter-writer, deliberately cultivating the practice as an art, and imitating the style in vogue before newspapers and telegraphs suppressed private letters. He had an astonishing memory,

was brilliant as an epigrammatist, was a great reader and a most genial companion. He was in his element with a group of children, reading to them, sharing their fun and always remembering the birthdays. He died in London, on the 23rd of February 1874, and was buried near his friends Leech and Thackeray, in Kensal Green cemetery.

See G.S. Layard, *A Great "Punch" Editor: Being the Life, Letters and Diaries of Shirley Brooks* (1907.)

BROOKS, PHILLIPS (1835-1893), American clergyman and author, was born in Boston, Mass., on the 13th of December 1835. Through his father, William Gray Brooks, he was descended from the Rev. John Cotton; through his mother, Mary Ann Phillips, a woman of rare force of character and religious faith, he was a great-grandson of the founder of Phillips Academy, Andover, Mass. Of the six sons, four—Phillips, Frederic, Arthur and John Cotton—entered the ministry of the Protestant Episcopal Church. Phillips Brooks prepared for college at the Boston Latin school and graduated at Harvard in 1855. After a short and unsuccessful experience as a teacher in the Boston Latin school, he began in 1856 to study for the ministry of the Protestant Episcopal Church in the theological seminary at Alexandria, Virginia. In 1859 he graduated, was ordained deacon by Bishop William Meade of Virginia, and became rector of the church of the Advent, Philadelphia. In 1860 he was ordained priest, and in 1862 became rector of the church of the Holy Trinity, Philadelphia, where he remained seven years, gaining an increasing name as preacher and patriot. Endowed by inheritance with a rich religious character, evangelical traditions, ethical temper and strong intellect, he developed, by wide reading in ancient and modern literature, a personality and attitude of mind which appealed to the characteristic thought and life of the period. With Tennyson, Coleridge, Frederic D. Maurice and F. W. Robertson he was in strong sympathy. During the Civil War he upheld with power the cause of the North and the negro, and his sermon on the death of President Lincoln was an eloquent expression of the character of both men. In 1869 he became rector of Trinity church, Boston. In 1877 the present church was finished, the architect being his friend H. H. Richardson. Here Phillips Brooks preached Sunday after Sunday to great congregations, until he was consecrated bishop of Massachusetts in 1891. In 1886 he declined an election as assistant bishop of Pennsylvania. He was for many years an overseer and preacher of Harvard University, his influence upon the religious life of the university being deep and wide. In 1881 he declined an invitation to be the sole preacher to the university and professor of Christian ethics. On the 30th of April 1891 he was elected sixth bishop of Massachusetts, and on the 14th of October was consecrated to that office in Trinity church, Boston. After a brief but great episcopate of fifteen months, he died, unmarried, on the 23rd of January 1893. Phillips Brooks was a tall, well-proportioned man of fine physique, his height being six feet four inches. In character he was pure, simple, endowed with excellent judgment and a keen sense of humour, and quick to respond to any call for sympathy. When kindled by his subject it seemed to take possession of him and pour itself out with overwhelming speed of utterance, with heat and power. His sympathy with men of other ways and thought, and with the truth in other ecclesiastical systems gained for him the confidence and affection of men of varied habits of mind and religious traditions, and was thus a great factor in gaining increasing support for the Episcopal Church. As years went by his influence as a religious leader became unique. The degree of S.T.D. had been conferred upon him by the universities of Harvard (1877), and of Columbia (1887), and the degree of D.D. by the university of Oxford, England (1885). In 1877 he published a course of lectures upon preaching, which he had delivered at the theological school of Yale University, and which are an expression of his own experience. In 1879 appeared the Bohlen Lectures on "The Influence of Jesus." In 1878 he published his first volume of sermons, and from time to time issued other volumes, including *Sermons Preached in English Churches* (1883).

In 1901, at New York, was published, in two volumes, *Phillips Brooks, Life and Letters*, by the Rev. A.V.G. Allen, D.D., professor of ecclesiastical history, Episcopal Theological school, Cambridge, Mass., who in 1907 published at New York, in a single volume, *Phillips Brooks*, an abbreviation and revision of the earlier biography.

(W. L.)

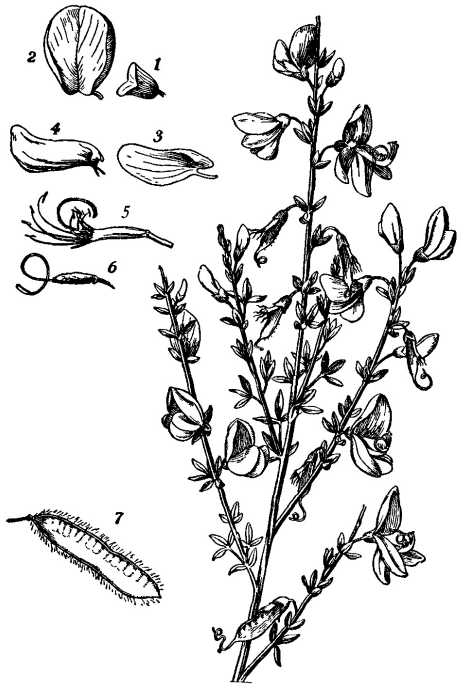
BROOKS'S, a London club in St James's Street. It was founded in 1764 by the dukes of Roxburghe and Portland. The building had been previously opened as a gaming-house by William Macall (Almack), and afterwards by Brooks, a wine merchant and money-lender, whose name it retained.

BROOM, known botanically as *Cytisus*, or *Sarothamnus, scoparius*, a member of the natural order Leguminosae, a shrub found on heaths and commons in the British Isles, and also in Europe (except the north) and temperate Asia. The leaves are small, and the function of carbon-assimilating is shared by the green stems. The bright yellow flowers scatter their pollen by an explosive mechanism; the weight of a bee alighting on the flower causes the keel to split and the pollen to be shot out on to the insect's body. When ripe the black pods explode with a sudden twisting of the valves and scatter the seeds. The twigs have a bitter and nauseous taste and have long had a popular reputation as a diuretic; the seeds have similar properties.

[v.04 p.0650]

"Butcher's broom," a very different plant, known botanically as *Ruscus aculeatus*, is a member of the natural order Liliaceae. It is a small evergreen shrub found in copses and woods, but rare in the southern half of England. The stout angular stems bear leaves reduced to small scales, which subtend flattened leaf-like branches (cladodes) with a sharp apex. The small whitish flowers are borne on the face of the cladodes, and are succeeded by a bright red berry.

BROOME, WILLIAM (1689-1745), English scholar and poet, the son of a farmer, was born at Haslington, Cheshire, where he was baptized on the 3rd of May 1689. He was educated at Eton, where he became captain of the school, and at St John's College, Cambridge. He collaborated with John Ozell and William Oldisworth in a translation (1712) of the *Iliad* from the French version of Madame Dacier, and he contributed in the same year some verses to *Lintot's Miscellany*. He was introduced to Pope, who was at that time engaged on his translation of the *Iliad*. Pope asked Broome to make a digest for him of the notes of Eustathius, the 12th-century annotator of Homer. This task Broome executed to Pope's entire satisfaction, refusing any payment. He was rector of Sturston, Norfolk, and his prosperity was further assured by his marriage in 1716 with a rich widow, Mrs Elizabeth Clarke. When Pope undertook the translation of the *Odyssey*, he engaged Elijah Fenton and Broome to assist him. Broome's facility in verse had gained for him at college the nickname of "the poet," and he adapted his style very closely to Pope's. He translated the 2nd, 6th, 8th, 11th, 12th, 16th, 18th and 23rd books, and practically provided all the notes. He was a vain, talkative man, and did not fail to make known his real share in the translation, of which Pope had given a very misleading account in the "proposals" issued to subscribers. He casually mentioned Broome as his coadjutor, as though his assistance was of an entirely subsidiary character. His influence over Broome was so strong that the latter was induced to write a note at the end of the translation minimizing his own share and implicating Fenton, who, moreover, had not wished his name to appear, in the deception. "If my performance," he said, "has merit either in these [the notes] or in any part of the translation, namely the 6th, 11th and 18th books, it is but just to attribute it to the judgment and care of Mr Pope, by whose hand every sheet was corrected." For the *Odyssey* Pope received £4500, of which Broome, who had provided a third of the text and the notes, received £570. He had hoped to secure fame from his connexion with Pope, and when he found that Pope had no intention of praising him he complained bitterly of being underpaid. Pope thought that Broome's garrulity had caused the reports which were being circulated to his disadvantage, and ungenerously made satirical allusions to him in the *Dunciad*[1] and the *Bathos*. After these insults Broome's patience gave way, and there is a gap in his correspondence with Pope, but in 1730 the intercourse was renewed on friendly terms. In 1728 the degree of LL.D. was conferred on him by the university of Cambridge, and he was presented to the rectory of Pulham, Norfolk, and subsequently by Charles, 1st Earl Cornwallis, who had been his friend at Cambridge, to two livings, Oakley Magna in Essex, and Eye in Suffolk. He died at Bath on the 16th of November 1745.



Cytisus scoparius, Common Broom.
1. Two-lipped calyx.
2. Broadly ovate vexillum or standard.
3. One of the alae or wings of the corolla.
4. Carina or keel.
5. Monadelphous stamens.
6. Hairy ovary with the long style, thickened upwards, and spirally curved.
7. Legume or pod.

Broome was also the author of some translations from Anacreon printed in the *Gentleman's Magazine*, and of *Poems on Several Occasions* (1727). His poems are included in Johnson's and other collections of the British poets. His connexion with Pope is exhaustively discussed in Elwin and Courthope's edition of Pope's *Works* (viii. pp. 30-186), where the correspondence between the two is reproduced.

[1] i. 146, "worthy Settle Banks and Broome." A footnote (1743) explained away the allusion by making it apply to Richard Brome, the disciple of Ben Jonson. Also iii. 332, of which the original rendering was:—

> "Hibernian politics, O Swift, thy doom,
> And Pope's, translating ten whole years with Broome."

In the *Bathos* he was classed with the parrots and the tortoises.

BROOM-RAPE, known botanically as *Orobanche*, a genus of brown leafless herbs growing attached to the roots of other plants from which they derive their nourishment. The usually stout stem bears brownish scales, and ends in a spike of yellow, reddish-brown or purplish flowers, with a gaping two-lipped corolla. Several species occur in the British Isles; the largest, *Orobanche major*, is parasitic on roots of shrubby leguminous plants, and has a stout stem 1 to 2 ft. high.

BROSCH, MORITZ (1829-1907), German historian, was born at Prague on the 7th of April 1829, was educated at Prague and Vienna, and became a journalist. Later he devoted himself to historical study, and he died on the 14th of July 1907 at Venice, where he had resided for over thirty years. To the series *Geschichte der europäischen Staaten* Brosch contributed *England 1509-1550* (6 vols., Gotha, 1884-1899), a continuation of the work of J.M. Lappenberg and R. Pauli, and *Der Kirchenstaat* (Gotha, 1880-1882). He gave further proof of his interest in English

history by writing *Lord Bolingbroke und die Whigs und Tories seiner Zeit* (Frankfort, 1883), and *Oliver Cromwell und die puritanische Revolution* (Frankfort, 1886). He also wrote *Julius II. und die Gründung des Kirchenstaats* (Gotha, 1878), while one of his last pieces of work was to contribute a chapter on "The height of the Ottoman power" to vol. iii. of the *Cambridge Modern History*.

See A.W. Ward in the *English Historical Review*, vol. xxii. (1907).

BROSELEY, a market town in the municipal borough of Wenlock (*q.v.*) and the Wellington (Mid) parliamentary division of Shropshire, England, on the right bank of the Severn. It has a station (Ironbridge and Broseley) on the Great Western railway, 158 m. N.W. from London. There is
[v.04 p.0651] trade in coal, but the town is most famous for the manufacture of tobacco-pipes, a long-established industry. Pottery and bricks are also produced, and at Benthall, 1 m. W., are large encaustic tile works. The early name of the town was Burwardesley.

BROSSES, CHARLES DE (1709-1777), French magistrate and scholar, was born at Dijon and studied law with a view to the magistracy. The bent of his mind, however, was towards literature and science, and, after a visit to Italy in 1739 in company with his friend Jean Baptiste de Lacurne de Sainte-Palaye, he published his *Lettres sur l'état actuel de la mile souterraine d'Herculée* (Dijon, 1750), the first work upon the ruins of Herculaneum. It was during this Italian tour that he wrote his famous letters on Italy, which remained in MS. till long after his death. In 1760 he published a dissertation, *Du culte des dieux fétiches*, which was afterwards inserted in the *Encyclopédie méthodique*. At the solicitation of his friend Buffon, he undertook his *Histoire des navigations aux terres australes*, which was published in 1756, in two vols. 4to, with maps. It was in this work that de Brosses first laid down the geographical divisions of Australasia and Polynesia, which were afterwards adopted by John Pinkerton and succeeding geographers. He also contributed to the *Encyclopédie* the articles "Langues," "Musique," "Étymologic." In 1765 appeared his work on the origin of language, *Traite de la formation mécanique des langues*, the merits of which are recognized by E. B. Tylor in *Primitive Culture*. De Brosses had been occupied, during a great part of his life, on a translation of Sallust, and in attempting to supply the lost chapters in that celebrated historian. At length in 1777 he published *L'Histoire du septième siècle de la république romaine*, 3 vols. 4to, to which is prefixed a learned life of Sallust, reprinted at the commencement of the translation of that historian by Jean Baptiste Dureau de La Malle. These literary occupations did not prevent the author from discharging with ability his official duties as first president of the parliament of Burgundy, nor from carrying on a constant and extensive correspondence with the most distinguished literary characters of his time. In 1758 he succeeded the marquis de Caumont in the Académie des Belles-lettres; but when in 1770 he presented himself at the French Academy, his candidature was rejected owing to Voltaire's opposition on personal grounds. Besides the works already mentioned, he wrote several memoirs and dissertations in the collections of the Academy of Inscriptions, and in those of the Academy of Dijon, and he left behind him several MSS., which were unfortunately lost during the Revolution. His letters on Italy were, however, found in MS. in the confiscated library by his son, the *émigré* officer René de Brosses, and were first published in 1799, in the uncritical edition of Antoine Serieys, under the title of *Lettres historiques et critiques*. A fresh edition, freed from errors and interpolations, by R. Colomb, with the title *L'Italie il y a cent ans*, was issued in 1836; and two subsequent reprints appeared, one edited by Poulet-Malassis, under the title *Lettres familières* (1858); the other, a re-impression of Colomb's edition, under that of *Le Président de Brosses en Italic* (1858).

See H. Mamet, *Le President de Brosses, sa vie et ses ouvrages* (Lille, 1874); also Cunisset-Carnot, "La Querelle de Voltaire et du président de Brosses," in the *Revue des Deux Mondes* (February 15, 1888).

BROTHER, a male person in his relation to the other children of the same father and mother. "Brother" represents in English the Teutonic branch of a word common to the Indo-European languages, of. Ger. *Bruder*, Dutch *broeder*, Dan. and Swed. *broder*, &c. In Celtic languages, Gaelic and Irish have *brathair*, and Welsh *brawd*; in Greek the word is φράτηρ, in Lat. *frater*, from which come the Romanic forms, Fr. *frère*, Ital. *fratello*; the Span. *fray*, Port. *frei*, like the Ital. *frate*, *fra*, are only used of "friars." The Span. *hermano* and the Port. *irmão*, the regular words for brother, are from Lat. *germanus*, born of the same father and mother. The Sanskrit word is *bhrātār*, and the ultimate Indo-European root is generally taken to be *bhar*, to bear (cf. M. H. Ger. *barn*, Scot, *bairn*, child, and such words as "birth," "burden"). "Brother" has often been loosely used of kinsmen generally, or for members of the same tribe; also for quite fictitious relationships, *e.g.* "blood-brothers," through a sacramental rite of mutual blood-tasting, "foster-brothers," because suckled by the same nurse. Christianity, through the idea of the universal fatherhood of God, conceives all men as brothers; but in a narrower sense "the brethren" are the members of the Church, or, in a narrower still, of a confraternity or "brotherhood" within the Church. This latter idea is reproduced in those fraternal societies, *e.g.* the Freemasons, the members of which become "brothers" by initiation. "Brother" is also used symbolically, as implying equality, by sovereigns in addressing one another, and also by bishops.

BROTHERS, RICHARD (1757-1824), British religious fanatic, was born in Newfoundland on Christmas day, 1757, and educated at Woolwich. He entered the navy and served under Keppel and Rodney. In 1783 he became lieutenant, and was discharged on half-pay. He travelled on the continent, made an unhappy marriage in 1786, and again went to sea. But he felt that the military calling and Christianity were incompatible and abandoned the former (1789). Further scruples as to the oath required on the receipt of his half-pay reduced him to serious pecuniary

straits (1791), and he divided his time between the open air and the workhouse, where he developed the idea that he had a special divine commission, and wrote to the king and the parliament to that effect. In 1793 he declared himself the apostle of a new religion, "the nephew of the Almighty, and prince of the Hebrews, appointed to lead them to the land of Canaan." At the end of 1794 he began to print his interpretations of prophecy, his first book being *A Revealed Knowledge of the Prophecies and Times*. In consequence of prophesying the death of the king and the end of the monarchy, he was arrested for treason in 1795, and confined as a criminal lunatic. His case was, however, brought before parliament by his ardent disciple, Nathaniel Halhed, the orientalist, a member of the House of Commons, and he was removed to a private asylum in Islington. Here he wrote a variety of prophetic pamphlets, which gained him many believers, amongst them William Sharp, the engraver, who afterwards deserted him for Joanna Southcott. Brothers, however, had announced that on the 19th of November 1795 he was to be "revealed" as prince of the Hebrews and ruler of the world; and when this date passed without any such manifestation, what enthusiasm he had aroused rapidly dwindled, despite the fact that some of his earlier political predictions (*e.g.* the violent death of Louis XVI.) had been fulfilled. He died in London on the 25th of January 1824, in the house of John Finlayson, who had secured his release, and who afterwards pestered the government with an enormous claim for Brothers's maintenance. The supporters of the Anglo-Israelite theory claim him as the first writer on their side.

BROTHERS OF COMMON LIFE, a religious community formerly existing in the Catholic Church. Towards the end of his career Gerhard Groot (*q.v.*) retired to his native town of Deventer, in the province of Overyssel and the diocese of Utrecht, and gathered about him a number of those who had been "converted" by his preaching or wished to place themselves under his spiritual guidance. With the assistance of Florentius Radewyn, who resigned for the purpose a canonry at Utrecht, he was able to carry out a long-cherished idea of establishing a house wherein devout men might live in community without the monastic vows. The first such community was established at Deventer in the house of Floentius himself (*c.* 1380); and Thomas à Kempis, who lived in it from 1392 to 1399, has left a description of the manner of life pursued:—

"They humbly imitated the manner of the Apostolic life, and having one heart and mind in God, brought every man what was his own into the common stock, and receiving simple food and clothing avoided taking thought for the morrow. Of their own will they devoted themselves to God, and all busied themselves in obeying their rector or his vicar .... They laboured carefully in copying books, being instant continually in sacred study and devout meditation. In the morning, having said Matins, they went to the church (for Mass) .... Some who were priests and were learned in the divine law preached earnestly in the church."

[v.04 p.0652] Other houses of the Brothers of Common Life, otherwise called the "Modern Devotion," were in rapid succession established in the chief cities of the Low Countries and north and central Germany, so that there were in all upwards of forty houses of men; while those of women doubled that figure, the first having been founded by Groot himself at Deventer.

The ground-idea was to reproduce the life of the first Christians as described in Acts iv. The members took no vows and were free to leave when they chose; but so long as they remained they were bound to observe chastity, to practise personal poverty, putting all their money and earnings into the common fund, to obey the rules of the house and the commands of the rector, and to exercise themselves in self-denial, humility and piety. The rector was chosen by the community and was not necessarily a priest, though in each house there were a few priests and clerics. The majority, however, were laymen, of all kinds and degrees—nobles, artisans, scholars, students, labouring men. The clerics preached and instructed the people, working chiefly among the poor; they also devoted themselves to the copying of manuscripts, in order thereby to earn something for the common fund; and some of them taught in the schools. Of the laymen, the educated copied manuscripts, the others worked at various handicrafts or at agriculture. After the religious services of the morning the Brothers scattered for the day's work, the artisans going to the workshops in the city,—for the idea was to live and work in the world, and not separated from it, like the monks. Their rule was that they had to earn their livelihood, and must not beg. This feature seemed a reflection on the mendicant orders, and the idea of a community life without vows and not in isolation from everyday life, was looked upon as something new and strange, and even as bearing affinities to the Beghards and other sects, at that time causing trouble to both Church and state. And so opposition arose to the Modern Devotion, and the controversy was carried to the legal faculty at Cologne University, which gave a judgment strongly in their favour. The question, for all that, was not finally settled until the council of Constance (1414), when their cause was triumphantly defended by Pierre d'Ailly and Gerson. For a century after this the Modern Devotion flourished exceedingly, and its influence on the revival of religion in the Netherlands and north Germany in the 15th century was wide and deep. It has been the fashion to treat Groot and the Brothers of Common Life as "Reformers before the Reformation"; but Schulze, in the Protestant *Realencyklopädie*, is surely right in pronouncing this view quite unhistorical—except on the theory that all interior spiritual religion is Protestant: he shows that at the Reformation hardly any of the Brothers embraced Lutheranism, only a single community going over as a body to the new religion. During the second half of the 16th century the institute gradually declined, and by the middle of the 17th all its houses had ceased to exist.

AUTHORITIES.—The chief authorities are Thomas à Kempis, *Lives of Groot and his Disciples* and *Chronicle of Mount St Agnes* (both works translated by J.P. Arthur, the former under the title *Founders of the New Devotion*, 1905); Busch, *Chronicle of Windesheim* (ed. Grube, 1887). Much

has been written on the subject in Dutch and German; in English, S. Kettlewell, *Thomas à Kempis and the Brothers of Common Life* (1882) (but see Arthur in the Prefaces to above-named books); for a shorter sketch, F.R. Cruise, *Thomas à Kempis* (1887). An excellent article in Herzog-Hauck, *Realencyklopädie* (3rd ed.), "Brüder des gemeinsamen Lebens," supplies copious information with references to all the literature; see also Max Heimbucher, *Orden und Kongregationen* (1897), ii. § 123. The part played by the Brothers of Common Life in the religious and educational movements of the time may be studied in Ludwig Pastor's *History of the Popes from the close of the Middle Ages*, or J. Janssen's *History of the German People*.

(E. C. B.)

BROUGH, ROBERT (1872-1905), British painter, was born at Invergordon, Ross-shire. He was educated at Aberdeen, and, whilst apprenticed for over six years as lithographer to Messrs Gibb & Co., attended the night classes at the local art school. He then entered the Royal Scottish Academy, and in the first year took the Stuart prize for figure painting, the Chalmers painting bursary, and the Maclaine-Walters medal for composition. After two years in Paris under J.P. Laurens and Benjamin-Constant at Julian's *atelier*, he settled in Aberdeen in 1894 as a portrait painter and political cartoonist. A portrait of Mr W.D. Ross first drew attention to his talent in 1896, and in the following year he scored a marked success at the Royal Academy with his "Fantaisie en Folie," now at the National Gallery of British Art (Tate Gallery). Two of his paintings, "'Twixt Sun and Moon" and "Childhood of St Anne of Brittany," are at the Venice municipal gallery. Brough's art is influenced by Raeburn and by modern French training, but it strikes a very personal note. Robert Brough met his death from injuries received in a railway disaster in 1905, his early death being a notable loss to British art.

BROUGHAM, JOHN (1814-1880), British actor, was born at Dublin on the 9th of May 1814, and was educated for a surgeon. Owing to family misfortunes he was thrown upon his own resources and made his first appearance on the London stage in 1830, at the Tottenham Street theatre in *Tom and Jerry*, in which he played six characters. In 1831 he was a member of Madame Vestris's company, and wrote his first play, a burlesque. He remained with Madame Vestris as long as she and Charles Mathews retained Covent Garden, and he collaborated with Dion Boucicault in writing *London Assurance*, Dazzle being one of his best parts. In 1840 he managed the Lyceum theatre, for which he wrote several light burlesques, but in 1842 he moved to the United States, where he became a member of W.E. Burton's company, for which he wrote several comedies. Later he was the manager of Niblo's Garden, and in 1850 opened Brougham's Lyceum, which, like his next speculation, the lease of the Bowery theatre, was not financially a success. He was later connected with Wallack's and Daly's theatres, and wrote plays for both. In 1860 he returned to London, where he adapted or wrote several plays, including *The Duke's Motto* for Fechter. After the Civil War he returned to New York. Brougham's theatre was opened in 1869 with his comedy *Better Late than Never*, but this managerial experience was also unfortunate, and he took to playing with various stock companies. His last appearance was in 1879 as O'Reilly, the detective, in Boucicault's *Rescued*, and he died in New York on the 7th of June 1880. Brougham was the author of nearly 100 plays, most of them now forgotten. He was the founder of the Lotus Club in New York, and for a time its president. He also edited there in 1852 a comic paper called *The Lantern*, and published two collections of miscellaneous writings, *A Basket of Chips* and *The Bunsby Papers*. Brougham is said to have been the original of Harry Lorrequer in Charles Lever's novel. He was twice married, in 1838 to Emma Williams (d. 1865), and in 1844 to Mrs Annette Hawley (d. 1870), both actresses.

BROUGHAM, a four-wheeled closed carriage, seating two or more persons, and drawn by a single horse or pair, or propelled by motor. The modern "brougham" has developed and taken its name from the "odd little kind of garden-chair" described by Thomas Moore, which the first Lord Brougham had made by a coachmaker to his own design.

BROUGHAM AND **VAUX, HENRY PETER BROUGHAM,** 1ST BARON (1778-1868), lord chancellor of England, was born at Edinburgh on the 19th of September 1778. He was the eldest son of Henry Brougham and Eleanora, daughter of the Rev. James Syme. In his later years he was wont to trace his paternal descent to Uduardus de Broham, in the reign of Henry II., but no real connexion has been established between the ancient lords of Brougham castle, whose inheritance passed by marriage from the Viponts into the family of the De Cliffords, and the Broughams of Scales Hall, from whom the chancellor was really descended. Entering the high school of Edinburgh when barely seven, he left, having risen to be head of the school, in 1791. He entered the university of Edinburgh in 1792, and devoted himself chiefly to the study of natural science and mathematics, contributing in 1795 a paper to the Royal Society on some new phenomenon of light and colours, which was printed in the *Transactions* of that body. A paper on porisms was published in the same manner in 1798, and in 1803 his scientific reputation was so far established that he was elected F.R.S., But in spite of his taste for mathematical reasoning, Brougham's mind was not an accurate or exact one; and his pursuit of physical science was rather a favourite recreation than a solid advantage to him.

[v.04 p.0653]

For two years of his university career he had attended lectures in civil law, and having adopted law as a profession he was admitted to the faculty of advocates in 1800. It does not appear that he ever held a brief in the court of session, but he went a circuit or two, where he defended or prosecuted a few prisoners, and played a series of tricks on the presiding judge, Lord Eskgrove, which almost drove that learned person to distraction. The Scottish bar, however, as he soon perceived, offered no field sufficiently ample for his talents and his ambition. He resolved to go to London, where he had already appeared as junior counsel in a Scottish appeal to the House of

Lords. In 1803 he entered at Lincoln's Inn, and in 1808 he was called to the English bar. In the meantime he had turned to literature as a means of subsistence. When in 1802 the *Edinburgh Review* was founded by the young and aspiring lights of the northern metropolis, Brougham was the most ready, the most versatile and the most satirical of all its contributors. To the first twenty numbers he contributed eighty articles, wandering through every imaginable subject,—science, politics, colonial policy, literature, poetry, surgery, mathematics and the fine arts. The prodigious success of the *Review*, and the power he was known to wield in it, made him a man of mark from his first arrival in London. He obtained the friendship of Lord Grey and the leading Whig politicians. His wit and gaiety made him an ornament of society, and he sought to extend his literary and political reputation by the publication of an elaborate work on the colonial policy of the empire. In 1806, Fox being then in office, he was appointed secretary to a mission of Lord Rosslyn and Lord St Vincent to the court of Lisbon, with a view to counteract the anticipated French invasion of Portugal. The mission lasted two or three months; Brougham came home out of humour and out of pocket; and meantime the death of Fox put an end to the hopes of the Whigs.

Brougham was disappointed by the abrupt fall of the ministry, and piqued that his Whig friends had not provided him with a seat in parliament. Nevertheless, he exerted his pen with prodigious activity during the election of 1809; and Lord Holland declared that he had filled the booksellers' shops with articles and pamphlets. The result was small. No seat was placed at his disposal, and he was too poor to contest a borough. He was fortunate at this time to ally himself with the movement for the abolition of the slave-trade, and he remained through life not only faithful, but passionately attached to the cause. Indeed, one of the first measures he carried in the House of Commons was a bill to make the slave-trade felony, and he had the happiness, as chancellor of England, to take a part in the final measure of negro emancipation throughout the colonies.

Previous to his entering on practice at the English bar, Brougham had acquired some knowledge of international law, and some experience of the prize courts. This circumstance probably led to his being retained as counsel for the Liverpool merchants who had petitioned both Houses of Parliament against the Orders in Council. Brougham conducted the lengthened inquiry which took place at the bar of the House, and he displayed on this occasion a mastery over the principles of political economy and international law which at that time was rare. Nevertheless, he was unsuccessful, and it was not until 1812, when he was himself in parliament, that he resumed his attack on the Orders in Council, and ultimately conquered. It was considered inexpedient and impossible that a man so gifted, and so popular as Brougham had now become, should remain out of parliament, and by the influence of Lord Holland the duke of Bedford was induced to return him to the House of Commons for the borough of Camelford. He took his seat early in 1810, having made a vow that he would not open his mouth for a month. The vow was kept, but kept for that month only. He spoke in March in condemnation of the conduct of Lord Chatham at Walcheren, and he went on speaking for the rest of his life. In four months, such was the position he had acquired in the House that he was regarded as a candidate for the leadership of the Liberal party, then in the feeble hands of George Ponsonby. However, the Tories continued in power. Parliament was dissolved. Camelford passed into other hands. Brougham was induced to stand for Liverpool, with Thomas Creevey against Canning and General Gascoyne. The Liberals were defeated by a large majority, and what made the sting of defeat more keen was that Creevey retained his old seat for Thetford, while Brougham was left out in the cold.

He remained out of parliament during the four eventful years from 1812 to 1816, which witnessed the termination of the war, and he did not conceal his resentment against the Whigs. But in the years he spent out of parliament occurrences took place which gave ample employment to his bustling activity, and led the way to one of the most important passages of his life. He had been introduced in 1809 to the princess of Wales (afterwards Queen Caroline). But it was not till 1812 that the princess consulted him on her private affairs, after the rupture between the prince regent and the Whigs had become more decided. From that time, Brougham, in conjunction with Samuel Whitbread, became one of the princess's chief advisers; he was attached to her service, not so much from any great liking or respect for herself, as from an indignant sense of the wrongs and insults inflicted upon her by her husband. Brougham strongly opposed her departure from England in 1814, as well as her return in 1820 on the accession of George IV.

In 1816 he had again been returned to parliament for Winchelsea, a borough of the earl of Darlington, and he instantly resumed a commanding position in the House of Commons. He succeeded in defeating the continuance of the income-tax; he distinguished himself as an advocate for the education of the people; and on the death of Romilly he took up with ardour the great work of the reform of the law. Nothing exasperated the Tory party more than the select committee which sat, with Brougham in the chair, in 1816 and the three following years, to investigate the state of education of the poor in the metropolis. But he was as far as ever from obtaining the leadership of the party to which he aspired. Indeed, as was pointed out by Lord Lansdowne in 1817, the opposition had no recognized efficient leaders; their warfare was carried on in separate courses, indulging their own tastes and tempers, without combined action. Nor was Brougham much more successful at the bar. The death of George III. suddenly changed this state of things. Queen Caroline at once, in April 1820, appointed Brougham her attorney-general, and Denman her solicitor-general; and they immediately took their rank in court accordingly; this was indeed the sole act of royal authority on the part of the unhappy queen. In July Queen Caroline came from St Omer to England; ministers sent down to both Houses of Parliament the secret evidence which they had long been collecting against her; and a bill was brought into the House of Lords for the deposition of the queen, and the dissolution of the king's marriage. The

defence of the queen was conducted by Brougham, assisted by Denman, Lushington and Wilde, with equal courage and ability. His conduct of the defence was most able, and he wound up the proceedings with a speech of extraordinary power and effect. The peroration was said to have been written and rewritten by him seventeen times. At moments of great excitement such declamation may be of value, and in 1820 it was both heard and read with enthusiasm. But to the calmer judgment of later generations this celebrated oration seems turgid and overstrained. Such immense popular sympathy prevailed on the queen's behalf, that the ministry did not proceed with the bill in the Commons, and the result was a virtual triumph for the queen.

This victory over the court and the ministry raised Henry Brougham at once to the pinnacle of fame. He shared the triumph of the queen. His portrait was in every shop window. A piece of plate was presented to him, paid for by a penny subscription of peasants and mechanics. He refused to accept a sum of £4000 which the queen herself placed at his disposal; he took no more than the usual fees of counsel, while his salary as Her Majesty's attorney-general remained unpaid, until it was discharged by the treasury after her death. But from that moment his fortune was made at the bar. His practice on the northern circuit quintupled. One of his finest speeches was a defence of a Durham newspaper which had attacked the clergy for refusing to allow the bells of churches to be tolled on the queen's death; and by the admission of Lord Campbell, a rival advocate and an unfriendly critic, he rose suddenly to a position unexampled in the profession. The meanness of George IV. and of Lord Eldon refused him the silk gown to which his position at the bar entitled him, and for some years he led the circuit as an outer barrister, to the great loss of the senior members of the circuit, who could only be employed against him. His practice rose to about £7000 a year, but it was again falling off before he became chancellor.

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It may here be mentioned that in 1825 the first steps were taken, under the auspices of Brougham, for the establishment of a university in London, absolutely free from all religious or sectarian distinctions. In 1827 he contributed to found the "Society for the Diffusion of Useful Knowledge"—an association which gave an immense impulse to sound popular literature. Its first publication was an essay on the "Pleasures and Advantages of Science" written by himself. In the following year (1828) he delivered his great speech on law reform, which lasted six hours, in a thin and exhausted House,—a marvellous effort, embracing every part of the existing system of judicature.

The death of Canning, the failure of Lord Goderich, and the accession of the duke of Wellington to power, again changed the aspect of affairs. The progress of the movement for parliamentary reform had numbered the days of the Tory government. At the general election of 1830 the county of York spontaneously returned Brougham to the new House of Commons as their representative. The parliament met in November. Brougham's first act was to move for leave to bring in a bill to amend the representation of the people; but before the debate came on the government was defeated on another question; the duke resigned, and Earl Grey was commanded by William IV. to form an administration.

Amongst the difficulties of the new premier and the Whig party were the position and attitude of Brougham. He was not the leader of any party, and had no personal following in the House of Commons. Moreover, he himself had repeatedly declared that nothing would induce him to exchange his position as an independent member of parliament for any office, however great. On the day following the resignation of the Tory government, he reluctantly consented to postpone for one week his motion on parliamentary reform. The attorney-generalship was offered to him and indignantly refused. He himself affirms that he desired to be master of the rolls, which would have left him free to sit in the House of Commons. But this was positively interdicted by the king, and objected to by Lord Althorp, who declared that he could not undertake to lead the House with so insubordinate a follower behind him. But as it was impossible to leave Brougham out of the ministry, it was determined to offer him the chancellorship. Brougham himself hesitated, or affected to hesitate, but finally yielded to the representations of Lord Grey and Lord Althorp. On the 22nd of November the great seal was delivered to him by the king, and he was raised to the peerage as Baron Brougham and Vaux. His chancellorship lasted exactly four years.

Lord Brougham took a most active and prominent part in all the great measures promoted by Grey's government, and the passing of the Reform Bill was due in a great measure to the vigour with which he defended it. But success developed traits which had hitherto been kept in the background. His manner became dictatorial and he exhibited a restless eccentricity, and a passion for interfering with every department of state, which alarmed the king. By his insatiable activity he had contrived to monopolize the authority and popularity of the government, and notwithstanding the immense majority by which it was supported in the reformed parliament, a crisis was not long in arriving. Lord Grey resigned, but very much by Brougham's exertions the cabinet was reconstructed under Lord Melbourne, and he appeared to think that his own influence in it would be increased. But the irritability of his temper and the egotism of his character made it impossible for his colleagues to work with him, and the extreme mental excitement under which he laboured at this time culminated during a journey to Scotland in a behaviour so extravagant, that it gave the final stroke to the confidence of the king. At Lancaster he joined the bar-mess, and spent the night in an orgy. In a country house he lost the great seal, and found it again in a game of blindman's-buff. At Edinburgh, in spite of the coldness which had sprung up between himself and the Grey family, he was present at a banquet given to the late premier, and delivered a harangue on his own services and his public virtue. All this time he continued to correspond with the king in a strain which created the utmost irritation and amazement at Windsor.

Shortly after the meeting of parliament in November the king dismissed his ministers. The chancellor, who had dined at Holland House, called on Lord Melbourne on his way home, and learned the intelligence. Melbourne made him promise that he would keep it a secret until the morrow, but the moment he quitted the ex-premier he sent a paragraph to *The Times* relating the occurrence, and adding that "the queen had done it all." That statement, which was totally unfounded, was the last act of his official life. The Peel ministry, prematurely and rashly summoned to power, was of no long duration, and Brougham naturally took an active part in overthrowing it. Lord Melbourne was called upon in April 1835 to reconstruct the Whig government with his former colleagues. But, formidable as he might be as an opponent, the Whigs had learned by experience that Brougham was even more dangerous to them as an ally, and with one accord they resolved that he should not hold the great seal or any other office. The great seal was put in commission, to divert for a time his resentment, and leave him, if he chose, to entertain hopes of recovering it. These hopes, however, were soon dissipated; and although the late chancellor assumed an independent position in the House of Lords, and even affected to protect the government, his resentment against his "noble friends" soon broke out with uncontrolled vehemence. Throughout the session of 1835 his activity was undiminished. Bills for every imaginable purpose were thrown by him on the table of the House, and it stands recorded in Hansard that he made no less than 221 reported speeches in parliament in that year. But in the course of the vacation a heavier blow was struck: Lord Cottenham was made lord chancellor. Brougham's daring and arrogant spirit sank for a time under the shock, and during the year 1836 he never spoke in parliament. Among the numerous expedients resorted to in order to keep his name before the public, was a false report of his death by a carriage accident, sent up from Westmorland in 1839. He was accused, with great probability, of being himself the author of the report. Such credence did it obtain that all the newspapers of October 22, excepting *The Times*, had obituary notices. However, for more than thirty years after his fall he continued to take an active part in the judicial business of the House of Lords, and in its debates; but it would have been better for his reputation if he had died earlier. His reappearance in parliament on the accession of Queen Victoria was marked by sneers at the court, and violent attacks on the Whigs for their loyal and enthusiastic attachment to their young sovereign; and upon the outbreak of the insurrection in Canada, and the miscarriage of Lord Durham's mission, he overwhelmed his former colleagues, and especially Lord Glenelg, with a torrent of invective and sarcasm, equal in point of oratory to the greatest of his earlier speeches. Indeed, without avowedly relinquishing his political principles, Brougham estranged himself from the whole party by which those principles were defended; and his conduct in general during the years following his loss of office revealed his character in a very unfavourable light. He continued, however, to render judicial services in the privy council, and the House of Lords. The privy council, especially when hearing appeals from the colonies, India, and the courts maritime and ecclesiastical was his favourite
[v.04 p.0655] tribunal; its vast range of jurisdiction, varied by questions of foreign and international law, suited his discursive genius. He had remodelled the judicial committee in 1833, and it still remains one of the most useful of his creations.

In the year 1860 a second patent was conferred upon him by Queen Victoria, with a reversion of his peerage to his youngest brother, William Brougham (d. 1886). The preamble of this patent stated that this unusual mark of honour was conferred upon him by the crown as an acknowledgment of the great services he had rendered, more especially in promoting the abolition of slavery, and the emancipation of the negro race. The peerage was thus perpetuated in a junior branch of the family, Lord Brougham himself being without an heir. He had married in 1821 Mrs Spalding (d. 1865), daughter of Thomas Eden, and had two daughters, the survivor of whom died in 1839. Brougham's last days were passed at Cannes, in the south of France. An accident having attracted his attention to the spot about the year 1838, when it was little more than a fishing village on a picturesque coast, he bought there a tract of land and built on it. His choice and his example made it the sanatorium of Europe. He died there on the 7th of May 1868, in the ninetieth year of his age.

The verdict of the time has proved that there was nothing of permanence, and little of originality in the prodigious efforts of Brougham's genius. He filled the office of chancellor during times burning with excitement, and he himself embodied and expressed the fervour of the times. He affected at first to treat the business of the court of chancery as a light affair, though in truth he had to work hard to master the principles of equity, of which he had no experience. His manner in court was desultory and dictatorial. Sometimes he would crouch in his chair, muffled in his wig and robes, like a man asleep; at other times he would burst into restless activity, writing letters, working problems, interrupting counsel. But upon the whole Brougham was a just and able judge, though few of his decisions are cited as landmarks of the law.

As a parliamentary figure Brougham's personality excited for many years an immense amount of public interest, now somewhat hard to comprehend. His boundless command of language, his animal spirits and social powers, his audacity and well-stored memory enabled him to dominate the situation. His striking and almost grotesque personal appearance, added to the effect of his voice and manner—a tall disjointed frame, with strong bony limbs and hands, that seemed to interpret the power of his address; strange angular motions of the arms; the incessant jerk of his harsh but expressive features; the modulations of his voice, now thundering in the loudest tones of indignation, now subdued to a whisper—all contributed to give him the magical influence such as is excited by a great actor. But his eccentricity rose at times to the verge of insanity; and with all his powers he lacked the moral elevation which inspires confidence and wins respect.

The activity of Lord Brougham's pen was only second to the volubility of his tongue. He carried

on a vast and incessant correspondence of incredible extent. For thirty years he contributed largely to the *Edinburgh Review*, and he continued to write in that journal even after he held the great seal. The best of his writings, entitled "Sketches of the Statesmen of the time of George III.", first appeared in the *Review*. These were followed by the "Lives of Men of Letters and Science," of the same period. Later in life he edited Paley's *Natural Theology*; and he published a work on political philosophy, besides innumerable pamphlets and letters to public men on the events of the day. He published an incorrect translation of Demosthenes' *De Corona*. A novel entitled *Albert Lunel* was attributed to him. A fragment of the *History of England under the House of Lancaster* employed his retirement. In 1838 was published an edition of his speeches in four volumes, elaborately corrected by himself. The last of his works was his posthumous *Autobiography*. Ambitious as he was of literary fame, and jealous of the success of other authors, he has failed to obtain any lasting place in English literature. His style was slovenly, involved and incorrect; and his composition bore marks of haste and carelessness, and nowhere shows any genuine originality of thought. The collected edition of his works and speeches carefully revised by himself (Edinburgh, 1857 and 1872) is the best. His *Autobiography* is of some value from the original letters with which it is interspersed. But Lord Brougham's memory was so much impaired when he began to write his recollections that no reliance can be placed on his statements, and the work abounds in manifest errors. Nor was his regard for truth at any time unimpeachable, and the accounts which he gave of more than one transaction in which he played a prominent part were found on investigation to be unfounded.

The best modern account of Brougham is J.B. Atlay's, in his *Victorian Chancellors* (1906); Lord Campbell's, in *Lives of the Chancellors*, is spiteful, and by an unfriendly though well-informed critic; the Rev. W. Hunt's judicious and careful biography in the *D.N.B.* is somewhat lacking in colour; Henry Reeve's article in the 9th ed. of the *Ency. Brit.*, which is frequently drawn upon above, now requires a good many corrections in points of fact and perspective, but gives a brilliant picture by an appreciative critic, much "behind the scenes." See also references in the *Greville Memoirs* and *Creevey Papers*; S. Walpole, *History of England* (1890); J.A. Roebuck, *History of the Whig Ministry* (1852); Lord Holland, *Memoirs of the Whig Party* (1854); *Brougham and his Early Friends: Letters to James Loch*, 1798-1809 (3 vols., London, 1908, privately printed).

BROUGHTON, HUGH (1549-1612), English scholar and divine, was born at Owlbury, Bishop's Castle, Shropshire, in 1549. He was educated by Bernard Gilpin at Houghton-le-Spring and at Cambridge, where he became fellow of St John's and then of Christ's, and took orders. Here he laid the foundation of the Hebrew scholarship for which he was afterwards so distinguished. From Cambridge he went to London, where his eloquence gained him many and powerful friends. In 1588 he published his first work, "a little book of great pains," entitled *A Concent of Scripture*. This work, dealing with biblical chronology and textual criticism, was attacked at both universities, and the author was obliged to defend it in a series of lectures. In 1589 he went to Germany, where he frequently engaged in discussions both with Romanists and with the learned Jews whom he met at Frankfort and elsewhere. In 1591 he returned to England, but his Puritan leanings incurred the hostility of Whitgift. Accordingly in 1592 he once more went abroad, and cultivated the acquaintance of the principal scholars of Europe, including Scaligeri and Rabbi Elias. Such was the esteem in which he was held, even by his opponents, that he might have had a cardinal's hat if he had been willing to change his faith. In 1599 he published his "Explication" of the article "He descended into hell," in which he maintained that Hades means simply the abode of departed spirits, not the place of torment. On the accession of James he returned to England; but not being engaged to co-operate in the new translation of the Bible (though he had for some years planned a similar work), he retired to Middleburg in Holland, where he preached to the English congregation. In 1611 he returned to England, where he died on the 4th of August 1612.

Some of his works were collected and published in a large folio volume in 1662, with a sketch of his life by John Lightfoot, but many of his theological MSS. remain still unedited in the British Museum.

BROUGHTON, JOHN CAM HOBHOUSE, Baron (1786-1869), English writer and politician, was the eldest son of Sir Benjamin Hobhouse, Bart., by his wife Charlotte, daughter of Samuel Cam of Chantry House, Bradford, Wiltshire. Born at Bristol on the 27th of June 1786, he was educated at Westminster school and Trinity College, Cambridge, where he graduated in 1808. He took the Hulsean prize in 1808 for his *Essay on the Origin and Intention of Sacrifices*. At Cambridge he founded the "Whig Club," and the "Amicable Society," and became very intimate with Byron, who accompanied him on a tour in Spain, Greece and Turkey in 1809. Hobhouse was present at the battle of Dresden in August 1813, and, following the allied army into France, saw Louis XVIII. enter Paris in May 1814. He was again in Paris after the return of Napoleon from Elba, and showed his dislike of the Bourbons and his sympathy with Bonaparte by writing in 1816 a pamphlet entitled *The substance of some letters written by an Englishman resident in Paris during the last reign of the emperor Napoleon*. This caused some offence in England and more in France, and the French translation was seized by the government and both translator and printer were imprisoned. A further period of travel with Byron followed, and at this time Hobhouse wrote some notes to the fourth canto of *Childe Harold*. This canto was afterwards dedicated to him, and a revised edition of a part of his notes entitled *Historical illustrations of the fourth canto of "Childe Harold" containing dissertations on the ruins of Rome and an essay on Italian literature*, was published in 1818. In February 1819 Hobhouse was the Radical candidate at a by-election for the representation of the city of Westminster, but he failed to secure election. He had already

gained some popularity by writing in favour of reform, and in 1819 he issued *A defence of the People in reply to Lord Erskine's "Two Defences of the Whigs,"* followed by *A trifling mistake in Thomas, Lord Erskine's recent preface*. The House of Commons declared this latter pamphlet a breach of privilege; its author was arrested on the 14th of December 1819, and in spite of an appeal to the court of king's bench he remained in custody until the end of the following February. But this proceeding only increased his popularity, and at the general election of 1820 he was returned for Westminster. Hobhouse shared Byron's enthusiasm for the liberation of Greece; after the poet's death in 1824 he proved his will, and superintended the arrangements for his funeral. In parliament he proved a valuable recruit to the party of reform; and having succeeded his father as 2nd baronet in 1831, was appointed secretary at war in the ministry of Earl Grey in February 1832, and was made a privy councillor. He effected some reforms and economies during his tenure of this office, but, unable to carry out all his wishes, became chief secretary for Ireland in March 1833. He had only held this post for a few weeks when, in consequence of his refusal to vote with the government against the abolition of the house and window tax, he resigned both his office and his seat in parliament. At the subsequent election he was defeated, but joined the cabinet as first commissioner of woods and forests when Lord Melbourne took office in July 1834, and about the same time was returned at a by-election as one of the members for Nottingham. In Melbourne's government of 1835 he was president of the board of control, in which position he strongly supported the Indian policy of Lord Auckland; he returned to the same office in July 1846 as a member of Lord John Russell's cabinet; and in February 1851 he went to the House of Lords as Baron Broughton of Broughton Gyfford. He left office when Russell resigned in February 1852, and took little part in political life, being mainly occupied in literary pursuits and in correspondence. He died in London on the 3rd of June 1869.

He had married in July 1828 Lady Julia Tomlinson Hay, daughter of George, 7th marquess of Tweeddale, by whom he had three daughters, but being without heir male the barony lapsed on his death, the baronetcy passing to his nephew, Charles Parry Hobhouse. Lord Broughton was a partner in Whitbread's brewery, a fellow of the Royal Society, and one of the founders of the Royal Geographical Society. He was responsible for the passing of the Vestry Act of 1831, and is said to have first used the phrase "his majesty's opposition." He was a good classical scholar, and although not eloquent, an able debater. In addition to the works already enumerated he wrote *A journey through Albania and other provinces of Turkey in Europe and Asia to Constantinople during the years 1809 and 1810* (London, 1813), revised edition (London, 1855); and *Italy: Remarks made in Several Visits from the Year 1816 to 1854* (London, 1859). A collection of his diaries, correspondence and memoranda is in the British Museum.

See T. Moore, *Life of Lord Byron* (London, 1837-1840); *Greville Memoirs* (London, 1896); *Dictionary of National Biography*, vol. xxvii. (London, 1891); *The Times*, June 4, 1869; Spencer Walpole, *History of England* (London, 1890). Broughton also wrote *Recollections of a Long Life*, printed privately in 1865, and in 1909 published with additions in 2 vols. edited by his daughter, Lady Dorchester, with a preface by the earl of Rosebery.

BROUGHTY FERRY, a municipal and police burgh, seaport and watering-place of Forfarshire, Scotland, on the Firth of Tay, 4 m. E. of Dundee by the North British railway. Pop. (1901) 10,484. The name is a corruption of Brugh or Burgh Tay, in allusion to the fortress standing on the rock that juts into the Firth. It is believed that a stronghold has occupied this site since Pictish times. The later castle, built in 1498, fell into the hands of the English in 1547 and was held by them for three years. Gradually growing more or less ruinous it was acquired by government in 1855, repaired, strengthened and converted into a Tay defence, mounting several heavy guns. Owing to its healthy and convenient situation, Broughty Ferry has become a favourite residence of Dundee merchants. Fishery and shipping are carried on to a limited extent. Before the erection of the Tay Bridge the town was the scene of much traffic, as the railway ferry from Tayport was then the customary access to Dundee from the south. Monifieth (pop. 2134), 2¼ m. north-east of Broughty Ferry, with a station on the North British railway, is noted for its golf links. About 2 m. north rises the conical hill of Laws (400 ft. high), on the top of which are the remains of a vitrified fort, 390 ft. long by 198 ft. in breadth.

BROUSSAIS, FRANÇOIS JOSEPH VICTOR (1772-1838), French physician, was born at St Malo on the 17th of December 1772. From his father, who was also a physician, he received his first instructions in medicine, and he studied for some years at the college of Dinan. At the age of seventeen he entered one of the newly-formed republican regiments, but ill-health compelled him to withdraw after two years. He resumed his medical studies, and then obtained an appointment as surgeon in the navy. In 1799 he proceeded to Paris, wherein 1803 he graduated as M.D. In 1805 he again joined the army in a professional capacity, and served in Germany and Holland. Returning to Paris in 1808 he published his *Histoire des phlegmasies ou inflammations chroniques*; then left again for active service in Spain. In 1814 he returned to Paris, and was appointed assistant-professor to the military hospital of the Val-de-Grace, where he first promulgated his peculiar doctrines on the relation between "life" and "stimulus," and on the physiological interdependence and sympathies of the various organs. His lectures were attended by great numbers of students, who received with the utmost enthusiasm the new theories which he propounded. In 1816 he published his *Examen de la doctrine médicale généralement adoptée*, which drew down upon its author the hatred of the whole medical faculty of Paris; but by degrees his doctrines triumphed, and in 1831 he was appointed professor of general pathology in the academy of medicine. In 1828 he published a work *De l'irritation et de la folie*, and towards the end of his life he attracted large audiences by his lectures on phrenology. He died at Vitry-sur-Seine on the 17th of November 1838.

BROUSSONET, PIERRE MARIE AUGUSTE (1761-1807), French naturalist, was born at Montpellier on the 28th of February 1761, and was educated for the medical profession. Visiting England, he was admitted in 1872 an honorary member of the Royal Society, and in the same year published at London the first part of his work on fishes, *Ichthyologiae Decas I*, material for which was communicated to him by Sir Joseph Banks. On his return to Paris he was appointed perpetual secretary to the Society of Agriculture, and in 1789 became a member of the National Assembly. Under the convention he had to leave Paris, and after some dangers he made his way to Madrid. The enmity of the French emigrants, however, drove him from Spain, and afterwards from Lisbon, but at last he found a refuge in Morocco as physician to an embassy sent out by the United States. Later he obtained permission from the Directory to return to France, and in 1805 was appointed professor of botany at Montpellier, where he died on the 17th of January 1807.

BROUWER, or BRAUWER, **ADRIAN** (1608-1640), Dutch painter, was born at Haarlem, of very humble parents, who bound him apprentice to the painter Frans Hals. Brouwer had an admirable eye for colour, and much spirit in design; and these gifts his master appears to have turned to his own profit, while his pupil was half starved. As the result of this ungenerous treatment, Brouwer was frequently brought into low company and dissipated scenes, which he delineated with great spirit and vivid colouring in his pictures. The unfortunate artist died in a hospital at Antwerp at the early age of thirty-two, consequently his works are few and rarely met with. The largest collection of his masterpieces is in the Pinakothek at Munich.

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BROWN, CHARLES BROCKDEN (1771-1810), American novelist, was born of Quaker parents in Philadelphia, on the 17th of January 1771. Of delicate constitution and retiring habits, he early devoted himself to study; his principal amusement was the invention of ideal architectural designs, devised on the most extensive and elaborate scale. This characteristic talent for construction subsequently assumed the shape of Utopian projects for perfect commonwealths, and at a later period of a series of novels distinguished by the ingenuity and consistent evolution of the plot. The transition between these intellectual phases is marked by a juvenile romance entitled *Carsol*, not published until after the author's death, which professes to depict an imaginary community, and shows how thoroughly the young American was inspired by Godwin and Mary Wollstonecraft, whose principal writings had recently made their appearance. From the latter he derived the idea of his next work, *The Dialogue of Alcuin* (1797), an enthusiastic but inexperienced essay on the question of woman's rights and liberties. From Godwin he learned his terse style, condensed to a fault, but too laconic for eloquence or modulation, and the art of developing a plot from a single psychological problem or mysterious circumstance. The novels which he now rapidly produced offer the strongest affinity to *Caleb Williams*, and if inferior to that remarkable work in subtlety of mental analysis, greatly surpass it in affluence of invention and intensity of poetical feeling. All are wild and weird in conception, with incidents bordering on the preternatural, yet the limit of possibility is never transgressed. In *Wieland; or the Transformation* (1798), the first and most striking, a seemingly inexplicable mystery is resolved into a case of ventriloquism. *Arthur Mervyn; or Memoirs of the Year 1793* (1798-1800), is remarkable for the description of the epidemic of yellow fever in Philadelphia. *Edgar Huntly* (Philadelphia, 1801), a romance rich in local colouring, is remarkable for the effective use made of somnambulism, and anticipates Cooper's introduction of the American Indian into fiction. *Ormond* (1799) is less powerful, but contains one character, Constantia Dudley, which excited the enthusiastic admiration of Shelley. Two subsequent novels, *Clara Howard* (1801) and *Jane Talbot* (1804), dealing with ordinary life, proved failures, and Brown betook himself to compiling a general system of geography, editing a periodical, and an annual register, and writing political pamphlets. He died of consumption on the 22nd of February 1810. He is depicted by his biographer as the purest and most amiable of men, and in spite of a certain formality, due perhaps to his Quaker education, the statement is borne out by his correspondence.

The life of Charles Brockden Brown was written by his friend William Dunlap (Philadelphia, 1815). See also William H. Prescott, *Biographical and Critical Miscellanies* (New York, 1845). His works in 6 vols. were published at Philadelphia in 1857 with a "life," and in a limited and more elaborate edition (1887).

BROWN, FORD MADOX (1821-1893), English painter, was born at Calais on the 16th of April 1821. His father was Ford Brown, a retired purser in the navy; his mother, Caroline Madox, of an old Kentish family. His paternal grandfather was Dr John Brown, who established the Brunonian Theory of Medicine. Ford Madox Brown was the only child of his parents, save for a daughter who died young. In childhood he was shifted about a good deal between France and England; and having shown from the age of six or seven a turn for drawing he was taken, when fourteen years old, and with meagre acquirements in the way of general tuition, to Bruges, and placed under the instruction of Gregorius, a pupil of David. His principal instructor, however, from about 1837, was Baron Wappers, of Antwerp, then regarded as a great light of the Belgian school. From him the youth learned the technique not only of oil painting but of various other branches of art. At a very early age Brown attained a remarkable degree of force in drawing and painting, as attested by an extant oil-portrait of his father, done at an age not exceeding fifteen. His first composition, towards 1836, represented a blind beggar and his child; his first exhibited work, 1837, was "Job on the Ash-heap"; the first exhibited work in London (at the Royal Academy, 1840), "The Giaour's Confession," from Byron's poem. Both his parents died before 1840, leaving to the young painter a moderate competence, which soon was materially reduced. In 1840 Brown completed a large picture, "The Execution of Mary, queen of Scots," strong in dramatic effect and in handling, with rather sombre colour; from this time forth he must be regarded as a proficient artist, independent in his point of view and strenuous in execution. He contributed to the cartoon

competitions, 1844 and 1845, for the Houses of Parliament—"Adam and Eve after the Fall," "The Body of Harold brought to William the Conqueror," and "The Spirit of Justice." These highly remarkable cartoons passed not wholly unobserved, but not one of them obtained a prize. The years 1840 to 1845 were passed in Paris, London and Rome: towards the middle of 1846 Brown settled permanently in London. In 1841 he had married his cousin Elizabeth Bromley, who died of consumption in 1846, leaving a daughter, Lucy, who in 1874 became the wife of William M. Rossetti. Not long after being left a widower, Brown took a second wife, Emma Hill, who figures in many of his pictures. She had two children who grew up: Catherine, who married Dr Franz Hueffer, the musical scholar and critic, and Oliver, who died in 1874 in his twentieth year. All three children showed considerable ability in painting, and Oliver in romance as well. The second Mrs Brown died in 1890.

The most marked distinction of Brown as an artist may be defined as vigorous invention of historic or dramatic scenes, carried out with a great regard to individuality in the personages, expressions and accessories of incident and detail, not excluding the familiar, the peculiar and the semi-grotesque, when these seem to subserve the general intent. Owing, however, to his association with artists of the so-called "pre-Raphaelite" movement (which began late in 1848), and especially with Dante Gabriel Rossetti, who received some training in his studio in the spring of that year, he has been regarded sometimes as the precursor or initiator of this movement, and sometimes as a direct co-operator in it. His claim to be regarded as a precursor or initiator is not strong; though it is true that even before 1841 he had pondered the theory (not then much in vogue) that a picture ought to present the veritable light and shade proper to some one moment in the day, and his "Manfred on the Jungfrau" (1841) exemplifies this principle to some extent; it reappears in his very large picture of "Chaucer at the Court of Edward III." (now in the public gallery of Sydney, Australia), which, although projected in 1845, was not brought to completion until 1851. As to becoming a direct co-operator in the pre-Raphaelite movement, he did not join the "Brotherhood," though it would have been open to him to do so; but for some years his works exhibited a marked influence derived from the movement, not on the whole to their clear advantage. The principal pictures of this class are: "The Pretty Baa-lambs"; "Work" (a street scene at Hampstead); and "The Last of England" (an emigration subject, one of his most excellent achievements): dating between 1851 and 1863. "Christ Washing Peter's Feet" (now in the National Gallery of British Art) comes within the same range of dates, and is a masterly work; here the pre-Raphaelite influence is less manifest. Altogether it may be averred that the conception and introduction of the pre-Raphaelite scheme, such as it appeared to the public eye in 1849 and 1850, belong to Millais, Holman Hunt and Rossetti, rather than to Brown.

Other leading pictures by Brown are the following:—"Cordelia at the Bedside of Lear"; "Shakespeare"; "Jacob and Joseph's Coat"; "Elijah and the Widow's Son"; "Cordelia's Portion"; "The Entombment"; "Romeo and Juliet" (the parting on the balcony); "Don Juan and Haidee"; [v.04 p.0658] "Cromwell on his Farm"; "Cromwell, Protector of the Vaudois":—covering the period from 1849 to 1877. "Sardanapalus and Myrrha," begun within the same period, was finished later. He produced, moreover, a great number of excellent cartoons for stained glass, being up to 1874 a member of the firm of decorative art, Morris, Marshall, Faulkner and Co. He also executed, in colours or in crayons, various portraits, including his own. From 1878 he was almost engrossed by work which he undertook for the town hall of Manchester, and which entailed his living for some few years in that city—twelve large wall paintings, some of them done in a modified form of the Gambier-Parry process, and others in oils on canvas applied to the wall surface. They present a compendium of the history of Manchester and its district, from the building of the Roman camp at Mancunium to the experimental work of Dalton in elaborating the atomic theory. This is an extremely fine series, though with some diversity of individual merit in the paintings, and is certainly the chief representative, in the United Kingdom, of any such form of artistic effort—if we leave out of count the works (by various painters) in the Houses of Parliament.

Madox Brown was never a popular or highly remunerated artist. Up to near middle age he went through trying straits in money matters; afterwards his circumstances improved, but he was not really well off at any time. In youth he followed the usual course as an exhibiting painter, but after some mortifications and heart-burnings he did little in this way after 1852. He held, however, in 1865, an exhibition of his own then numerous paintings and designs. He also delivered a few lectures on fine art from time to time. From 1868 he suffered from gout; and this led to an attack of apoplexy, from which he died in London on the 6th of October 1893. He was a man of upright, independent and honourable character, of warm affections, a steady and self-sacrificing friend; but he took offence rather readily, and viewed various persons and institutions with a degree of suspicion which may be pronounced excessive. He felt interest in many questions outside the range of his art, and, being a good and varied talker, had often something apposite and suggestive to say about them. On more than one occasion he exerted himself very zealously for the benefit of the working classes. In politics he was a consistent Democrat, and on religious questions an Agnostic.

The life of this artist has been well written by his grandson, Ford M. Hueffer, in a handsomely illustrated volume entitled *Ford Madox Brown* (London, 1896). This volume contains some extracts from Brown's diary, extending in the whole from 1847 to 1865; and other lengthier extracts appear in two books edited by William M. Rossetti—*Ruskin, Rossetti, Pre-Raphaelitism* (1899), and *Pre-Raphaelite Diaries and Letters* (1899). See also the *Preferences in Art, &c.*, by Harry Quilter (1892), and a pamphlet, *Ford Madox Brown* (1901), by Helen Rossetti (Angeli), applicable to a collection of his works exhibited in the Whitechapel Art Gallery.

(W. M. R.)

BROWN, FRANCIS (1849-), American Semitic scholar, was born in Hanover, New Hampshire, on the 26th of December 1849, the son of Samuel Gilman Brown (1813-1885), president of Hamilton College from 1867 to 1881, and the grandson of Francis Brown (1784-1820), whose removal from the presidency of Dartmouth College and later restoration were incidental to the famous "Dartmouth College case." The younger Francis graduated from Dartmouth in 1870 and from the Union Theological Seminary in 1877, and then studied in Berlin. In 1879 he became instructor in biblical philology at the Union Theological Seminary, in 1881 an associate professor of the same subject, and in 1890 professor of Hebrew and cognate languages.[1] Dr Brown's published works have won him honorary degrees from the universities of Glasgow and Oxford, as well as from Dartmouth and Yale; they are, with the exception of *The Christian Point of View* (1902; with Profs. A. C. McGiffert and G. W. Knox), almost purely linguistic and lexical, and include *Assyriology: its Use and Abuse in Old Testament Study* (1885), and the important revision of Gesenius, undertaken with S. R. Driver and C. A. Briggs, *A Hebrew and English Lexicon of the Old Testament* (1891-1905).

[1] In 1908 he succeeded Charles Cuthbert Hall (1852-1908) as president of the seminary.

BROWN, SIR GEORGE (1790-1865), British soldier, was born and educated in Elgin, Scotland. He obtained a commission in the 43rd (now 1st Bn. Oxfordshire) Light Infantry in 1806, was promoted lieutenant a few months later, and saw active service for the first time in the Mediterranean and at Copenhagen, 1806 and 1807. The 43rd was one of the earliest arrivals in Spain when the Peninsular War broke out, and Brown was with his regiment at Vimeiro, and in the Corunna retreat. Later in 1809 the famous Light Division was formed, and with Craufurd he was present at all the actions of 1810-1811, being severely wounded at Talavera; he was then promoted captain and attended the Staff College at Great Marlow until (late in 1812) he returned to the Peninsula as a captain in the 85th. With this regiment he served under Major-General Lord Aylmer at the Nivelle and Nive, his conduct winning for him the rank of major. The 85th was next employed under General Robert Ross in America, and Brown, who received a severe wound at the action of Bladensburg, was promoted to a lieut.-colonelcy. At the age of twenty-five, with a brilliant war record, he received an appointment at the Horse Guards, and remained in London for over twenty-five years in various staff positions. He was made a colonel and K.H. in 1831, and by 1852 had arrived at the rank of lieut.-general and the dignity of K.C.B. At this time he was adjutant-general, but on the appointment of Lord Hardinge to the post of commander-in-chief, Brown left the Horse Guards. In 1854, on the despatch of a British force to the East, Sir George Brown was appointed to command the Light Division. This he led in action, and administered in camp, on Peninsular principles, and, whilst preserving the strictest discipline to a degree which came in for criticism, he made himself beloved by his men. At Alma he had a horse shot under him. At Inkerman he was wounded whilst leading the French Zouaves into action. In the following year, when an expedition against Kertch and the Russian communications was decided upon, Brown went in command of the British contingent. He was invalided home on the day of Lord Raglan's death. From March 1860 to March 1865 he was commander-in-chief in Ireland. At the time of his death in 1865 he was general and G.C.B., colonel of the 32nd Regiment and colonel-in-chief of the Rifle Brigade.

BROWN, GEORGE (1818-1880), Canadian journalist and statesman, was born in Edinburgh on the 29th of November 1818, and was educated in his native city. With his father, Peter Brown (d. 1863), he emigrated to New York in 1838; and in 1843 they removed to Toronto, and began the publication of *The Banner*, a politico-religious paper in support of the newly formed Free Church of Scotland. In 1844 he began, independently of his father, the issue of the Toronto *Globe*. This paper, at first weekly, became in 1853 a daily, and through the ability and energy of Brown, came to possess an almost tyrannical influence over the political opinion of Ontario. In 1851 he entered the Canadian parliament as member for Kent county. Though giving at first a modified support to the Reform government, he soon broke with it and became leader of the Radical or "Clear Grit" party. His attacks upon the Roman Catholic church and on the supposed domination in parliament of the French Canadian section made him very unpopular in Lower Canada, but in Upper Canada his power was great. Largely owing to his attacks, the Clergy Reserves were secularized in 1854. He championed the complete laicization of the schools in Ontario, but unsuccessfully, the Roman Catholic church maintaining its right to separate schools. He also fought for the representation by population of the two provinces in parliament, the Act of Union (1841) having granted an equal number of representatives to each. This principle of "Rep. by Pop." was conceded by the British North America Act (1867). In 1858 Brown became premier of "The Short Administration," which was defeated and compelled to resign after an existence of two days.

He was one of the earliest advocates of a federation of the British colonies in North America, and in 1864, to accomplish this end, entered into a coalition with his bitter personal and political
[v.04 p.0659] opponent, Mr (afterwards Sir) John A. Macdonald. Largely owing to Brown's efforts, Federation was carried through the House, but on the 21st of December 1865 he resigned from the Coalition government, though continuing to support its Federation policy, and in 1867 he was defeated in South Ontario and never again sat in the House. In great measure owing to his energy, and in spite of much concealed opposition from the French-Canadians, the North-West Territories were purchased by the new Dominion. In December 1873 he was called to the Canadian senate, and in 1874 was appointed by the imperial government joint plenipotentiary with Sir Edward Thornton

to negotiate a reciprocity treaty between Canada and the United States. The negotiations were successful, but the draft treaty failed to pass the United States Senate. Soon afterwards Brown refused the lieutenant-governorship of Ontario, and on two subsequent occasions the offer of knighthood, devoting himself to the *Globe* and to a model farm at Bow Park near Brantford. On the 25th of March 1880 he was shot by a discharged employé, and died on the 9th of May.

His candour, enthusiasm and open tolerance of the opinions of others made him many warm friends and many fierce enemies. He was at his best in his generous protests against all privileges, social, political and religious, and in the self-sacrificing patriotism which enabled him to fling aside his personal prejudices, and so to make Federation possible.

See J. C. Dent, *Canadian Portrait Gallery* (Toronto, 1800). The official *Life*, by the Hon. Alexander Mackenzie, is decidedly partisan. A life by John Lewis is included in the *Makers of Canada* series (Toronto).

(W. L. G.)

BROWN, HENRY KIRKE (1814-1886), American sculptor, was born in Leyden, Massachusetts, on the 24th of February 1814. He began to paint portraits while quite a boy, studied painting in Boston under Chester Harding, learned a little about modelling, and in 1836-1839 spent his summers working as a railroad engineer to earn enough to enable him to study further. He spent four years (1842-1846) in Italy; but returning to New York he remained distinctively American, and was never dominated, as were so many of the early American sculptors, by Italian influence. He died on the 10th of July 1886 at Newburgh, New York. His equestrian statues are excellent, notably that of General Winfield Scott (1874) in Washington, D.C., and one of George Washington (1856) in Union Square, New York City, which was the second equestrian statue made in the United States, following by three years that of Andrew Jackson in Washington by Clark Mills (1815-1883). Brown was one of the first in America to cast his own bronzes. Among his other works are: Abraham Lincoln (Union Square, New York City); Nathanael Greene, George Clinton, Philip Kearny, and Richard Stockton (all in the National Statuary Hall, Capitol, Washington, D.C.); De Witt Clinton and "The Angel of the Resurrection," both in Greenwood cemetery, New York City; and an "Aboriginal Hunter."

His nephew and pupil, Henry Kirke Bush-Brown (b. 1857), also became prominent among American sculptors, his "Buffalo Hunt," equestrian statues of Generals Meade and Reynolds at Gettysburg, and "Justinian" in the New York appellate court-house, being his chief works.

BROWN, JACOB (1775-1828), American soldier, was born of Quaker ancestry, in Bucks county, Pennsylvania, on the 9th of May 1775. From 1796 to 1798 he was engaged in surveying public lands in Ohio; in 1798 he settled in New York City, and during the period (1798-1800) when war with France seemed imminent he acted as military secretary to Alexander Hamilton, then inspector-general of the United States army. Subsequently he purchased a large tract of land in Jefferson county, New York, where he founded the town of Brownville. There he served as county judge, and attained the rank (1810) of brigadier-general in the state militia. On the outbreak of the second war with Great Britain (1812) he was placed in command of the New York state frontier from Oswego to Lake St Francis (near Cornwall, Ontario) and repelled the British attacks on Ogdensburg (October 4, 1812) and Sackett's Harbor (May 29, 1813). In July 1813 he was commissioned brigadier-general in the regular army, and in January 1814 he was promoted major-general and succeeded General James Wilkinson in command of the forces at Niagara. Early in the summer of 1814 he undertook offensive operations, and his forces occupied Fort Erie, and, on the 5th of July, at Chippawa, Ontario, defeated the British under General Phineas Riall (c. 1769-1851). On the 25th of July, with General Winfield Scott, he fought a hotly contested, but indecisive, battle with the British under General Gordon Drummond (1771-1854) at Lundy's Lane, where he was twice wounded. After the war he remained in the army, of which he was the commanding general from March 1821 until his death at Washington, D.C., on the 24th of February 1828.

BROWN, JOHN (1715-1766), British divine and author, was born at Rothbury, Northumberland, on the 5th of November 1715. His father, a descendant of the Browns of Coalston, near Haddington, became vicar of Wigton in that year. Young Brown was educated at St John's College, Cambridge; and after graduating at the head of the list of wranglers in 1735, he took holy orders, and was appointed minor canon and lecturer at Carlisle. In 1745 he distinguished himself in the defence of Carlisle as a volunteer, and in 1747 was appointed chaplain to Dr Osbaldiston, on his admission to the bishopric of Carlisle. His poem, entitled "Honour" (1743), was followed by the "Essay on Satire." This gained for him the friendship of William Warburton, who introduced him to Ralph Allen, of Prior Park, near Bath. In 1751 Brown dedicated to Allen his *Essay on the Characteristics of Lord Shaftesbury*, containing an able defence of the utilitarian philosophy, praised later by John Stuart Mill (*Westminster Review*, vol. xxix. p. 477). In 1756 he was promoted by the earl of Hardwicke to the living of Great Horkesley in Essex, and in the following year he took the degree of D.D. at Cambridge. He was the author of two plays, *Barbarossa* (1754) and *Athelstane* (1756); Garrick played in both, and the first was a success. The most popular of his works was the *Estimate of the Manners and Principles of the Times* (2 vols., 1757-1758), a bitter satire which pleased a public depressed by the ill-success in the conduct of the war, and ready to welcome an attack on luxury and kindred evils. Other works are the *Additional Dialogue of the Dead between Pericles and Cosmo ...* (1760), in vindication of Chatham's policy; and the *Dissertation on the Rise, Union and Power, &c., of Poetry and Music* (1763). He was consulted in connexion with a scheme of education which Catherine II. of Russia

desired to introduce into her dominions. A memorandum on the subject by Dr Brown led to an offer on her part to entertain him at St Petersburg as her adviser on the subject. He had bought a postchaise and various other things for the journey, when he was persuaded to relinquish the design on account of his gout. He had been subject to fits of melancholy, and, influenced perhaps by disappointment, he committed suicide on the 23rd of September 1766.

There is a detailed account of John Brown by Andrew Kippis in *Biographia Britannica* (1780), containing the text of the negotiations for his journey to Russia, and of a long letter in which he outlines the principles of the scheme he would have proposed. See also T. Davies, *Memoirs of ... David Garrick* (1780), chap. xix.

BROWN, JOHN (1722-1787), Scottish divine, was born at Carpow, in Perthshire. He was almost entirely self-educated, having acquired a knowledge of Latin, Greek and Hebrew while employed as a shepherd. His early career was varied, and he was in succession a packman, a soldier in the Edinburgh garrison in 1745, and a school-master. He was, from 1750 till his death, minister of the Burgher branch of the Secession church (see United Presbyterian Church) in Haddington. From 1786 he was professor of divinity for his denomination, and was mainly responsible for the training of its ministry. He gained a just reputation for learning and piety. The best of his many works are his *Self-Interpreting Bible* and *Dictionary of the Bible*, works that were long very popular. The former was translated into Welsh. He also wrote an *Explication of the Westminster Confession*, and a number of biographical and historical sketches.

[v.04 p.0660]

BROWN, JOHN (1735-1788), Scottish physician, was born in 1735 at Lintlaws or at Preston, Berwickshire. After attending the parish school at Duns, he went to Edinburgh and entered the divinity classes at the university, supporting himself by private tuition. In 1759 he seems to have discontinued his theological studies, and to have begun the study of medicine. He soon attracted the notice of William Cullen, who engaged him as private tutor to his family, and treated him in some respects as an assistant professor. In time, however, he quarrelled with Cullen, as with the professors of the university in general, and from about 1778 his public lectures contained vigorous attacks on all preceding systems of medicine and Cullen's in particular. In 1780 he published his *Elementa Medicinae*, expounding his own, or as it was then called the Brunonian, theory of medicine, which for a time had a great vogue. In 1786 he set out for London in the vain hope of bettering his fortunes, and died there of apoplexy on the 17th of October 1788.

An edition of his works, with notice of his life by his son, William Cullen Brown, appeared in 1804.

BROWN, JOHN (1784-1858), Scottish divine, grandson of the last-named, was born at Whitburn, Linlithgowshire, on the 12th of July 1784. He studied at Glasgow university, and afterwards at the divinity hall of the "Burgher" branch of the "Secession" church at Selkirk, under the celebrated George Lawson. In 1806 he was ordained minister of the Burgher congregation at Biggar, Lanarkshire, where he laboured for sixteen years. While there he had an interesting controversy with Robert Owen the socialist. Transferred in 1822 to the charge of Rose Street church, Edinburgh, he at once took a high rank as a preacher. In 1829 he succeeded James Hall at Broughton Place church, Edinburgh. In 1835 he was appointed one of the professors in the theological hall of the Secession church, and, great as was his ability as a preacher and pastor, it was probably in this sphere that he rendered his most valuable service. He had been the first in Scotland to use in the pulpit the exegetical method of exposition of Scripture, and as a professor he illustrated the method and extended its use. To him chiefly is due the abandonment of the principle of interpretation according to the "analogy of faith," which practically subordinated the Bible to the creed. Brown's exegesis was marked by rare critical sagacity, exact and extensive scholarship, unswerving honesty, and a clear, logical style; and his expository works have thus a permanent value. He had a considerable share in the Apocrypha controversy, and he was throughout life a vigorous and consistent upholder of anti-state-church or "voluntary" views. His two sermons on *The Law of Christ respecting civil obedience, especially in the payment of tribute*, called forth by a local grievance from which he had personally suffered, were afterwards published with extensive additions and notes, and are still regarded as an admirable statement and defence of the voluntary principle. The part he took in the discussion on the Atonement, which agitated all the Scottish churches, led to a formal charge of heresy against him by those who held the doctrine of a limited atonement. In 1845, after a protracted trial, he was acquitted by the synod. From that time he enjoyed the thorough confidence of his denomination (after 1847 merged in "the United Presbyterian church"), of which in his later years he was generally regarded as the leading representative. He died on the 13th of October 1858. His chief works were: *Expository Discourses on First Peter* (1848); *Exposition of the Discourses and Sayings of our Lord* (1850); *Exposition of our Lord's Intercessory Prayer* (1850); *The Resurrection of Life* (1851); *Expository Discourses on Galatians* (1853); and *Analytical Exposition of the Epistle to the Romans* (1857).

See *Memoir of John Brown, D.D.*, by John Cairns (1860).

BROWN, JOHN (1800-1859), American abolitionist, leader of the famous attack upon Harper's Ferry, in 1859, was born on the 9th of May 1800, at Torrington, Connecticut. He is said to have been descended from Peter Brown, who went to America in the *Mayflower*, and he was the grandson of Captain John Brown, who served in the War of Independence. He was taken by his father, Owen Brown, to Hudson, Ohio, in 1805. At the age of eighteen he began to prepare himself for the Congregational ministry, but soon changed his mind and turned his attention to land surveying. He engaged successively in the tanning business, in sheep-raising, and in the

wool trade, but met with little success and in 1842, at Akron, Ohio, became bankrupt. In 1849, after having lived in Ohio, Pennsylvania, and Massachusetts, he removed to North Elba, N.Y., where he engaged in farming on part of the land which was being given in small tracts, by its owner Gerrit Smith, to negro settlers. Long before this he had conceived a strong hatred for the institution of slavery, and had determined to do what he could to bring about its destruction. In 1854 five of his sons removed to Kansas, where the violent conflict was beginning between the "free-state" and the pro-slavery settlers, and in the following year Brown, leaving the rest of his family at North Elba, joined them, settling near Osawatomie and immediately becoming a conspicuous figure in the border warfare. His name became particularly well known in connexion with the so-called "Pottawatomie massacre," the killing in cold blood, on the 25th of May 1856, by men under his orders, of five pro-slavery settlers in retaliation for the murder a short time previously of five "free-state" settlers. He also on the 2nd of June, at the head of about thirty men, captured Captain H. C. Pate and twenty-two pro-slavery men at Black Jack, and on the 30th of August 1856, with a small body of supporters, vigorously resisted an attack of a superior pro-slavery force upon Osawatomie. Brown then visited the Eastern states for the purpose of raising money to be used in the Kansas struggle and of arousing the people against slavery. After spending a short time in Kansas, in 1858-1859 he proceeded to carry out a long-cherished scheme for facilitating the escape of fugitive slaves by establishing in the mountains of Virginia a stronghold in which such fugitives could take refuge and defend themselves against their pursuers. At Chatham, Canada, with eleven white and thirty-five negro associates, he adopted a "Provisional Constitution and Ordinance for the People of the United States." Brown was elected commander-in-chief, and from among this group a secretary of state, a secretary of war, a secretary of the treasury, and members of Congress were chosen. Later, with only twenty-two men supplied with arms furnished by the Massachusetts-Kansas committee, and with funds contributed (in ignorance of Brown's plans) by his intimate associates, Theodore Parker, George L. Stearns, T. W. Higginson, and F. B. Sanborn, all of Boston, and Gerrit Smith, of Peterboro, New York, he removed to a farm near Harper's Ferry, the site of a Federal arsenal, which he intended to capture as a preliminary to the carrying out of the main part of his plan. On the night of the 16th of October 1859, with only eighteen men, five of whom were negroes, he made the attack, easily capturing the arsenal and taking about sixty of the leading citizens prisoners to be used as hostages. On the following morning Brown and his followers were vigorously attacked, and on the 18th—a small force of United States marines under Colonel Robert E. Lee having arrived—were overpowered, Brown being seriously wounded after he had surrendered. Of the twenty-two men who had participated in the raid, ten were killed, seven were taken prisoners, and five escaped. On the other side five were killed and nine wounded. Brown was committed to the Charlestown, Virginia (now West Virginia), gaol on the 19th of October; on the 27th his trial began; on the 31st he was convicted of "treason, and conspiring and advising with slaves and other rebels, and murder in the first degree"; and on the 2nd of December he was hanged at Charlestown. His fellow-prisoners were likewise hanged soon afterwards. Brown was buried at North Elba, New York. The attack upon Harper's Ferry created widespread excitement, particularly in the Southern states; and among the abolitionists in the North Brown was looked upon as a martyr to their cause. Shortly after his death a famous popular song became widely current in the North, beginning:—

> John Brown's body lies a-mouldering in the grave,
> But his soul goes marching on.

[v.04 p.0661] Intensely religious in his nature, Brown possessed something of the gloomy fanaticism of his Puritan ancestors. The secret of his whole career lies in his emphatic conviction, to use the words of Wendell Phillips, that he had "letters of marque from God"; that he had a divine commission to destroy slavery by violent means. He scouted the "milk and water principles" of the milder abolitionists, advocated vigorous resistance to the slave power, and expressed his ideas by actions rather than by words. It now seems that this policy aided very little in making Kansas a free state, and that the attack on Harper's Ferry, while creating much feeling at the moment, had very little effect on the subsequent course of events. It is safe to assume that secession and civil war would have followed the election of Lincoln if there had been no such raid into Virginia.

Brown was twice married and was the father of twenty children, eight of whom died in early childhood. His sons aided him in all his undertakings, two of them being killed at Harper's Ferry; and Owen Brown, who died in 1889, was long the only survivor of the attack.

See the life (1910) by O. G. Villard, and F. B. Sanborn's *Life and Letters of John Brown* (Boston, 1885); R. J. Hinton's *John Brown and His Men* (New York, 1894); James Redpath's *Public Life of Captain John Brown* (Boston, 1860); Von Hoist's essay, *John Brown* (Boston, 1889); and J. F. Rhodes, *History of the United States from the Compromise of 1850* (New York, 1890-1906).

BROWN, JOHN (1810-1882), Scottish physician and author, son of John Brown (1784-1858), was born at Biggar, Scotland, on the 22nd of September 1810. He graduated as M.D. at the university of Edinburgh in 1833, and practised as a physician in that city. His reputation, however, is based on the two volumes of essays, *Horae Subsecivae* (i.e. "leisure hours") (1858, 1861), *John Leech and other Papers* (1882), *Rab and His Friends* (1859), and *Marjorie Fleming: a Sketch* (1863). The first volume of *Horae Subsecivae* deals chiefly with the equipment and duties of a physician, the second with subjects outside his profession. He was emphatic in his belief that an author should publish nothing "unless he has something to say, and has done his best to say it aright." Acting on this principle, he published little himself, and only after subjecting it to the severest criticism. His work is invariably characterized by humour and tenderness. He suffered during the

latter years of his life from pronounced attacks of melancholy, and died on the 11th of May 1882.

See also E. T. M^{c}Laren, *Dr John Brown and his Sister Isabella* (4th ed., 1890); and *Letters of Dr John Brown*, edited by his son and D. W. Forrest, with biography by E. T. M^{c}Laren (1907).

BROWN, SIR JOHN (1816-1896), English armour plate manufacturer, was born at Sheffield on the 6th of December 1816, the son of a slater. He was apprenticed when fourteen years old to a Sheffield firm who manufactured files and table cutlery. Impressed with Brown's ability, the senior partner offered him the control of the business (Earl Horton and Co.) and advanced some of the necessary capital. Brown invented in 1848 the conical steel spring buffer for railway wagons, and in 1860, after seeing the French ship "La Gloire" armoured with hammered plate, he determined to attempt the production of armour for the British navy by a rolling process. The experiment was successful, and led to admiralty orders for armour plate sufficient to protect about three-quarters of the navy. In 1856 Brown had started the Atlas Works in Sheffield, which soon produced, beside armour plates and railway buffers, ordnance forgings, steel rails, railway carriage axles and tires. The works covered thirty acres and employed eventually more than four thousand workmen. Besides supplying iron to the Sheffield steel trade, Brown himself successfully developed the Bessemer process. In 1864, after his business had been converted into a limited company, he retired. He died at Bromley, Kent, on the 27th of December 1896. Among the honours conferred upon him was a knighthood in 1867, the office of mayor of Sheffield in 1862 and 1863, and that of Master Cutler in 1865 and 1866.

BROWN, JOHN GEORGE (1831-), American painter, was born in Durham, England, on the 11th of November 1831. He studied at Newcastle-on-Tyne, in the Edinburgh Academy, and after removing to New York City in 1853, at the schools of the National Academy of Design of which he afterwards became a member. In 1866 he became one of the charter members of the Water-Colour Society, of which he was president from 1887 to 1904. He generally confined himself to representations of street child life, bootblacks, newsboys, &c. ; his "Passing Show" (Paris, Salon, 1877) and "Street Boys at Play" (Paris Exhibition, 1900) are good examples of his popular talent.

BROWN, ROBERT (1773-1858), British botanist, was born on the 21st of December 1773 at Montrose, and was educated at the grammar school of his native town, where he had as contemporaries Joseph Hume and James Mill. In 1787 he entered Marischal College, Aberdeen, but two years afterwards removed to Edinburgh University, where his taste for botany attracted the attention of John Walker (1731-1803), then professor of natural history in the university. In 1795 he obtained a commission in the Forfarshire regiment of Fencible Infantry as "ensign and assistant surgeon," and served in the north of Ireland. In 1798 he made the acquaintance of Sir Joseph Banks, by whom in 1801 he was offered the post of naturalist to the expedition fitted out under Captain Matthew Flinders for the survey of the then almost unknown coasts of Australia. Ferdinand Bauer, afterwards familiarly associated with Brown in his botanical discoveries, was draughtsman; William Westall was landscape painter; and among the midshipmen was one afterwards destined to rise into fame as Sir John Franklin. In 1805 the expedition returned to England, having obtained, among other acquisitions, nearly 4000 species of plants, many of which were new. Brown was almost immediately appointed librarian of the Linnean Society. In this position, though one of no great emolument, he had abundant opportunities of pursuing his studies; but it was not until 1810 that he published the first volume of his great work, in Latin, the *Prodromus Florae Novae Hollandiae et Insulae Van Diemen*, which did much to further the general adoption of A.L. de Jussieu's natural system of plant classification. Its merits were immediately recognized, and it gave its author an international reputation among botanists. It is rare in its original edition, the author having suppressed it, hurt at the *Edinburgh Review* having fallen foul of its Latinity. With the exception of a supplement published in 1830, no more of the work appeared. In 1810 Brown became librarian to Sir Joseph Banks, who on his death in 1820 bequeathed to him the use and enjoyment of his library and collections for life. In 1827 an arrangement was made by which these were transferred to the British Museum, with Brown's consent and in accordance with Sir Joseph's will. Brown then became keeper of this new botanical department, an office which he held until his death. Soon after Banks's decease he resigned the librarianship of the Linnean Society, and from 1849 to 1853 he served as its president. He received many honours. Elected a fellow of the Royal Society in 1811, he received its Copley medal in 1839, for his "discoveries on the subject of vegetable impregnation," and in 1833 he was elected one of the five foreign associates of the Institute of France. Among his other distinctions was membership of the order "pour le Mérite" of Prussia. In the *Academia Caesarea Naturae Curiosorum* he sat under the cognomen of Ray. He died on the 10th of June 1858, in the house in Soho Square, London, bequeathed to him by Sir Joseph Banks. His works, which embrace not only systematic botany, but also plant anatomy and physiology, are distinguished by their thoroughness and conscientious accuracy, and display powers at once of minute detail and of broad generalization. The continual movements observed by the microscope among minute particles suspended in a liquid were noticed by him in 1827, and hence are known as "Brownian movements."

In 1825-1834 his works up to that date were collected and published in four divisions by Nees von Esenbeck, in German, under the title of *Vermischte botanische Schriften* (Leipzig and Nuremberg). In 1866 the Ray Society reprinted, under the editorship of his friend and successor in the keepership of the Botanical Department of the British Museum, J.J. Bennet, his complete writings, the *Prodromus* alone excepted. In these *Miscellaneous Works* (2 vols., with atlas of plates) the history of his discoveries can be best followed.

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BROWN, SAMUEL MORISON (1817-1856), Scottish chemist, poet and essayist, born at Haddington on the 23rd of February 1817, was the fourth son of Samuel Brown, the founder of itinerating libraries, and grandson of John Brown, author of the *Self-Interpreting Bible*. In 1832 he entered the university of Edinburgh, where, after studying in Berlin and St Petersburg, he graduated as M.D. in 1839. About 1840 he was engaged in experiments by which he sought to prove that "carbon in certain states of combination is susceptible of conversion into silicon," and his failure to establish this proposition had much to do with his want of success as a candidate for the chair of chemistry at Edinburgh in 1843. He held the doctrine that the chemical elements are compounds of equal and similar atoms, and might therefore possibly be all derived from one generic atom. In 1850 he published a tragedy, *Galileo Galilei*, and two volumes of his *Lectures on the Atomic Theory and Essays Scientific and Literary* appeared in 1858, with a preface by his kinsman Dr John Brown, the author of *Horae Subsecivae*. He died at Edinburgh on the 20th of September 1856.

BROWN, THOMAS (1663-1704), English satirist, of "facetious memory" as Addison designates him, was the son of a farmer at Shifnal, in Shropshire, and was born in 1663. He was entered in 1678 at Christ Church, Oxford, where he is said to have escaped expulsion by the famous lines beginning, "I do not love thee, Dr Fell." He was for three years schoolmaster at Kingston-on-Thames, and afterwards settled in London. Under the pseudonym of Dudly Tomkinson he wrote a satire on Dryden, *The Reasons of Mr Bays changing his Religion: considered in a Dialogue between Crites, Eugenius and Mr Bays*, with two other parts having separate titles (1688-1690, republished with additions in 1691). He was the author of a great variety of poems, letters, dialogues and lampoons, full of humour and erudition, but coarse and scurrilous. His writings have a certain value for the knowledge they display of low life in London. He died on the 16th of June 1704, and was buried in the cloister of Westminster Abbey.

His collected works were published in 1707-1708. The second volume contains a collection of *Letters from the Dead to the Living*, some of which are translated from the French. His *Comical Romance done into English* (1772, the *Roman Comique* of Scarron) was reprinted in 1892.

BROWN, THOMAS (1778-1820), Scottish philosopher, was born at Kirkmabreck, Kirkcudbright, where his father was parish clergyman. He was a boy of a refined nature, a wide reader and an eager student. Educated at several schools in London, he went to Edinburgh University in 1792, where he attended Dugald Stewart's moral philosophy class. His attendance was desultory, and he does not appear to have completed his arts course. After studying law for a time he took up medicine; his graduation thesis *De Somno* was well received. But his great strength lay in metaphysical analysis, as was shown in his answer to the objections raised against the appointment of Sir John Leslie to the mathematical professorship (1805). Leslie, a follower of Hume, was attacked by the clerical party as a sceptic and an infidel, and Brown took the opportunity to defend Hume's doctrine of causality as in no way inimical to religion. His defence, at first only a pamphlet, became in its third edition a lengthy treatise entitled *Inquiry into the Relation of Cause and Effect*, and is a fine specimen of Brown's analytical faculty. In 1806 he became a medical practitioner in partnership with James Gregory, but, though successful in his profession, preferred literature and philosophy. After twice failing in the attempt to gain a professorship in the university, he was invited, during an illness of Dugald Stewart in the session of 1808-1809, to act as his substitute, and during the following session he undertook a great part of Stewart's work. The students received him with enthusiasm, due partly to his splendid rhetoric and partly to the novelty and ingenuity of his views. In 1810 he was appointed as colleague to Stewart, a position which he held for the rest of his life. He wrote his lectures at high pressure, and devoted much time to the editing and publication of the numerous poems which he had written at various times during his life. He was also engaged in preparing an abstract of his lectures as a handbook for his class. His health, never strong, gave way under the strain of his work. He was advised to take a voyage to London, where he died on the 2nd of April 1820.

His friend and biographer, David Welsh (1793-1845), superintended the publication of his text-book, the *Physiology of the Human Mind*, and his *Lectures on the Philosophy of the Human Mind* was published by his successors, John Stewart and the Rev. E. Milroy. The latter was received with great enthusiasm both in England (where it reached its 19th edition) and in America; but recent criticism has lessened its popularity and it is now almost forgotten.

Brown's philosophy occupies an intermediate place between the earlier Scottish school and the later analytical or associational psychology. To the latter Brown really belonged, but he had preserved certain doctrines of the older school which were out of harmony with his fundamental view. He still retained a small quantum of intuitive beliefs, and did not appear to see that the very existence of these could not be explained by his theory of mental action. This intermediate or wavering position accounts for the comparative neglect into which his works have now fallen. They did much to excite thinking, and advanced many problems by more than one step, but they did not furnish a coherent system, and the doctrines which were then new have since been worked out with greater consistency and clearness.

Brown wrote a criticism of Darwin's *Zoonomia* (1798), and was one of the first contributors to the *Edinburgh Review*, in the second number of which he published a criticism of the Kantian philosophy, based entirely on Villers's French account of it. Among his poems, which are modelled on Pope and Akenside and rather commonplace, may be mentioned: *Paradise of Coquettes* (1814); *Wanderer in Norway* (1815); *Warfiend* (1816); *Bower of Spring* (1817); *Agnes* (1818); *Emily* (1819); a collected edition in 4 vols. appeared in 1820.

For a severe criticism of Brown's philosophy, see Sir W. Hamilton's *Discussions* and *Lectures on Metaphysics*; and for a high estimate of his merits, see J. S. Mill's *Examination of Hamilton*. See also D. Welsh's *Account of the Life and Writings, &c.* (1825); M^{c}Cosh's *Scottish Philosophy*, pp. 317-337. The only German writer who seems to have known anything of Brown is Beneke, who found in him anticipations of some of his own doctrines. See *Die neue Psychologie*, pp. 320-330.

BROWN, THOMAS EDWARD (1830-1897), British poet, scholar and divine, was born on the 5th of May 1830, at Douglas, Isle of Man. His father, the Rev. Robert Brown, held the living of St Matthew's—a homely church in a poor district. His mother came of Scottish parentage, though born in the island. Thomas, the sixth of ten children, was but two years old when the family removed to Kirk Braddan vicarage, a short distance from Douglas, where his father (a scholar of no university, but so fastidious about composition that he would have some sentences of an English classic read to him before answering an invitation) took share with the parish schoolmaster in tutoring the clever boy until, at the age of fifteen, he was entered at King William's College. Here his abilities soon declared themselves, and hence he proceeded to Christ Church, Oxford, where his position (as a servitor) cost him much humiliation, which he remembered to the end of his life. He won a double first, however, and was elected a fellow of Oriel in April 1854, Dean Gaisford having refused to promote him to a senior studentship of his own college, on the ground that no servitor had ever before attained to that honour. Although at that time an Oriel fellowship conferred a deserved distinction, Brown never took kindly to the life, but, after a few terms of private pupils, returned to the Isle of Man as vice-principal of his old school. He had been ordained deacon, but did not proceed to priest's orders for many years. In 1857 he married his cousin, Miss Stowell, daughter of Dr Stowell of Ramsey, and soon afterwards left the island once more to become headmaster of the Crypt school, Gloucester —a position which in no long time he found intolerable. From Gloucester he was summoned by the Rev. John Percival (afterwards bishop of Hereford), who had recently been appointed to the struggling young foundation of Clifton College, which he soon raised to be one of the great public schools. Percival wanted a master for the modern side, and made an appointment to meet Brown at Oxford; "and there," he writes, "as chance would have it, I met him standing at the corner of St
[v.04 p.0663] Mary's Entry, in a somewhat Johnsonian attitude, four-square, his hands deep in his pockets to keep himself still, and looking decidedly volcanic. We very soon came to terms, and I left him there under promise to come to Clifton as my colleague at the beginning of the following term." At Clifton Brown remained from September 1863 to July 1892, when he retired—to the great regret of boys and masters alike, who had long since come to regard "T.E.B.'s" genius, and even his eccentricities, with a peculiar pride—to spend the rest of his days upon the island he had worshipped from childhood and often celebrated in song. His poem "Betsy Lee" appeared in *Macmillan's Magazine* (April and May 1873), and was published separately in the same year. It was included in *Fo'c's'le Yarns* (1881), which reached a second edition in 1889. This volume included at least three other notable poems—"Tommy Big-eyes," "Christmas Rose," and "Captain Tom and Captain Hugh." It was followed by *The Doctor and other Poems* (1887), *The Manx Witch and other Poems* (1889), and *Old John and other Poems*—a volume mainly lyrical (1893). Since his death all these and a few additional lyrics and fragments have been published in one volume by Messrs Macmillan under the title of *The Collected Poems of T.E. Brown* (1900). His familiar letters (edited in two volumes by an old friend, Mr S.T. Irwin, in 1900) bear witness to the zest he carried back to his native country, although his thoughts often reverted to Clifton. In October 1897 he returned to the school on a visit. He was the guest of one of the house-masters, and on Friday evening, 29th October, he gave an address to the boys of the house. He had spoken for some minutes with his usual vivacity, when his voice grew thick and he was seen to stagger. He died in less than two hours. Brown's more important poems are narrative, and written in the Manx dialect, with a free use of pauses, and sometimes with daring irregularity of rhythm. A rugged tenderness is their most characteristic note; but the emotion, while almost equally explosive in mirth and in tears, remains an educated emotion, disciplined by a scholar's sense of language. They breathe the fervour of an island patriotism (humorously aware of its limits) and of a simple natural piety. In his lyrics he is happiest when yoking one or the other of these emotions to serve a philosophy of life, often audacious, but always genial.

(A. T. Q.-C.)

BROWN, SIR WILLIAM, BART. (1784-1864), British merchant and banker, founder of the banking-house of Brown, Shipley & Co., was born at Ballymena, Ireland, on the 30th of May 1784, the son of an Irish linen-merchant. At the age of sixteen he accompanied his father and brothers to Baltimore, Maryland, U.S.A., whither it had been decided to transfer the family business, but in 1809 left America for Liverpool. Here he established a branch of the firm, which had now begun to deal largely in raw cotton as well as linen and soon afterwards developed into one of general merchants and finally bankers. Brown became one of the leaders in Liverpool commerce, and in 1832 took a principal share in the reform of the system of dock-management then in vogue at that port. The great financial crisis of 1837 seriously threatened the ruin of the firm, but on Brown's urgent representations as to the multiplicity of interests involved the Bank of England agreed to advance him £2,000,000 to tide matters over. Actually Brown only found it necessary to apply for £1,000,000, which he repaid within six months. His business, both mercantile and banking, continued to increase, and in 1844 he was in possession of a sixth of the trade between Great Britain and the United States. "There is hardly," declared Richard Cobden at this period, "a wind that blows, or a tide that flows in the Mersey, that does not bring a ship freighted with cotton or some other costly commodity for Mr Brown's house." In 1856 the friction between the British and American governments due to the enlistment by British consuls of

recruits for the Crimean War was largely allayed by the action of Brown, who in an interview with Lord Palmerston, then prime-minister, explained the objections taken in America. From 1846 to 1859 he was Liberal M.P. for South Lancashire. In 1860 he presented Liverpool with a public library and museum, and in 1863 was made a baronet. He died at Liverpool in 1864.

BROWN, WILLIAM LAURENCE (1755-1830), Scottish divine, was born on the 7th of January 1755 at Utrecht, where his father was minister of the English church. The father, having been appointed professor of ecclesiastical history at St Andrews, returned to Scotland in 1757, and his son went to the grammar school of that city, and then to the university. After passing through the divinity classes, he went in 1774 to the university of Utrecht, where he studied theology and civil law. In 1777 he was appointed to the English church in Utrecht, and about 1788 to the professorship of moral philosophy and ecclesiastical history in the university, to which was soon added the professorship of the law of nature. The war which followed the French Revolution finally drove Brown in January 1795 to London, where he was cordially welcomed. In 1795 the magistrates of Aberdeen appointed him to the chair of divinity, and soon after he was made principal of Marischal College. In the year 1800 he was appointed chaplain in ordinary to the king, and in 1804 dean of the chapel royal, and of the order of the Thistle. He died on the 11th of May 1830. His most widely-known works were an *Essay on the Natural Equality of Men* (1793), which gained the Teyler Society's prize; a treatise *On the Existence of the Supreme Creator* (1816), to which was awarded the first Burnet prize of £1250; and *A Comparative View of Christianity, and of the other Forms of Religion with regard to their Moral Tendency* (2 vols., 1826).

BROWN BESS, a name given in the British army to the flintlock musket with which the infantry were formerly armed. The term is applied generally to the weapon of the 18th and early 19th centuries, and became obsolete on the introduction of the rifle. The first part of the name derives from the colour of the wooden stock, for the name is found much earlier than the introduction of "browning" the barrel of muskets; "Bess" may be either a humorous feminine equivalent of the "brown-bill," the old weapon of the British infantry, or a corruption of the "buss," *i.e.* box, in "blunderbuss."

BROWNE, EDWARD HAROLD (1811-1891), English bishop, was born at Aylesbury and educated at Eton and Cambridge. He was ordained in 1836, and two years later was elected senior tutor of Emmanuel College, Cambridge. From 1843 to 1849 he was vice-principal of St David's College, Lampeter, and in 1854 was appointed Norrisian professor of divinity at Cambridge. His best-known book is the *Exposition of the Thirty-nine Articles* (vol. i., Cambridge, 1850; vol. ii., London, 1853), which remained for many years a standard work on the subject. In 1864 he was consecrated bishop of Ely, and proceeded to reorganize his diocese. He maintained that the deposition of Bishop Colenso endangered the independence of bishops. Nevertheless, he was opposed to Colenso's criticism of the Bible, and replied to it in *The Pentateuch and the Elohistic Psalms* (1863), written from a conservative standpoint. In 1869 he was one of the consecrating prelates when Temple became bishop of Exeter, and endeavoured to remove the prejudice against his appointment by showing that Temple was not responsible for the views of other writers in the famous *Essays and Reviews* (1860). He was bishop of Winchester from 1873 till 1890, when ill-health compelled him to resign.

BROWNE, HABLÔT KNIGHT (1815-1882), English artist, famous as "Phiz," the illustrator of the best-known books by Charles Dickens, Charles Lever and Harrison Ainsworth in their original editions. His talents in other directions of art were of a very ordinary kind. As an interpreter and illustrator of Dickens's characters, "Phiz," as he always signed his drawings, was in some respects the equal of his rivals Cruikshank and Leech, while, in his own way, he excelled them both. Of Huguenot extraction, he was born in Lambeth on the 11th of June 1815. His father died early and left the family badly off. Browne was apprenticed to Finden, the eminent engraver on steel, in whose studio he obtained his only artistic education. To engraving, however, he was entirely unsuited, and having in 1833 secured an important prize from the Society of Arts for a drawing of "John Gilpin," he abandoned engraving in the following year and took to other artistic work, with the ultimate object of becoming a painter. In the spring of 1836 he met Charles
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Dickens. It was at the moment when the serial publication of *Pickwick* was in danger from the want of a capable interpreter for the illustrations. Dickens knew Browne slightly as the illustrator of his little pamphlet *Sunday under Three Heads*, and probably this slight knowledge of his work stood the draughtsman in good stead. In the original edition of *Pickwick*, issued in shilling monthly parts from early in 1836 until the end of 1837, the first seven plates were drawn by Robert Seymour, a clever illustrator who committed suicide in April 1836. The next two plates were by R.W. Buss, an otherwise successful portrait-painter and lecturer, but they were so poor that a change was imperative. Browne and W.M. Thackeray called independently at the publishers' office with specimens of their powers for Dickens's inspection. The novelist preferred Browne. Browne's first two etched plates for *Pickwick* were signed "Nemo," but the third was signed "Phiz," a pseudonym which was retained in future. When asked to explain why he chose this name he answered that the change from "Nemo" to "Phiz" was made "to harmonize better with Dickens's Boz." Possibly Browne adopted it to conceal his identity, hoping one day to become famous as a painter. It is to be noted, however, that "Phiz" is usually attached to his better work and H.K.B. to his less successful drawings. "Phiz" undoubtedly created Sam Weller, so far as his well-known figure is concerned, as Seymour had created Pickwick. Dickens and "Phiz" were personally good friends in early days, and in 1838 travelled together to Yorkshire to see the schools of which Nicholas Nickleby became the hero; afterwards they made several journeys of this nature in company to facilitate the illustrator's work. The other Dickens

characters which "Phiz" realized most successfully are perhaps Squeers, Micawber, Guppy, Major Bagstock, Mrs Gamp, Tom Pinch and, above all, David Copperfield. Of the books by Dickens which "Phiz" illustrated the best are *David Copperfield*, *Pickwick*, *Dombey and Son*, *Martin Chuzzlewit* and *Bleak House*. Browne made several drawings for *Punch* in early days and also towards the end of his life; his chief work in this direction being the clever design for the wrapper which was used for eighteen months from January 1842. He also contributed to *Punch's Pocket Books*. In addition to his work for Dickens, "Phiz" illustrated over twenty of Lever's novels (the most successful being *Harry Lorrequer*, *Charles O'Malley*, *Jack Hinton* and the *Knight of Gwynne*). He also illustrated Harrison Ainsworth's and Frank Smedley's novels. *Mervyn Clitheroe* by Ainsworth is one of the most admirable of the artist's Works. Browne was in continual employment by publishers until 1867, when he had a stroke of paralysis. Although he recovered slightly and made many illustrations on wood, they were by comparison inferior productions which the draughtsman's admirers would willingly ignore. In 1878 he was awarded an annuity by the Royal Academy. He gradually became worse in health, until he died on the 8th of July 1882.

Most of Browne's work was etched on steel plates because these yielded a far larger edition than copper. Browne was annoyed at some of his etchings being transferred to stone by the publishers and printed as lithographic reproductions. Partly with the view to prevent this treatment of his work he employed a machine to rule a series of lines over the plate in order to obtain what appeared to be a tint; when manipulated with acid this tint gave an effect somewhat resembling mezzotint, which at that time it was found practically impossible to transfer to stone. The illustrations executed by Browne are particularly noteworthy because they realized exactly what the reader most desired to see represented. So skilful was he in drawing and composition that no part of the story was avoided by reason of the elaborateness of the subject. Whatever was the best incident for illustration was always the one selected.

See D. Croal Thomson, *Hablôt Knight Browne, "Phiz": Life and Letters* (London, 1884); John Forster, *Life of Charles Dickens* (London, 1871-1874); F.G. Kitton, *"Phiz": A Memoir* (London, 1882); *Charles Dickens and his Illustrators* (London, 1899); M.H. Spielmann, *The History of Punch* (London, 1895).

(D. C. T.)

BROWNE, ISAAC HAWKINS (1705-1760), English poet, was born on the 21st of January 1705 at Burton-upon-Trent, of which place his father was vicar. He was educated at Lichfield, at Westminster school, and at Trinity College, Cambridge. After taking his M.A. degree he removed to Lincoln's Inn, and was called to the bar, but never practised. He was the author of "Design and Beauty," a poem addressed to his friend Joseph Highmore the painter; and of "The Pipe of Tobacco" which parodied Cibber, Ambrose Philips, Thomson, Young, Pope and Swift, who were then all living. He was elected to Parliament through private interest in 1744 and again in 1747 for the borough of Wenlock in Shropshire. In 1754 he published his chief work, *De Animi Immortalitate*, a Latin poem much admired by the scholars of his time. The best of the many translations of these verses is by Soame Jenyns. Browne is said by Johnson to have been "one of the first wits of this country." He was a brilliant talker in private life, especially when his tongue was loosed by wine; but he made no mark in public life. He died in London on the 14th of February 1760.

Two editions of his *Poems on Various Subjects, Latin and English*, were published in 1767 by his son Isaac Hawkins Browne (1745-1818), the author of two volumes of essays on religion and morals. One of these was printed for private circulation, and is said to have contained a memoir. A full account by Andrew Kippis in *Biographia Britannica* (1780) includes large extracts from his poems.

BROWNE, JAMES (1703-1841), Scottish man of letters, was born at Whitefield, Perthshire, in 1793. He was educated at Edinburgh and at the university of St Andrews, where he studied for the church. He wrote a "Sketch of the History of Edinburgh," for Ewbank's *Picturesque Views* of that city, 1823-1825. In 1826 he became a member of the Faculty of Advocates, and obtained the degree of LL.D. from King's College, Aberdeen. His works include a *Critical Examination of Macculloch's Work on the Highlands and Islands of Scotland* (1826), *Aperçu sur les Hiéroglyphes d'Égypte* (Paris, 1827), a *Vindication of the Scottish Bar from the Attacks of Mr Broughton*, and *History of the Highlands and Highland Clans* (1834-1836). He was appointed editor of the *Caledonian Mercury* in 1827; and two years later he became sub-editor of the seventh edition of the *Encyclopaedia Britannica*, to which he contributed a large number of articles. He died in April 1841.

BROWNE, SIR JAMES (1839-1896), Anglo-Indian engineer and administrator, was the son of Robert Browne of Falkirk in Scotland. He was educated at the military college, Addiscombe, and received a commission in the Bengal engineers in 1857. He served in the expedition against the Mahsud Waziris in 1860, being mentioned in despatches, and in 1863 in the Umbeyla campaign, when he was three times mentioned. In January 1875 he became superintendent of works for the building of the Indus bridge. In 1877 he was promoted lieutenant-colonel, and in 1878-1879 accompanied Sir Donald Stewart as political officer during the Afghan War. He took part in several engagements, was mentioned in despatches, and received the C.B. In 1881 he became colonel, and in 1882 commanded the Indian engineer contingent sent to Egypt, being present at the battle of Tell-el-Kebir. For his services in Egypt he received the 3rd class of the Osmanieh Order and the khedive's star. In 1884 he was appointed engineer in chief of the Sind-Pishin railway. In 1888 he was made a K.C.S.I, and in 1889 quarter-master-general for India. In 1892 he

was appointed agent to the governor-general in Baluchistan, in succession to Sir Robert Sandeman, his intimate experience of the Baluchis, gained during his railway work, having specially fitted him for this post. He died suddenly on the 13th of June 1896. Sir James Browne was a man of splendid courage and physique, and many tales are told of the personal prowess which, together with his sympathetic knowledge of the natives, made him a popular hero among the frontier tribesmen.

See General McLeod Innes, *The Life and Times of Sir James Browne* (1905).

BROWNE, MAXIMILIAN ULYSSES, Count von, Baron de Camus and Mountany (1705-1757), Austrian field marshal, was born at Basel on the 23rd of October 1705. His father (Ulysses Freiherr v. Browne, d. 1731) was an Irish exile of 1690, who entered the imperial service and in
[v.04 p.0665] 1716 was made a count of the Empire (*Reichsgraf*) by the emperor Charles VI. His uncle Georg, Reichsgraf von Browne (1698-1792), was a distinguished soldier, who rose to the rank of field marshal in the Russian army, and was made Reichsgraf by the emperor Joseph II. in 1779. The powerful influence which he commanded, through his father and his wife (*née* Countess Marie Philippine v. Martinitz), advanced the young officer through the subordinate grades so rapidly that at the age of twenty-nine he was colonel of an infantry regiment. But he justified his early promotion in the field, and in the Italian campaign of 1734 he greatly distinguished himself. In the Tirolese fighting of 1735, and in the unfortunate Turkish war, he won further distinction as a general officer. He was a lieutenant field marshal in command of the Silesian garrisons when in 1740 Frederick II. and the Prussian army overran the province. His careful employment of such resources as he possessed materially hindered the king in his conquest and gave time for Austria to collect a field army (see Austrian Succession, War of the). He was present at Mollwitz, where he received a severe wound. His vehement opposition to all half-hearted measures brought him frequently into conflict with his superiors, but contributed materially to the unusual energy displayed by the Austrian armies in 1742 and 1743. In the following campaigns Browne exhibited the same qualities of generalship and the same impatience of control. In 1745 he served under Count Traun, and was promoted to the rank of Feldzeugmeister. In 1746 he was present in the Italian campaign and the battles of Piacenza and Rottofredo. Browne himself with the advanced guard forced his way across the Apennines and entered Genoa. He was thereafter placed in command of the army intended for the invasion of France, and early in 1747 of all the imperial forces in Italy. At the end of the war Browne was engaged in the negotiations which led to the convention of Nice (January 21st, 1749). He became commander-in-chief in Bohemia in 1751, and field marshal two years later. He was still in Bohemia when the Seven Years' War opened with Frederick's invasion of Saxony (1756). Browne's army, advancing to the relief of Pirna (see Seven Years' War), was met, and, after a hard struggle, defeated by the king at Lobositz, but he drew off in excellent order, and soon made another attempt with a picked force to reach Pirna, by wild mountain tracks. The field marshal never spared himself, bivouacking in the snow with his men, and Carlyle records that private soldiers made rough shelters over him as he slept. He actually reached the Elbe at Schandau, but as the Saxons were unable to break out Browne retired, having succeeded, however, in delaying the development of Frederick's operations for a whole campaign. In the campaign of 1757 he voluntarily served under Prince Charles of Lorraine (*q.v.*) who was made commander-in-chief, and on the 6th of May in that year, while leading a bayonet charge at the battle of Prague, Browne, like Schwerin on the same day, met his death. He was carried mortally wounded into Prague, and there died on the 26th of June, his last days embittered by the knowledge that he was unjustly held responsible for the failure of the campaign. His name has been borne, since 1888, by the 36th Austrian infantry.

See *Zuverlässige Lebensbeschreibung U.M. Reichsgrafen*, v. B. K.-K. Gen.-Feldmarschall (Frankfurt and Leipzig, 1757); Baron O'Cahill, *Gesch. der grossten Herrfuhrer* (Rastadt, 1785, v. ii. pp. 264-316).

BROWNE, PETER (?1665-1735), Irish divine and bishop of Cork and Ross, was born in Co. Dublin, not long after the Restoration. He entered Trinity College, Dublin, in 1682, and after ten years' residence obtained a fellowship. In 1699 he was made provost of the college, and in the same year published his *Letter in answer to a Book entitled "Christianity not Mysterious,"* which was recognized as the ablest reply yet written to Toland. It expounds in germ the whole of his later theory of analogy. In 1710 he was made bishop of Cork and Ross, which post he held till his death in 1733. In 1713 he had become somewhat notorious from his vigorous pamphleteering attack on the fashion of drinking healths, especially "to the glorious and immortal memory." His two most important works are the *Procedure, Extent, and, Limits of the Human Understanding* (1728), an able though sometimes captious critique of Locke's essay, and *Things Divine and Supernatural conceived by Analogy with Things Natural and Human*, more briefly referred to as the *Divine Analogy* (1733). The doctrine of analogy was intended as a reply to the deistical conclusions that had been drawn from Locke's theory of knowledge. Browne holds that not only God's essence, but his attributes are inexpressible by our ideas, and can only be conceived analogically. This view was vigorously assailed as leading to atheism by Berkeley in his *Alciphron* (Dialogue iv.), and a great part of the *Divine Analogy* is occupied with a defence against that criticism. The bishop emphasizes the distinction between metaphor and analogy; though the conceived attributes are not thought as they are in themselves, yet there is a reality corresponding in some way to our ideas of them. His analogical arguments resemble those found in the Bampton Lectures of Dean Mansel. Browne was a man of abstemious habits, charitable disposition, and impressive eloquence. He died on the 27th of August 1735.

BROWNE, ROBERT (1550-1633), a leader among the early Separatist Puritans (hence

sometimes called Brownists), was born about 1550 at Tolethorpe, near Stamford. He was of an ancient family, several members of which had been distinguished as merchants, county magnates and local benefactors. He was educated at Corpus Christi College, Cambridge, "commencing B.A." in 1572. For some years he was a schoolmaster, but in what place is uncertain. In 1579, on a brother's application and without his own consent, he was licensed to preach, and actually preached for some six months in Cambridge, where he gained considerable popularity; but impugning the episcopal order of the Established Church, he had his licence revoked early in the following year. He then went, on the invitation of Robert Harrison, "Maister in the Hospitall," to Norwich, where he soon gathered a numerous congregation, the members of which became associated in a religious "covenant," to the refusing of "all ungodlie communion with wicked persons." He seems also to have preached in various parts of Norfolk and Suffolk, especially at Bury St Edmunds, and vigorously denounced the form of government existing in the Church, which at this time he held incompatible with true "preaching of the word." Dr Freake, bishop of Norwich, caused him to be imprisoned early in 1581, but he was ere long released through the influence of his remote kinsman, the Lord Treasurer Burghley. Before the end of 1581, however, he incurred two more imprisonments, and, apparently in January 1582, migrated with his whole company to Middelburg in Zealand. There they organized a church on what they conceived to be the New Testament model, but the community broke up within two years owing to internal dissensions.

Meanwhile, Browne issued two most important works, *A Treatise of Reformation without Tarying for Anie*, in which he asserts the inalienable right of the church to effect necessary reforms without the authorization or permission of the civil magistrate; and *A Booke which sheweth the life and manners of all True Christians*, in which he enunciates the theory of Congregational independency (see CONGREGATIONALISM). These, with a third tract (*A Treatise upon the 23. of Matthew*, see C. Burrage, as below, pp. 21-25), making together a thin quarto, were published at Middelburg in 1582. The following year two men were hanged at Bury St Edmunds for circulating them. In January 1584[1] Browne and some of his company came to Edinburgh, after visiting Dundee and St Andrews. He remained some months in Scotland, endeavouring to commend his ecclesiastical theories, but had no success. He then returned to Stamford, in which town or neighbourhood he seems to have resided chiefly for the next two years, his residence being broken by visits to London and probably to the continent (early in 1585), and by at least one imprisonment (summer, 1585). His attitude to the lawfulness of occasional attendance at services
[v.04 p.0666] in parish churches seems to have been changing about this time; on the 7th of October 1585 he was induced to make a qualified submission to the established order. The story that this result was brought about by excommunication, actual or threatened, is very doubtful, and rests on late and questionable authority. A further submission prepared the way for his appointment, in November 1586, to the mastership of St Olave's grammar school, Southwark, which he held for more than two years. During part of this time he was much engaged in controversy, on the one hand with Stephen Bredwell, an uncompromising advocate of the established order, and on the other with some of those who more or less occupied his own earlier position, and now looked upon him as a renegade. In particular he several times replied to Barrowe and Greenwood; one of his replies, entitled *A Reproofe of certaine schismatical persons and their doctrine touching the hearing and preaching of the word of God* (1587-1588), has recently been recovered, and sheds a flood of light upon the development of Browne's later views (see Burrage, pp. 45-62, for this whole period).

Before the 20th of June 1589 his mastership of St Olave's seems to have terminated, and after being rector of Little Casterton (in the gift of his eldest brother) for a month or two, he finally, in September 1591, accepted episcopal ordination and the rectory of Achurch-cum-Thorpe Waterville, in Northamptonshire. There he ministered for forty-two years, with one lengthy interval, 1617-1626, which is only partly accounted for (see Burrage, pp. 68-71). There is reason to believe that he never entirely abandoned his early ideal, but latterly thought it possible to maintain a spiritual fellowship within the framework of the Established Church. The closing years of his life seem to have been clouded, due partly to separation among his own flock, and partly to growing irritability in himself, a lonely and disappointed man. When over eighty years old he had a dispute with the parish constable about a rate, blows were struck, and before a magistrate he behaved so stubbornly that he was sent to Northampton gaol, where he died in October 1633. He was buried in St Giles's churchyard, Northampton. In spite of his later attitude of compromise with expediency, which he felt forced on him by external conditions too strong to defy or ignore, Robert Browne remains a pioneer in ecclesiastical theory in England, the first formulator of an ideal which subsequently became known as Congregationalism (*q.v.*). He rediscovered certain forgotten aspects of primitive church life, and did not shrink from suffering for the sake of what he held to be the truth. In addition to the works above-mentioned, Browne wrote several controversial and apologetic treatises, of which some remained in MS. until quite recently, and some are still missing.

See H.M. Dexter, *The Congregationalism of the Last Three Hundred Years* (1880); C. Burrage, *The True Story of Robert Browne* (Oxford, 1906); *Congregational Historical Society's Transactions*, passim (1901-1906).

[1] Probably after writing *A True and Short Declaration*, the main source of our knowledge of his life hitherto.

BROWNE, SIR THOMAS (1605-1682), English author and physician, was born in London, on the 19th of October 1605. He was admitted as a scholar of Winchester school in 1616, and

matriculated at Broadgates Hall (Pembroke College), Oxford, in 1623, where he graduated B.A. in January 1626. He took the further degree of M.A. in 1629, studied medicine, and practised for some time in Oxfordshire. Between 1630 and 1633 he left England, travelled in Ireland, France and Italy, and on his way home received the degree of M.D. at the university of Leiden. He returned to London in 1634, and, after a short residence at Shipden Hall, near Halifax, settled in practice at Norwich in 1637. He married in 1641 Dorothy Mileham. Their eldest son, Edward, became president of the Royal College of Physicians, and glimpses of their happy family life are obtainable in the fragmentary correspondence contained in Simon Wilkin's edition. In 1642 a copy of his *Religio Medici*, which he describes as "a private exercise directed to myself," was printed from one of his MSS. without his knowledge, and reviewed by Sir Kenelm Digby in *Observations ...* (1643). The interest aroused by this edition compelled Browne to put forth a correct version (1643) of the work, in which letters between Digby and Browne were included. The book was probably written as early as 1635, for he describes himself as still under thirty. In 1646 he published *Pseudodoxia Epidemica; Enquiries into very many commonly received Tenents and commonly presumed Truths* (1646), and in 1658 *Hydriotaphia, Urne-Buriall; or, a discourse of the sepulchrall urnes lately found in Norfolk. Together with the Garden of Cyrus, or the quincunciall, lozenge, or net-work plantations of the ancients, artificially, naturally, and mystically considered. With Sundry observations* (1658). These four works were all that he published, though several tracts, notably the *Christian Morals*[1] intended as a continuation of *Religio Medici*, were prepared for publication, and appeared posthumously. In 1671 he received the honour of knighthood from Charles II. on his visit to Norwich. He began a correspondence with John Evelyn in 1658. Very few of the letters are extant, but the diarist has left an account of a visit to Browne (*Diary*, 17th of October 1671). He died in 1682 on his seventy-seventh birthday, and was buried at St Peter's, Mancroft, Norwich. His coffin was accidentally broken in 1840, and his skull is preserved in the museum of the Norwich hospital.

Browne's writings are among the few specimens of purely literary work produced during a period of great political excitement and discord. He remained to all appearance placidly indifferent to the struggle going on around him. His first book appeared in the year of the outbreak of the Civil War; *Pseudodoxia Epidemica* in the critical year of 1646; and *Hydriotaphia*, the reflections on the shortness of human life inspired by the unearthing of some funeral urns, on the eve of the Restoration. A mind as aloof as his is a psychological curiosity, and its peculiarities are faithfully reflected in the form and matter of his works. His display of erudition, his copious citations from authorities, his constant use of metaphor and analogy, and his elaborate diction, are common qualities of the writers of the 17th century, but Browne stands apart from his contemporaries by reason of the peculiar cast of his mind. Imbued with the Platonic mysticism which taught him to look on this world as only the image, the shadow of an invisible system, he regarded the whole of experience as only food for contemplation. Nothing is too great or too small for him; all finds a place in the universe of being, which he seems to regard almost from the position of an outsider. He did not speculate systematically on the problems of existence, but he meditates repeatedly on the outward and visible signs of mortality, and on what lies beyond death. Of Browne, as of the greatest writers, it is true that the style is the man. The form of his thought is as peculiar and remarkable as the matter; the two, indeed, react on one another. Much of the quaintness of his style, no doubt, depends on the excessive employment of latinized words, many of which have failed to justify their existence; but the peculiarities of his vocabulary do not explain the unique character of his writing, which is appreciated to-day as much as ever.

The *Religio Medici* was a puzzle to his contemporaries, and it is still hard to reconcile its contradictions. A Latin translation appeared at Leiden in 1644, and it was widely read on the continent, being translated subsequently into Dutch, French and German. In Paris it was issued in the belief that Browne was really a Roman Catholic, but in Rome the authorities thought otherwise, and the book was placed on the *Index Expurgatorius*. It is the confession of a mind keen and sceptical in some aspects, and credulous in others. Browne professes to be absolutely free from heretical opinions, but asserts the right to be guided by his own reason in cases where no precise guidance is given either by Scripture or by Church teaching. "I love," he says, "to lose myself in a mystery, to pursue my reason to an O, Altitudo!" The *Pseudodoxia Epidemica*, written in a more direct and simple style than is usual with Browne, is a wonderful storehouse of out-of-
[v.04 p.0667]
the-way facts and scraps of erudition, exhibiting a singular mixture of credulity and shrewdness. Sir Thomas evidently takes delight in discussing the wildest fables. That he himself was by no means free from superstition is proved by the fact that the condemnation of two unfortunate women, Amy Duny and Rose Cullender, for witchcraft at Norwich in 1664 was aided by his professional evidence. The *Garden of Cyrus* is a continued illustration of one quaint conceit. The whole universe is ransacked for examples of the *Quincunx*, and he discovers, as Coleridge says, "quincunxes in heaven above, quincunxes in earth below, quincunxes in the mind of man, quincunxes in tones, in optic nerves, in roots of trees, in leaves, in everything!" But the whole strength of his genius and the wonderful charm of his style are to be sought in the *Urnburial*, the concluding chapter of which, for richness of imagery and majestic pomp of diction, can hardly be paralleled in the English language. For anything at all resembling it we must turn to the finest passages of Jeremy Taylor or of Milton's prose writings.

In 1684 appeared a collection of *Certain Miscellany Tracts* (ed. Tenison), and in 1712 *Posthumous Works of the learned Sir Thomas Browne*. The first collected edition of Browne's works appeared in 1686. It is said to have been edited by Dr, afterwards Archbishop Tenison. Sir Thomas Browne's *Works, including his Life and Correspondence*, were carefully edited by Simon Wilkin in 1835-1836. Among modern reprints may be mentioned Dr W.A. Greenhill's editions in

the "Golden Treasury" series of the *Religio Medici, Letter to a friend* and *Christian Morals* (1881), with an admirable bibliographical note on the complicated subject of the numerous editions of the *Religio Medici*; of the *Hydriotaphia* and the *Garden of Cyrus* (1896), completed by Mr E.H. Marshall; a complete edition for the English Library, edited by Mr Charles Sayle (1904, &c.). Browne's interest in bird-lore is noted by Evelyn, and some *Notes and Letters on the Natural History of Norfolk* were collected from his MSS. in the Sloane Collection, and edited by Thomas Southwell in 1902.

[1] Ed. John Jeffery, archdeacon of Norwich, 1716. The dignified "Letter to a Friend, upon the occasion of the Death of his Intimate Friend" (written about 1672, pr. 1690) has been generally supposed to be a preliminary sketch for *Christian Morals*, but Dr W.A. Greenhill thinks it was written later.

BROWNE, WILLIAM (1591-1643), English pastoral poet, was born at Tavistock, Devonshire, in 1591, of a branch of the family of Browne of Betchworth Castle, Surrey. He received his early education at the grammar school of his native town, and is said to have proceeded to Oxford about 1603. After a short residence at Clifford's Inn he entered the Inner Temple in 1611. His elegy on the death of Henry, prince of Wales, and the first book of *Britannia's Pastorals* appeared in 1613; the *Shepherd's Pipe*, which contained some eclogues by other poets, in 1614. The second book of the pastorals (1616) is dedicated to William Herbert, earl of Pembroke, whose seat at Wilton was Browne's home for some time. In 1624 he returned to Oxford as tutor to Robert Dormer, afterwards earl of Carnarvon, matriculating at Exeter College in April and receiving his M.A. degree in November of the same year. Nearly all Browne's poetic work dates from his early manhood, before his marriage in 1628 with Timothy, daughter of Sir Thomas Eversham of Horsham, Essex. In the fourth eclogue of George Wither's *Shepherd's Hunting*, written as early as 1613-1614, Philarete (Wither) asks Willy (Browne) why he is silent, and the reply is that some "my music do contemne." The times were unfavourable to his tranquil talent, and the second half of his life was spent in retirement. He died some time before 1645, when letters of administration were granted to his widow, and he may have been the William Browne whose burial is recorded in the Tavistock registers under the date of the 27th of March 1643.

Browne was the pupil and friend of Michael Drayton, who associates "my Browne" in the "Epistle to Henry Reynolds" with the two Beaumonts as "my dear companions whom I freely chose, My bosom friends." But directly indebted as Browne is for the form of his poems, for the slight story and the rather wearisome allegory, to Spenser, Sidney, Drayton and especially to Fletcher's *Faithful Shepherdess*, his poetry is no mere copy of any of these models. His Arcadia is localized in his native Devonshire. He was untiring in his praises of "Tavy's voiceful stream (to whom I owe more strains than from my pipe can ever flow)." He knew local history and traditions, and he celebrates the gallant sailors who "by their power made the Devonian shore Mock the proud Tagus." (*Brit. Past.* bk. ii., song 3). It is for his truthful, affectionate pictures of his country life and its surroundings that the stories of Marina and Celandine, Doridon and the rest are still read. A copy of Browne's pastorals with annotations in Milton's handwriting is preserved in the Huth library, and there are many points of likeness between Lycidas and the elegy on Philarete (Thomas Manwood) in the fourth eclogue of the *Shepherd's Pipe*. Keats was a student of Browne, and Herrick's fairy fantasies are thought to owe something to the third book of the pastorals.

The first two books of *Britannia's Pastorals* were re-issued in 1625. The third, though it had no doubt circulated in the author's lifetime, remained unknown until Beriah Botfield discovered a copy of it in the library of Salisbury cathedral, bound up with the 1613 and 1616 editions of the first and second books. This MS. was edited for the Percy Society by T.C. Croker in 1852. A collected edition of Browne's works was published in 1772 by John Davies. It is not known whether *The Inner Temple Masque* on the story of Ulysses and Circe, which was written for performance on the 13th of January 1615, was ever actually represented. A series of sonnets to Caelia, some epistles, elegies and epitaphs, with some other miscellaneous poems, complete the list of Browne's works. These have been collected from various sources, the most important being Lansdowne MS. 777 (British Museum), and they were printed for the first time by Sir S.E. Brydges in 1815. Excellent modern complete editions of Browne and Mr W.C. Hazlitt's (1868-1869) for the Roxburghe library, and a more compact one (1894) by Mr Gordon Goodwin, with an introduction by Mr A.H. Bullen, for the "Muse's Library." For an elaborate analysis of Browne's obligations to earlier pastoral writers see F.W. Moorman, "William Browne" (*Quellen und Forschungen zur Sprach- und Culturgeschichte der Germanischen Völker* Strassburg, 1897). A translation of Marin le Roy de Gomberville's *Polexandre*, by William Browne (1647), may be a posthumous work of the poet's.

BROWNE, WILLIAM GEORGE (1768-1813), English traveller, was born at Great Tower Hill, London, on the 25th of July 1768. At seventeen he was sent to Oriel College, Oxford. Having had a moderate competence left him by his father, on quitting the university he applied himself entirely to literary pursuits. But the fame of James Bruce's travels, and of the first discoveries made by the African Association, determined him to become an explorer of Central Africa. He went first to Egypt, arriving at Alexandria in January 1792. He spent some time in visiting the oasis of Siwa or Jupiter Ammon, and employed the remainder of the year in studying Arabic and in examining the ruins of ancient Egypt. In the spring of 1793 he visited Sinai, and in May set out for Darfur, joining the great caravan which every year went by the desert route from Egypt to that country. This was his most important journey, in which he acquired a great variety of original information. He was forcibly detained by the sultan of Darfur and endured much hardship, being unable to effect his purpose of returning by Abyssinia. He was, however, allowed

to return to Egypt with the caravan in 1796; after this he spent a year in Syria, and did not arrive in London till September 1798. In 1799 he published his *Travels in Africa, Egypt and Syria, from the year 1792 to 1798*. The work was full of valuable information; but, from the abruptness and dryness of the style, it never became popular. In 1800 Browne again left England, and spent three years in visiting Greece, some parts of Asia Minor and Sicily. In 1812 he once more set out for the East, proposing to penetrate to Samarkand and survey the most interesting regions of central Asia. He spent the winter in Smyrna, and in the spring of 1813 travelled through Asia Minor and Armenia, made a short stay at Erzerum, and arrived on the 1st of June at Tabriz. About the end of the summer of 1813 he left Tabriz for Teheran, intending to proceed thence into Tartary, but was shortly afterwards murdered. Some bones, believed to be his, were afterwards found and interred near the grave of Jean de Thevenot, the French traveller.

Robert Walpole published, in the second volume of his *Memoirs relating to European and Asiatic Turkey* (1820), from papers left by Browne, the account of his journey in 1802 through Asia Minor to Antioch and Cyprus; also *Remarks written at Constantinople* (1802).

BROWNHILLS, an urban district in the Lichfield parliamentary division of Staffordshire, England, 6 m. W. of Lichfield, on branch lines of the London & North-Western and Midland railways, and near the Essington Canal. Pop. (1891) 11,820; (1901) 15,252. There are extensive
[v.04 p.0668] coal-mines in the district, forming part of the Cannock Chase deposit. The town lies on the Roman Watling Street, and remains of earthworks are seen at Knave's Castle, on the Street, and at Castle Old Fort, 2 m. S.E. Ogley Hay, the parish of which partly covers Brownhills, is a large adjoining village; there are also Great Wyrley and Norton-under-Cannock or Norton Canes to the N.W. and N., with collieries, and at Church Bridge are brick, tile, and edge-tool works. Wyrley Grove is a picturesque mansion of the 17th century.

BROWNING, ELIZABETH BARRETT (1806-1861), English poet, wife of the poet Robert Browning, was born probably at Coxhoe Hall, Durham, for this was the home of her father and mother for some time after their marriage in 1805. Her baptismal register gives the date of her birth as the 6th of March 1806, and that of her christening as the 10th of February 1808. The long misunderstanding as to her age, whereby she was supposed to have been born three years later, was shared by her contemporaries and even for a time by her husband. She was the daughter and eldest child of Edward Barrett Moulton, who added the surname of Barrett on the death of his maternal grandfather, whose estates in Jamaica he inherited. His wife was Mary Graham-Clarke, daughter of J. Graham-Clarke of Fenham Hall, Newcastle-on-Tyne. She died when her illustrious daughter was twenty-two years old. Elizabeth's childhood was passed in the country, chiefly at Hope End, a house bought by her father in the beautiful country in sight of the Malvern Hills. "They seem to me," she wrote, "my native hills; for though I was born in the county of Durham, I was an infant when I went first into their neighbourhood, and lived there until I had passed twenty by several years." Her country poems, such as "The Lost Bower," "Hector in the Garden," and "The Deserted Garden," refer to the woods and gardens of Hope End. Elizabeth Barrett was much the companion of her father, who pleased himself with printing fifty copies of what she calls her "great epic of eleven or twelve years old, in four books"—*The Battle of Marathon* (sent to the printer in 1819). She owns this to have been "a curious production for a child," but disclaims for it anything more than "an imitative faculty." The love of Pope's Homer, she adds, led her to the study of Greek, and of Latin as a help to Greek, "and the influence of all those tendencies is manifest so long afterwards as in my *Essay on Mind* [*Essay on Mind and other Poems*, 1826], a didactic poem written when I was seventeen or eighteen, and long repented of." She was a keen student, and it is told of her that when her health failed she had her Greek books bound so as to look like novels, for fear her doctor should forbid her continuous study. At this time began her friendship with the blind scholar Hugh Stuart Boyd, with whom she read Greek authors, and especially the Greek Christian Fathers and Poets. To him she addressed later three of her sonnets, and he was one of her chief friends until his death in 1848. In 1832 Mr Barrett sold his house of Hope End, and brought his family to Sidmouth, Devon, for some three years. There Elizabeth made a translation of the *Prometheus Bound* of Aeschylus, published with some original poems (1833). After that time London became the home of the Barretts until the children married and the father died. The temporary dwelling was at 74 Gloucester Place, Portman Square, and in 1838 the lease was taken of the final house, 50 Wimpole Street.

It is in the middle of the year 1836 that Elizabeth Barrett's active literary life began. She then made the acquaintance of R.H. Horne, afterwards famous for a time as the author of *Orion*, but perhaps best remembered as her correspondent (*Letters to R.H. Horne*, 2 vols. 1877), and this acquaintance led to the appearance of rather frequent poems by Miss Barrett in the *New Monthly Magazine*, edited by Bulwer (Lord Lytton), and in other magazines or annuals. But the publication of *The Seraphim and other Poems* (1838) was a graver step. "My present attempt," she writes in this year, "*is* actually, and will be considered by others, more a trial of strength than either of my preceding ones." There was at that date a lull in the production of conspicuous books of poetry. Wordsworth had ceased, Browning and Tennyson had hardly begun to write their best. Miss Barrett's volume was well reviewed, but not popular, and no second edition was required; of the poems afterwards famous it contained three, "Cowper's Grave," "My Doves," and "The Sea-Mew," the first impassioned and the other two very quiet, which a fine taste must rank high among all her works. *The Quarterly Review* (September 1840), in an article on "Modern English Poetesses," criticizes *The Seraphim* with *Prometheus*, and treats the former with respect, but does not lift the author out of the quite unequal company of Mrs Norton, "V," and other contemporary women. In the previous year Elizabeth had made the memorable acquaintance of Wordsworth. "No," she writes, "I was not at all disappointed in Wordsworth, although perhaps I

should not have singled him from the multitude as a great man. There is a *reserve* even in his countenance; ... his eyes have more meekness than brilliancy; and in his slow, even articulation there is rather the solemnity and calmness of *truth* itself than the animation and energy of those who seek for it ... He was very kind, and sate near me and talked to me as long as he was in the room, and recited a translation by Cary of a sonnet of Dante's—and altogether it was a dream." With Landor, at the same date, a meeting took place that had long results. At this time, too, began another of Elizabeth's valued friendships—that with Miss Mitford, author of *Our Village* and other works less well remembered. Mr John Kenyon also became at about this time a dear and intimate friend. He was a distant cousin of the Barretts, had published some verse, and was a warm and generous friend to men of letters. From the date of the birth of their child (1849) he gave the Brownings a hundred pounds a year, and when he died in 1856 he bequeathed to them eleven thousand pounds. To him a great number of Elizabeth's letters are addressed, and to him in later years was *Aurora Leigh* dedicated. Elizabeth Barrett began also in London an acquaintance with Harriet Martineau.

Full of the interest of friendship and literature, the residence in London was unfavourable to Elizabeth's health. In early girlhood she had a spinal affection, and her lungs became delicate. She broke a blood-vessel in the beginning of the Barretts' life in town, and was thereafter an invalid—by no means entirely confined to her room, but often imprisoned there, and generally a recluse, until her marriage. Her state was so threatening that in 1838 it was found necessary to remove her to Torquay, where she spent three years, accompanied by her brother Edward, the dearest of her eight brothers, the only one, she said many years later, who ever comprehended her, and for a time by her father and sisters. During this time of physical suffering she underwent the greatest grief of her life by the drowning of her beloved brother, who with two friends went sailing in a small boat and was lost in Babbacombe Bay. Rumours of the foundering reached the unhappy sister, who was assured of the worst after three days, when the bodies were found. The accident of Edward Barrett's meeting with his death through her residence at Torquay, and the minor accident of her having parted from him on the day of his death, as she said, "with pettish words," increased her anguish of heart to horror. A few days before she had written, "There are so many mercies close around me that God's being seems proved to me, *demonstrated* to me, by His manifested love." When the blow came, its heavy weight and closeness to her heart convinced her, she wrote, through an awful experience of suffering, of divine action. But many years later the mention of her brother's death was intolerable to her. At the time she only did not die. She had to remain for nearly a year day and night within hearing of the sea, of which the sound seemed to her the moan of a dying man.

There is here an interval of silence in the correspondence which busied her secluded life at all ages; but with an impulse of self-protection she went to work as soon as her strength sufficed. One of her tasks was a part taken in the *Chaucer Modernized* (1841), a work suggested by Wordsworth, to which he, Leigh Hunt, Horne and others contributed. In 1841 she returned to
[v.04 p.0669] Wimpole Street, and in that and the following year she was at work on two series of articles on the Greek Christian poets and on the English poets, written for the *Athenaeum* under the editorship of Mr C.W. Dilke. In work she found some interest and even some delight: "Once I wished not to live, but the faculty of life seems to have sprung up in me again from under the crushing foot of heavy grief. Be it all as God wills."

It is in 1842 that we notice the name of Robert Browning in her letters: "Mr Horne the poet and Mr Browning the poet were not behind in approbation," she says in regard to her work on the poets. "Mr Browning is said to be learned in Greek, especially the dramatists." In this year also she declares her love for Tennyson. To Kenyon she writes, "I ought to be thanking you for your great kindness about this divine Tennyson." In 1842, moreover, she had the pleasure of a letter from Wordsworth, who had twice asked Kenyon for permission to visit her. The visit was not permitted on account of Miss Barrett's ill-health. Now Haydon sent her his unfinished painting of the great poet musing upon Helvellyn; she wrote her sonnet on the portrait, and Haydon sent it to Rydal Mount. Wordsworth's commendation is rather cool. In August 1843 "The Cry of the Children" appeared in *Blackwood's Magazine*, and during the year she was associated with her friend Horne in a critical work, *The New Spirit of the Age*, rather by advice than by direct contribution. Her two volumes of poems (1844) appeared, six years after her former book, under the title of *Poems, by Elizabeth Barrett Barrett*. The warmest praises that greeted the new poems were H.F. Chorley's in the *Athenaeum*, John Forster's in the *Examiner*, and those conveyed in *Blackwood*, the *Dublin Review*, the *New Quarterly* and the *Atlas*. Letters came from Carlyle and others. Both he and Miss Martineau selected as their favourite poem "Lady Geraldine's Courtship," a violent piece of work. In the beginning of the following year came the letter from a stranger that was to be so momentous to both. "I had a letter from Browning the poet last night," she writes to her old friend Mrs Martin, "which threw me into ecstasies—Browning, the author of *Paracelsus*, the king of the mystics." She is flattered, though not to "ecstasies," at about the same time by a letter from E.A. Poe, and by the dedication to her, as "the noblest of her sex," of his own work. "What is to be said, I wonder, when a man calls you the 'noblest of your sex'? 'Sir, you are the most discerning of yours.'" America was at least as quick as England to appreciate her poetry; among other messages thence came in the spring letters from Lowell and from Mrs Sigourney. "She says that the sound of my poetry is stirring the 'deep green forests of the New World'; which sounds pleasantly, does it not?" It is in the same year that the letters first speak of the hope of a journey to Italy. The winters in London, with the imprisonment which—according to the medical practice of that day—they entailed, were lowering Elizabeth's strength of resistance against disease. She longed for the change of light, scene, manners and language, and the longing became a hope, until her father's prohibition put an end to it, and doomed her, as she

and others thought, to death, without any perceptible reason for the denial of so reasonable a desire.

Meanwhile the friendship with Browning had become the chief thing in Elizabeth Barrett's life. The correspondence, once begun, had not flagged. In the early summer they met. The allusion to his poetry in "Lady Geraldine's Courtship" had doubtless put an edge to his already keen wish to know her. He became her frequent visitor and kept her room fragrant with flowers. He never lagged, whether in friendship or in love. We have the strange privilege, since the publication of the letters between the two, of following the whole course of this noble love-story from beginning to end, and day by day. Browning was six years younger than the woman he so passionately admired, and he at first believed her to be confined by some hopeless physical injury to her sofa. But of his own wish and resolution he never doubted. Her hesitation, in her regard for his liberty and strength, to burden him with an ailing wife, she has recorded in the Sonnets afterwards published under a slight disguise as *Sonnets from the Portuguese*. She refused him once "with all her will, but much against her heart," and yielded at last for his sake rather than her own. Her father's will was that his children should not marry, and, kind and affectionate father though he was, the prohibition took a violent form and struck terror into the hearts of the three dutiful and sensitive girls. Robert Browning's addresses were, therefore, kept secret, for fear of scenes of anger which the most fragile of the three could not face. Browning was reluctant to practise the deception; Elizabeth alone knew how impossible it was to avoid it. When she was persuaded to marry, it was she who insisted, in mental and physical terror, upon a secret wedding. Throughout the summer of 1846 her health improved, and on the 12th of September the two poets were married in St Marylebone parish church. Browning visited it on his subsequent journeys to England to give thanks for what had taken place at its altar. Elizabeth's two sisters had been permitted to know of the engagement, but not of the wedding, so that their father's anger might not fall on them too heavily. For a week Mrs Browning remained in her father's house. On the 19th of September she left it, taking her maid and her little dog, joined her husband, and crossed to the Continent. She never entered that home again, nor did her father ever forgive her. Her letters, written with tears to entreat his pardon, were never answered. They were all subsequently returned to her unopened. Among them was one she had written, in the prospect of danger, before the birth of her child. With her sisters her relations were, as before, most affectionate. Her brothers, one at least of whom disapproved of her action, held for a time aloof. All others were taken entirely by surprise. Mrs Jameson, who had been one of the few intimate visitors to Miss Barrett's room, had offered to take her to Italy that year, but met her instead on her way thither with a newly-married husband. The poets' journey was full of delight. Where she could not walk, up long staircases or across the waters of the stream at Vaucluse, Browning carried her. In October they reached Pisa, and there they wintered, Mrs Jameson keeping them company for a time lest ignorance of practical things should bring them, in their poverty, to trouble. She soon found that they were both admirable economists; not that they gave time and thought to husbandry, but that they knew how to enjoy life without luxuries. So they remained to the end, frugal and content with little.

For climate and cheapness they settled in Italy, choosing Florence in the spring of 1847, and remaining there, with the interruptions of a change to places in Italy such as Siena and Rome, and to Paris and England, until Mrs Browning's death. It was at Pisa that Robert Browning first saw the *Sonnets from the Portuguese*, poems which his wife had written in secret and had no thought of publishing. He, however, resolved to give them to the world. "I dared not," he said, "reserve to myself the finest sonnets written in any language since Shakespeare's." The judgment, which the existence of Wordsworth's sonnets renders obviously absurd, may be pardoned. The sonnets were sent to Miss Mitford and published at Reading, as *Sonnets by E.B.B.*, in 1847. In 1850 they were included, under their final title, in a new issue of poems. During the Pisan autumn appeared in *Blackwood's Magazine* seven poems by Mrs Browning which she had sent some time before, and the publication of which at that moment disturbed her as likely to hurt her father by an apparent reference to her own story. At Pisa also she wrote and sent to America a poem, "The Runaway Slave at Pilgrim Point," which was published in Boston, in *The Liberty Bell*, in 1848, and separately in England in 1849. In the summer of 1847 the Brownings left their temporary dwelling in Florence and took the apartment in Casa Guidi, near the Pitti Palace, which was thenceforth their chief home. Early in their residence began that excited interest in Italian affairs which made so great a part of Mrs Browning's emotional life. The Florentines, under the government of the grand duke, were prosperous but disturbed by national aspirations. Mrs Browning, by degrees, wrote Casa Guidi Windows on their behalf and as an [v.04 p.0670] appeal to the always impulsive sympathies of England. In 1849 was born the Brownings' only child, their beloved son Robert Wiedemann Barrett. After this event Mrs Browning resumed her literary activities, preparing a new issue, with some additions, of her poems (1850). A poem on the death of a friend's child appeared in the *Athenaeum* (1849), and there the new volumes were warmly praised. *Casa Guidi Windows* followed in 1851. Visiting England in that year, the Brownings saw much of the Procters, and something of Florence Nightingale, Kingsley, Ruskin, Rogers, Patmore and Tennyson, and also of Carlyle, with whom they went to Paris, where they saw George Sand, and where they passed the December days of the *coup d'état*. Mrs Browning happened to take a political fancy to Napoleon III., whom she would probably have denounced if a tithe of his tyrannies had occurred in Italy, and the fancy became more emotional in after years.

A new edition of Mrs Browning's poems was called for in 1853, and at about this time, in Florence, she began to work on *Aurora Leigh*. She was still writing this poem when the Brownings were again in England, in 1855. Tennyson there read to them his newly-written *Maud*. After another interval in Paris they were in London again—Mrs Browning for the last time. She

was with her dear cousin Kenyon during the last months of his life. In October 1856 the Brownings returned to their Florentine home, Mrs Browning leaving her completed *Aurora Leigh* for publication. The book had an immediate success; a second edition was required in a fortnight, a third a few months later. In the fourth edition (1859) several corrections were made. The review in *Blackwood* was written by W.E. Aytoun, that in the *North British* by Coventry Patmore.

In 1857 Mrs Browning addressed a petition, in the form of a letter, to the emperor Napoleon begging him to remit the sentence of exile upon Victor Hugo. We do not hear of any reply. In 1857 Mrs Browning's father died, unreconciled. Henrietta Barrett had married, like her sister, and like her was unforgiven. In 1858 occurred another visit to Paris, and another to Rome, where Hawthorne and his family were among the Brownings' friends. In 1859 came the Italian war in which Mrs Browning's hasty sympathies were hotly engaged. Her admiration of Italy's champion, Napoleon III., knew no bounds, and did not give way when, by the peace of Villafranca, Venice and Rome were left unannexed to the kingdom of Italy, and the French frontiers were "rectified" by the withdrawal from that kingdom of Savoy and Nice. That peace, however, was a bitter disappointment, and her fragile health suffered. At Siena and Florence this year the Brownings were very kind to Landor, old, solitary, and ill. Mrs Browning's poem, "A Tale of Villafranca", was published in the *Athenaeum* in September, and afterwards included in *Poems before Congress* (1860). Then followed another long visit to Rome, and there Mrs Browning prepared for the press this, her last volume. The little book was judged with some impatience, *A Curse for a Nation* being mistaken for a denunciation of England, whereas it was aimed at America and her slavery. The *Athenaeum*, amongst others, committed this error. The *Saturday Review* was hard on the volume, so was *Blackwood*; the *Atlas* and *Daily News* favourable. In July 1860 was published "A Musical Instrument" in the young *Cornhill Magazine*, edited by the author's friend W.M. Thackeray. The last blow she had to endure was the death of her sister Henrietta, in the same year.

On the 30th of June 1861 Elizabeth Barrett Browning died. Her husband, who tended her alone on the night of her decease, wrote to Miss Blagden: "Then came what my heart will keep till I see her again and longer—the most perfect expression of her love to me within my whole knowledge of her. Always smilingly, happily, and with a face like a girl's, and in a few minutes she died in my arms, her head on my cheek. ... There was no lingering, nor acute pain, nor consciousness of separation, but God took her to himself as you would lift a sleeping child from a dark uneasy bed into your arms and the light. Thank God." Her married life had been supremely happy. Something has been said of the difference between husband and wife in regard to "spiritualism", in which Mrs Browning had interest and faith, but no division ever interrupted their entirely perfect affection and happiness. Of her husband's love for her she wrote at the time of her marriage, "He preferred ... of free and deliberate choice, to be allowed to sit only an hour a day by my side, to the fulfilment of the brightest dream which should exclude me in any possible world." "I am still doubtful whether all the brightness can be meant for *me*. It is just as if the sun rose again at 7 o'clock P.M." "I take it for pure magic, this life of mine. Surely nobody was ever so happy before." "I must say to you [Mrs Jameson] who saw the beginning with us, that this end of fifteen months is just fifteen times better and brighter; the mystical 'moon' growing larger and larger till scarcely room is left for any stars at all: the only differences which have touched me being the more and more happiness." Browning buried his wife in Florence, under a tomb designed by their friend Frederick Leighton. On the wall of Casa Guidi is placed the inscription: "Qui scrisse e mori Elisabetta Barrett Browning, che in cuore di donna conciliava scienza di dotto e spirito di poeta, e face del suo verso aureo annello fra Italia e Inghilterra. Pone questa lapide Firenze grata 1861." In 1866 Robert Browning published a volume of selections from his wife's works.

The place of Elizabeth Barrett Browning in English literature is high, if not upon the summits. She had an original genius, a fervent heart, and an intellect that was, if not great, exceedingly active. She seldom has composure or repose, but it is not true that her poetry is purely emotional. It is full of abundant, and even over-abundant, thoughts. It is intellectually restless. The impassioned peace of the greatest poetry, such as Wordsworth's, is not hers. Nor did she apparently seek to attain those heights. Her Greek training taught her little of the economy that such a poetic education is held to impose; she "dashed", not by reason of feminine weakness, but as it were to prove her possession of masculine strength. Her gentler work, as in the *Sonnets from the Portuguese*, is beyond praise. There is in her poetic personality a glory of righteousness, of spirituality, and of ardour that makes her name a splendid one in the history of an incomparable literature.

See the *Letters of Elizabeth Barrett Browning addressed to R.H. Horne, with Comments on Contemporaries*, edited by S.R. Townshend Mayer (2 vols., 1877); *The Poetical Works of Elizabeth Barrett Browning from 1826 to 1844*, edited with memoir by J.H. Ingram (1887); *Elizabeth Barrett Browning* (Eminent Women series), by J.H. Ingram, 1888); *Records of Tennyson, Ruskin and the Brownings*, by Anne Ritchie (1892); *The Letters of Elizabeth Barrett Browning*, edited with biographical additions by Frederick G. Kenyon (2 vols., 1897); *The Letters of Robert Browning and Elizabeth Barrett Barrett* (2 vols., 1899); *La Vie et l'œuvre d'Elizabeth Browning*, by Mdlle. Germaine-Marie Merlette (Paris, 1906)

(A. Me.)

BROWNING, OSCAR (1837-), English writer, was born in London on the 17th of January 1837, the son of a merchant, William Shipton Browning. He was educated at Eton and at King's College, Cambridge, of which he became fellow and tutor, graduating fourth in the classical tripos of 1860. He was for fifteen years a master at Eton College, resuming residence in 1876 at

Cambridge, where he became university lecturer in history. He soon became a prominent figure in college and university life, encouraging especially the study of political science and modern political history, the extension of university teaching and the movement for the training of teachers. He is well known to Dante students by his *Dante; Life and Works* (1891), and to the study of Italian history he has contributed *Guelphs and Ghibellines* (1903). His works on modern history include *England and Napoleon in 1803* (1887), *History of England* (4 vols. 1890), *Wars of the Nineteenth Century* (1899), *History of Europe 1814-1843* (1901), *Napoleon, the first Phase* (1905).

BROWNING, ROBERT (1812-1889), English poet, was born at Camberwell, London, on the 7th of May 1812. He was the son of Robert Browning (1781-1866), who for fifty years was employed in the Bank of England. Earlier Brownings had been settled in Wiltshire and Dorsetshire, and there is no ground for the statement that the family was partly of Jewish origin. The poet's mother was a daughter of William Wiedemann, a German who had settled in Dundee and married a Scottish wife. His parents had one other child, a daughter, Sarianna, born in 1814. They lived
[v.04 p.0671] quietly in Camberwell. The elder Browning had a sufficient income and was indifferent to money-making. He had strong literary and artistic tastes. He was an ardent book collector, and so good a draughtsman that paternal authority alone had prevented him from adopting an artistic career. He had, like his son, a singular faculty for versifying, and helped the boy's early lessons by twisting the Latin grammar into grotesque rhymes. He lived, as his father had done, to be 84, with unbroken health. The younger Robert inherited, along with other characteristics, much of his father's vigour of constitution. From the mother, who had delicate health, he probably derived his excessive nervous irritability; and from her, too, came his passion for music. The family was united by the strongest mutual affection, and the parents erred, if anything, on the side of indulgence. Browning was sent to a school in the neighbourhood, but left it when fourteen, and had little other teaching. He had a French tutor for the next two years, and in his eighteenth year he attended some Greek lectures at the London University. At school he never won a prize, though it was more difficult to avoid than to win prizes. He was more conspicuous for the love of birds and beasts, which he always retained, than for any interest in his lessons. He rather despised his companions and made few friends. A precocious poetical capacity, however, showed itself in extra-scholastic ways. He made his schoolfellows act plays, partly written by himself. He had composed verses before he could write, and when twelve years old completed a volume of poems called *Incondita*. His parents tried unsuccessfully to find a publisher; but his verses were admired by Sarah Flower, afterwards Mrs Adams, a well-known hymn-writer of the day, and by W.J. Fox, both of whom became valuable friends. A copy made by Miss Flower was in existence in 1871, but afterwards destroyed by the author. Browning had the run of his father's library, and acquired a very unusual amount of miscellaneous reading. Quarles' *Emblems* was an especial favourite; and besides the Elizabethan dramatists and standard English books, he had read all the works of Voltaire. Byron was his first master in poetry, but about the age of fourteen he fell in accidentally with Shelley and Keats. For Shelley in particular he conceived an enthusiastic admiration which lasted for many years, though it was qualified in his later life.

The more aggressive side of Browning's character was as yet the most prominent; and a self-willed lad, conscious of a growing ability, found himself cramped in Camberwell circles. He rejected the ordinary careers. He declined the offer of a clerkship in the Bank of England; and his father, who had found the occupation uncongenial, not only approved the refusal but cordially accepted the son's decision to take poetry for his profession. For good or evil, Browning had been left very much to his own guidance, and if his intellectual training suffered in some directions, the liberty permitted the development of his marked originality. The parental yoke, however, was too light to provoke rebellion. Browning's mental growth led to no violent breach with the creeds of his childhood. His parents became Dissenters in middle life, but often attended Anglican services; and Browning, though he abandoned the dogmas, continued to sympathize with the spirit of their creed. He never took a keen interest in the politics of the day, but cordially accepted the general position of contemporary Liberalism. His worship of Shelley did not mean an acceptance of his master's hostile attitude towards Christianity, still less did he revolt against the moral discipline under which he had been educated. He frequented literary and artistic circles, and was passionately fond of the theatre; but he was entirely free from a coarse Bohemianism, and never went to bed, we are told, without kissing his mother. He lived with his parents until his marriage. His mother lived till 1849, and his father till 1866, and his affectionate relations to both remained unaltered. Browning's first published poem, *Pauline*, appeared anonymously in 1833. He always regarded it as crude, and destroyed all the copies of this edition that came within his reach. It was only to avoid unauthorized reprints that he consented with reluctance to republishing it in the collected works of 1868. The indication of genius was recognized by W.J. Fox, who hailed it in the *Monthly Repository* as marking the advent of a true poet. *Pauline* contains an enthusiastic invocation of Shelley, whose influence upon its style and conception is strongly marked. It is the only one of Browning's works which can be regarded as imitative. In the winter of 1833 he went to St Petersburg on a visit to the Russian consul-general, Mr Benckhausen. There he wrote the earliest of his dramatic lyrics, "Porphyria's Lover" and "Johannes Agricola." In the spring of 1834 he visited Italy for the first time, going to Venice and Asolo.

Browning's personality was fully revealed in his next considerable poems, *Paracelsus* (1835) and *Sordello* (1840). With *Pauline*, however, they form a group. In an essay (prefixed to the spurious Shelley letters of 1851), Browning describes Shelley's poetry "as a sublime fragmentary essay towards a presentment of the correspondency of the universe to Deity." The phrase describes his own view of the true functions of a poet, and Browning, having accepted the vocation, was

meditating the qualifications which should fit him for his task. The hero of *Pauline* is in a morbid state of mind which endangers his fidelity to his duty. *Paracelsus* and *Sordello* are studies in the psychology of genius, illustrating its besetting temptations. Paracelsus fails from intellectual pride, not balanced by love of his kind, and from excessive ambition, which leads him to seek success by unworthy means. Sordello is a poet distracted between the demands of a dreamy imagination and the desire to utter the thoughts of mankind. He finally gives up poetry for practical politics, and gets into perplexities only to be solved by his death. *Pauline* might in some indefinite degree reflect Browning's own feelings, but in the later poems he adopts his characteristic method of speaking in a quasi-dramatic mood. They are, as he gave notice, "poems, not dramas." The interest is not in the external events, but in the "development of a soul"; but they are observations of other men's souls, not direct revelations of his own. Paracelsus was based upon a study of the original narrative, and Sordello was a historical though a very indefinite person. The background of history is intentionally vague in both cases. There is one remarkable difference between them. The *Paracelsus*, though full of noble passages, is certainly diffuse. Browning heard that John Sterling had complained of its "verbosity," and tried to remedy this failing by the surgical expedient of cutting out the usual connecting words. Relative pronouns henceforth become scarce in his poetry, and the grammatical construction often a matter of conjecture. Words are forcibly jammed together instead of being articulately combined. To the ordinary reader many passages in his later work are both crabbed and obscure, but the "obscurity" never afterwards reached the pitch of *Sordello*. It is due to the vagueness with which the story is rather hinted than told, as well as to the subtlety and intricacy of the psychological expositions. The subtlety and vigour of the thought are indeed surprising, and may justify the frequent comparisons to Shakespeare; and it abounds in descriptive passages of genuine poetry.

Still, Browning seems to have been misled by a fallacy. It was quite legitimate to subordinate the external incidents to the psychological development in which he was really interested, but to secure the subordination by making the incidents barely intelligible was not a logical consequence. We should not understand Hamlet's psychological peculiarities the better if we had to infer his family troubles from indirect hints. Browning gave more time to *Sordello* than to any other work, and perhaps had become so familiar with the story which he professed to tell that he failed to make allowance for his readers' difficulties. In any case it was not surprising that the ordinary reader should be puzzled and repelled, and the general recognition of his genius long delayed, by his reputation for obscurity.

It might, however, be expected that he would make a more successful appeal to the public by purely dramatic work, in which he would have to limit his psychological speculation and to place his characters in plain situations. *Paracelsus* and *Sordello* show so great a power of reading character and appreciating subtler springs of conduct that its author clearly had one, at least, of the essential qualifications of a dramatist.

[v.04 p.0672] Before *Sordello* appeared Browning had tried his hand in this direction. He was encouraged by outward circumstances as well as by his natural bent. He was making friends and gaining some real appreciative admirers. John Forster had been greatly impressed by *Paracelsus*. Browning's love of the theatre had led to an introduction to Macready in the winter of 1835-1836; and Macready, who had been also impressed by *Paracelsus*, asked him for a play. Browning consented and wrote *Strafford*, which was produced at Covent Garden in May 1837, Macready taking the principal part. Later dramas were *King Victor and King Charles*, published in 1842; *The Return of the Druses* and *A Blot on the 'Scutcheon* (both in 1843), *Colombe's Birthday* (1844), *Luria* and *A Soul's Tragedy* (both in 1846), and the fragmentary *In a Balcony* (1853). *Strafford* succeeded fairly, though the defection of Vandenhoff, who took the part of Pym, stopped its run after the fifth performance. The *Blot on the 'Scutcheon*, produced by Macready as manager of Drury Lane on the 11th of February 1843, led to an unfortunate quarrel. Browning thought that Macready had felt unworthy jealousy of another actor, and had gratified his spite by an inadequate presentation of the play. He remonstrated indignantly and the friendship was broken off for years. Browning was disgusted by his experience of the annoyances of practical play-writing, though he was not altogether discouraged. The play had apparently such a moderate success as was possible under the conditions, and a similar modest result was attained by *Colombe's Birthday*, produced at Covent Garden on the 25th of April 1853. Browning, like other eminent writers of the day, failed to achieve the feat of attracting the British public by dramas of high literary aims, and soon gave up the attempt. It has been said by competent critics that some of the plays could be fitted for the stage by judicious adaptation. The *Blot on the 'Scutcheon* has a very clear and forcibly treated situation; and all the plays abound in passages of high poetic power. Like the poems, they deal with situations involving a moral probation of the characters, and often suggesting the ethical problems which always interested him. The speeches tend to become elaborate analyses of motive by the persons concerned, and try the patience of an average audience. For whatever reason, Browning, though he had given sufficient proofs of genius, had not found in these works the most appropriate mode of utterance.

The dramas, after *Strafford*, formed the greatest part of a series of pamphlets called *Bells and Pomegranates*, eight of which were issued from 1841 to 1846. The name, he explained, was intended to indicate an "alternation of poetry and thought." The first number contained the fanciful and characteristic *Pippa Passes*. The seventh, significantly named *Dramatic Romances and Lyrics*, contained some of his most striking shorter poems. In 1844 he contributed six poems, among which were "The Flight of the Duchess" and "The Bishop orders his Tomb at St Praxed's Church," to Hood's *Magazine*, in order to help Hood, then in his last illness. These poems take the special form in which Browning is unrivalled. He wrote very few lyrical poems of the ordinary

kind purporting to give a direct expression of his own personal emotions. But, in the lyric which gives the essential sentiment of some impressive dramatic situation, he has rarely been approached. There is scarcely one of the poems published at this time which can be read without fixing itself at once in the memory as a forcible and pungent presentation of a characteristic mood. Their vigour and originality failed to overcome at once the presumption against the author of *Sordello*. Yet Browning was already known to and appreciated by such literary celebrities of the day as Talfourd, Leigh Hunt, Procter, Monckton Milnes, Carlyle and Landor. His fame began to spread among sympathetic readers. The *Bells and Pomegranates* attracted the rising school of "pre-Raphaelites," especially D.G. Rossetti, who guessed the authorship of the anonymous *Pauline* and made a transcript from the copy in the British Museum. But his audience was still select.

Another recognition of his genius was of incomparably more personal importance and vitally affected his history. In 1844 Miss Barrett (see Browning, Elizabeth Barrett) published a volume of poems containing "Lady Geraldine's Courtship," with a striking phrase about Browning's poems. He was naturally gratified, and her special friend and cousin, John Kenyon, encouraged him to write to her. She admitted him to a personal interview after a little diffidence, and a hearty appreciation of literary genius on both sides was speedily ripened into genuine and most devoted love. Miss Barrett was six years older than Browning and a confirmed invalid with shaken nerves. She was tenderly attached to an autocratic father who objected on principle to the marriage of his children. The correspondence of the lovers (published in 1899) shows not only their mutual devotion, but the chivalrous delicacy with which Browning behaved in a most trying situation. Miss Barrett was gradually encouraged to disobey the utterly unreasonable despotism. They made a clandestine marriage on the 12th of September 1846. The state of Miss Barrett's health suggested misgivings which made Browning's parents as well as his bride's disapprove of the match. She, however, appears to have become stronger for some time, though always fragile and incapable of much active exertion. She had already been recommended to pass a winter in Italy. Browning had made three previous tours there, and his impressions had been turned to account in *Sordello* and *Pippa Passes*, in *The Englishman in Italy* and *Home Thoughts from Abroad*. For the next fifteen years the Brownings lived mainly in Italy, making their headquarters at Florence in the Casa Guidi. A couple of winters were passed in Rome. In the summer of 1849 they were at Siena, where Browning was helpful to Landor, then in his last domestic troubles. They also visited England and twice spent some months in Paris. Their only child, Robert Wiedemann Browning, was born at Florence in 1849. Browning's literary activity during his marriage seems to have been comparatively small; *Christmas Eve and Easter Day* appeared in 1850, while the two volumes called *Men and Women* (1855), containing some of his best work, showed that his power was still growing. His position involved some sacrifice and imposed limitations upon his energies. Mrs Browning's health required a secluded life; and Browning, it is said, never dined out during his marriage, though he enjoyed society and made many and very warm friendships. Among their Florence friends were Margaret Fuller Ossoli, Isa Blagden, Charles Lever and others. The only breach of complete sympathy with his wife was due to his contempt for "spiritualists" and "mediums," in whom she fully believed. His portrait of Daniel Dunglas Home as "Sludge the Medium" only appeared after her death. This domestic happiness, however, remained essentially unbroken until she died on 29th June 1861. The whole love-story had revealed the singular nobility of his character, and, though crushed for a time by the blow, he bore it manfully. Browning determined to return to England and superintend his boy's education at home. He took a house at 19 Warwick Crescent, Paddington, and became gradually acclimatized in London. He resumed his work and published the *Dramatis Personae* in 1864. The publication was well enough received to mark the growing recognition of his genius, which was confirmed by *The Ring and the Book*, published in four volumes in the winter of 1868-1869. In 1867 the university of Oxford gave him the degree of M.A. "by diploma," and Balliol College elected him as an honorary fellow. In 1868 he declined a virtual offer of the rectorship of St Andrews. He repeated the refusal on a later occasion (1884) from a dislike to the delivery of a public address. The rising generation was now beginning to buy his books; and he shared the homage of thoughtful readers with Tennyson, though in general popularity he could not approach his friendly rival. *The Ring and the Book* has been generally accepted as Browning's masterpiece. It was based on a copy of the *procès verbal* of Guido Franceschini's case discovered by him at Florence.

The audacity of the scheme is surprising. To tell the story of a hideous murder twelve times over, to versify the arguments of counsel and the gossip of quidnuncs, and to insist upon every detail with the minuteness of a law report, could have occurred to no one else. The poem is so far at the opposite pole from *Sordello*. Vagueness of environment is replaced by a photographic distinctness, though the psychological interest is dominant in both. Particular phrases may be crabbed, but nothing can be more distinct and vivid in thought and conception. If some of those "dramatic monologues" of which the book is formed fail to be poetry at all, some of them—that of Pompilia the victim, her champion Caponsacchi, and the pope who gives judgment—are in Browning's highest mood, and are as impressive from the ethical as from the poetical point of view. Pompilia was no doubt in some respects an idealized portrait of Mrs Browning. Other pieces may be accepted as a background of commonplace to throw the heroic into the stronger relief. *The Ring and the Book* is as powerful as its method is unique.

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Browning became gentler and more urbane as he grew older. His growing fame made him welcome in all cultivated circles, and he accepted the homage of his admirers with dignity and simplicity. He exerted himself to be agreeable in private society, though his nervousness made him invariably decline ever to make public speeches. He was an admirable talker, and took pains

to talk his best. A strong memory supplied him with abundant anecdotes; and though occasionally pugnacious, he allowed a fair share of the conversation to his companions. Superficial observers sometimes fancied that the poet was too much sunk in the man of the world; but the appearance was due to his characteristic reluctance to lay bare his deeper feelings. When due occasion offered, the underlying tenderness of his affections was abundantly manifest. No one could show more delicate sympathy. He made many warm personal friendships in his later years, especially with women, to whom he could most easily confide his feelings. In the early years of this period he paid visits to country houses, but afterwards preferred to retire farther from the London atmosphere into secluded regions. He passed some holidays in remote French villages, Pornic, Le Croisic and St Aubyn, which have left traces in his poetry. *Gold Hair* is a legend of Pornic, and *Hervé Riel* was written at Le Croisic. At St Aubyn he had the society of Joseph Milsand, who had shown his warm appreciation of Browning's poetry by an article in the *Revue des Deux Mondes*, which in 1852 had led to a personal friendship lasting till Milsand's death in 1886. Browning sent to him the proof-sheets of all his later works for revision. In 1877 Browning was at La Saisiaz on the Salève, near Geneva, where an old friend, Miss Egerton Smith, was staying. She died suddenly almost in his presence. She had constantly accompanied him to concerts during his London life. After her death he almost ceased to care for music. The shock of her loss produced the singular poem called *La Saisiaz*, in which he argues the problem of personal immortality with a rather indefinite conclusion. In later years Browning returned to Italy, and passed several autumns at Venice. He never visited Florence after his wife's death there.

Browning's literary activity continued till almost the end of his life. He wrote constantly, though he composed more slowly. He considered twenty-five or thirty lines to be a good day's work. His later writings covered a very great variety of subjects, and were cast in many different forms. They show the old characteristics and often the old genius. Browning's marked peculiarity, the union of great speculative acuteness with intense poetical insight, involved difficulties which he did not always surmount. He does not seem to know whether he is writing poetry or when he is versifying logic; and when the speculative impulse gets the upper hand, his work suggests the doubt whether an imaginary dialogue in prose would not have been a more effective medium. He is analysing at length when he ought to be presenting a concrete type, while the necessities of verse complicate and obscure the reasoning. A curious example is the *Prince Hohenstiel-Schwangau* (1871), an *alias* for Louis Napoleon. The attempt to show how a questionable hero apologizes to himself recalls the very powerful "Bishop Blougram," and "Sludge, the medium," of earlier works, but becomes prolix and obscure. *Fifine at the Fair* (1872) is another curious speculation containing a defence of versatility in lovemaking by an imaginary Don Juan. Its occasionally cynical tone rather scandalized admirers, who scarcely made due allowance for its dramatic character. Browning's profound appreciation of high moral qualities is, however, always one main source of his power. In later years he became especially interested in stories of real life, which show character passing through some sharp ordeal. The *Red Cotton Nightcap Country* (1873), describing a strange tragedy which had recently taken place in France, and especially *The Inn Album* (1875), founded on an event in modern English society, are powerful applications of the methods already exemplified in *The Ring and the Book*. The *Dramatic Idyls* (1879 and 1880) are a collection of direct narratives, with less analytical disquisition, which surprised his readers by their sustained vigour. In the last volumes, *Jocoseria* (1883), *Ferishtah's Fancies* (1884), *Parleying with Certain People* (1887) and *Asolando* (1889), the old power is still apparent but the hand is beginning to fail. They contain discussions of metaphysical problems, such as the origin of evil, which are interesting as indications of his creed, but can scarcely be regarded as successful either poetically or philosophically.

Another group of poems showed Browning's interest in Greek literature. *Balaustion's Adventure* (1871) includes a "transcript from Euripides," a translation, that is, of part of the *Alcestis*. *Aristophanes' Apology* (1875) included another translation from the *Heracles*, and in 1877 he published a very literal translation of the *Agamemnon*. This, it seems, was meant to disprove the doctrine that Æschylus was a model of literary style. Browning shared his wife's admiration for Euripides, and takes a phrase from one of her poems as a motto for *Balaustion's Adventure*. In the *Aristophanes' Apology* this leads characteristically to a long exposition by Aristophanes of his unsatisfactory reasons for ridiculing Euripides. It recalls the apologies of "Blougram" and Louis Napoleon, and contains some interesting indications of his poetical theory. Browning was to many readers as much prophet as poet. His religious position is most explicitly, though still not very clearly, set forth in the *Christmas Eve and Easter Day* (1850). Like many eminent contemporaries, he combined a disbelief in orthodox dogma with a profound conviction of the importance to the religious instincts of the symbols incorporated in accepted creeds. *Saul* (1845), *A Death in the Desert* (1864), and similar poems, show his strong sympathy with the spirit of the old belief, though his argumentative works have a more or less sceptical turn. It was scarcely possible, if desirable, to be original on such topics. His admirers hold that he shows an affinity to German metaphysicians, though he had never read their works nor made any express study of metaphysical questions. His distinctive tendency is to be found rather in the doctrine of life and conduct which both suggests and is illustrated by his psychological analyses. A very characteristic thought emphatically set forth in the *Rabbi Ben Ezra* (1864) and the *Grammarian's Funeral* (1855) is that a man's value is to be measured, not by the work done, but by the character which has been moulded. He delights in exhibiting the high moral instinct which dares to override ordinary convictions, or which is content with discharge of obscure duties, or superior to vulgar ambition and capable of self-sacrifice, because founded upon pure love and sympathy for human suffering. Browning's limitations are characteristic of the poetry of strong ethical preoccupations. His strong idiosyncrasy, his sympathy with the heroic and hatred of the base,

was hardly to be combined with the Shakespearian capacity for sympathizing with the most varied types of character. Though he deals with a great variety of motive with singularly keen analysis, he takes almost exclusively the moral point of view. That point of view, however, has its importance, and his morality is often embodied in poetry of surpassing force. Browning's love of the grotesque, sometimes even of the horrible, creates many most graphic and indelible portraits. The absence of an exquisite sense for the right word is compensated by the singular power of striking the most brilliant flashes out of obviously wrong words, and forcing comic rhymes to express the deepest and most serious thoughts. Though he professed to care little for motive as apart from human interest, his incidental touches of description are unsurpassably vivid.

[v.04 p.0674] The appreciation of Browning's genius became general in his later years, and zeal was perhaps a little heightened by the complacency of disciples able to penetrate a supposed mist of obscurity. The Browning Society, founded in 1881 by Dr F.J. Furnivall and Miss E.H. Hickey, was a product of this appreciation, and helped to extend the study of the poems. Browning accepted the homage in a simple and friendly way, though he avoided any action which would make him responsible for the publications. He received various honours: LL.D. degree from Cambridge in 1879, the D.C.L. from Oxford in 1882, and LL.D. from Edinburgh in 1884. He became foreign correspondent to the Royal Academy in 1886. His son, who had settled at Venice, married in 1887, and Browning moved to De Vere Gardens. In the autumn of 1889 he went with his sister to visit his son, and stayed on the way at Asolo, which he had first seen in 1838, when it supplied the scenery of *Pippa Passes*. He was charmed with the place, and proposed to buy a piece of ground and to build upon it a house to be called "Pippa's Tower"—in memory of his early heroine. While his proposal was under consideration he went to his son at Venice. His health had been breaking for some time, and a cold, aggravated by weakness of the heart, brought on a fatal attack. He died on the 12th of December 1889. He was buried in Westminster Abbey on 31st December. It was suggested that his wife's body should be removed from Florence to be placed beside him; but their son rightly decided that her grave should not be disturbed.

Browning's personal characteristics are so strongly stamped upon all his works that it is difficult to assign his place in contemporary thought. He is unique and outside of all schools. His style is so peculiar that he is the easiest of all poets to parody and the most dangerous to imitate. In spite of his early Shelley worship he is in certain respects more closely related to Wordsworth. Both of them started by accepting the poet's mission as quasi-prophetical or ethical. In other respects they are diametrically contrasted. Wordsworth expounded his philosophy by writing a poetical autobiography. Browning adheres to the dramatic method of which Wordsworth was utterly incapable. He often protested against the supposition that he put himself into his books. Yet there is no writer whose books seem to readers to be clearer revelations of himself. Nothing, in fact, is more characteristic of a man than his judgments of other men, and Browning's are keen and unequivocal. The revolutionary impulse had died out, and Browning has little to say either of the political questions which had moved Shelley and Byron, or of the social problems which have lately become more prominent. He represents the thought of a quieter epoch. He was little interested, too, in the historical or "romantic" aspect of life. He takes his subjects from a great variety of scenes and places—from ancient Greece, medieval Italy and modern France and England; but the interest for him is not in the picturesque surroundings, but in the human being who is to be found in all periods. Like Balzac, whom he always greatly admired, he is interested in the eternal tragedy and comedy of life. His problem is always to show what are the really noble elements which are eternally valuable in spite of failure to achieve tangible results. He gives, so far, another version of Wordsworth's doctrine of the cultivation of the "moral being." The psychological acuteness and the subtle analysis of character are, indeed, peculiar to himself. Like Carlyle, with whom he had certain points of affinity, he protests, though rather by implication than direct denunciation, against the utilitarian or materialistic view of life, and finds the divine element in the instincts which guide and animate every noble character. When he is really inspired by sympathy for such emotions he can make his most grotesque fancies and his most far-fetched analyses subservient to poetry of the highest order. It can hardly be denied that his intellectual ingenuity often tempts him to deviate from his true function, and that his observations are not to be excused because they result from an excess, instead of a deficiency, of intellectual acuteness. But the variety of his interests—aesthetic, philosophical and ethical—is astonishing, and his successes are poems which stand out as unique and unsurpassable in the literature of his time.

The Life and Letters of Browning, by Mrs Sutherland Orr (1891), one of his most intimate friends in later years, and *The Love Letters of Robert Browning and Elizabeth Barrett Barrett, 1845-1846*, published by his son in 1899, are the main authorities. A collection of Browning's poems in 2 vols. appeared in 1849, another in 3 vols. in 1863, another in 6 vols. in 1868, and a revised edition in 16 vols. in 1888-1889; in 1896 Mr Augustine Birrell and Mr F.G. Kenyon edited a complete edition in 2 vols.; another two-volume edition was issued by Messrs Smith, Elder in 1900. Among commentaries on Browning's works, Mrs Sutherland Orr's *Handbook to the Works of Browning* was approved by the poet himself. See also the Browning Society's *Papers*; and Mr T.J. Wise's *Materials for a Bibliography of the Writings of Robert Browning*, included in the *Literary Anecdotes of the Nineteenth Century* (1895), by W. Robertson Nicoll and T.J. Wise; Mr. Edmund Gosse's *Robert Browning: Personalia* (1890), from notes supplied by Browning himself. Among biographical and critical authorities may be mentioned: J.T. Nettleship, *Essays* (1868); Arthur Symons, *An Introduction to the Study of Browning* (1886); Stopford Brooke, *The Poetry of Robert Browning* (1902); G.K. Chesterton, *Browning* (1908) in the "English Men of Letters" series.

(L. S.)

BROWN-SÉQUARD, CHARLES EDWARD (1817-1894), British physiologist and neurologist, was born at Port Louis, Mauritius, on the 8th of April 1817. His father was an American and his mother a Frenchwoman, but he himself always desired to be looked upon as a British subject, though in the restlessness of his life and the enthusiasm of his disposition, characteristics of his mother's nation were plainly visible. After graduating in medicine at Paris in 1846 he returned to Mauritius with the intention of practising there, but in 1852 he went to America. Subsequently he returned to Paris, and in 1859 he migrated to London, becoming physician to the national hospital for the paralysed and epileptic. There he stayed for about five years, expounding his views on the pathology of the nervous system in numerous lectures which attracted considerable attention. In 1864 he again crossed the Atlantic, and was appointed professor of physiology and neuro-pathology at Harvard. This position he relinquished in 1867, and in 1869 became professor at the École de Médecine in Paris, but in 1873 he again returned to America and began to practise in New York. Finally, he went back to Paris to succeed Claude Bernard in 1878 as professor of experimental medicine in the Collège de France, and he remained there till his death, which occurred on the 2nd of April 1894 at Sceaux. Brown-Séquard was a keen observer and experimentalist. He contributed largely to our knowledge of the blood and animal heat, as well as many facts of the highest importance on the nervous system. He was the first scientist to work out the physiology of the spinal cord, demonstrating that the decussation of the sensory fibres is in the cord itself. He also did valuable work on the internal secretion of organs, the results of which have been applied with the most satisfactory results in the treatment of myxoedema. Unfortunately in his extreme old age, he advocated the hypodermic injection of a fluid prepared from the testicles of sheep, as a means of prolonging human life. It was known, among scientists, derisively, as the Brown-Séquard Elixir. His researches, published in about 500 essays and papers, especially in the *Archives de Physiologie*, which he helped to found in 1868, cover a very wide range of physiological and pathological subjects.

BROWNSON, ORESTES AUGUSTUS (1803-1876), American theological, philosophical and sociological writer, was born in Stockbridge, Vermont, on the 16th of September 1803. Having spent some time in active religious, reformatory and political (Democratic) work in the interior of New York state, and at Walpole, New Hampshire, and Canton, Massachusetts, Brownson removed in 1839 to Chelsea, Mass. He at once began to take an independent part in the movements then agitating New England, which between 1830 and 1850 was stirred by discussions pertaining to Unitarianism, transcendentalism, spiritualism, abolitionism and various schemes for communistic living. He was one of the founders, in New York, of the short-lived Workingman's party in 1828, and established the *Boston Quarterly Review*, mainly written by himself, in 1838. This periodical was merged in the *U.S. Democratic Review* of New York in 1842.
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In religion he first became a Presbyterian (1822); was a Universalist minister from 1826 to 1831, editing for some time the chief journal of this church, the *Gospel Advocate*; was an independent preacher at Ithaca, N.Y., in 1831; became a Unitarian minister in 1832, and in 1836 organized in Boston the Society for Christian Union and Progress, of which he was the pastor for seven years. In 1844 he became a Roman Catholic and so remained, though the question of the orthodoxy of his writings was at one time submitted by the pope to Cardinal Franzelin, who recommended Brownson, to little purpose, to express his views with more moderation. In his philosophy Brownson was a more or less independent follower of Comte for a short time, and of Victor Cousin, who, in his *Fragmens philosophiques*, praised him; he may be said to have taught a modified intuitionalism. In his schemes for social reform he was at first a student of Robert Owen, until his later views led him to accept Roman Catholicism. His first quarterly was followed, in 1844, by *Brownson's Quarterly Review* (first published in Boston and after 1855 in New York), in which he expressed his opinions on many themes until its suspension in 1864, and after its revival for a brief period in 1873-1875. Of his numerous publications in book form, the chief during his lifetime were *Charles Elwood, or the Infidel Converted* (1840, autobiographical), in which he strongly favoured the Roman Catholic Church; and *The American Republic: its Constitution, Tendencies and Destiny* (1865), in which he based government on ethics, declaring the national existence to be a moral and even a theocratic entity, not depending for validity upon the sovereignty of the people. Brownson died in Detroit, Michigan, on the 17th of April 1876.

After his death, his son, Henry F. Brownson, collected and published his various political, religious, philosophical, scientific and literary writings, in twenty octavo volumes (Detroit, 1883-1887), of which a condensed summary appeared in a single volume, also prepared by his son, entitled *Literary and Political Views* (New York, 1893). The son also published a biography in three volumes (Detroit, 1898-1900).

His daughter, Sarah M. Brownson (1839-1876), who married in 1873 William J. Tenney, was the author of several novels, and wrote a *Life of Demetrius Augustine Gallitzin, Prince and Priest* (1873).

BROWNSVILLE, a city and the county-seat of Cameron county, Texas, U.S.A., situated near the S. extremity of the state, on the Rio Grande river about 22 m. above its mouth, and opposite Matamoras, Mexico. Pop. (1890) 6134; (1900) 6305, including 2462 foreign-born and 18 negroes; (1910) 10,517. It is served by the St Louis, Brownsville & Mexico, and the Rio Grande railways, being connected by the former with Houston and Galveston and by the latter with Point Isabel on the Gulf coast. Its chief importance lies in its being the commercial and distributing centre for a rich and extensive agricultural region in southern Texas and northern Mexico, and an important market for rice, sugar-cane, fruit, vegetables and live-stock. It has a United States custom house,

the Cameron county court house, a Roman Catholic cathedral, St Joseph's College (Roman Catholic), and the Incarnate Word Academy (Roman Catholic). Before the Mexican War there was a small Mexican settlement on the site of Brownsville. In March 1846 General Zachary Taylor erected fortifications here, and upon his withdrawal to Point Isabel, left a small garrison in command of Major Jacob Brown. The fort was assaulted by General Arista and shelled by batteries from the Mexican shore, and at last on the 10th of May was relieved by General Taylor, who in advancing to its aid had won the battles of Palo Alto (8th of May) and Resaca de la Palma (9th of May). The fort, originally named Fort Taylor, was renamed Fort Brown, by order of General Taylor, in memory of Major Brown, who was mortally wounded during the bombardment. In 1859 Brownsville was captured by a band of Mexican raiders under Juan Nepomuceno Cortina. During the Civil War, until its temporary occupation by Federal forces in 1863, and subsequent effective blockade, it was an active centre of operations of Confederate blockade runners. At Palmetto Ranch, near the battlefield of Palo Alto, took place (13th of May 1865), more than a month after General Lee's surrender, the last engagement between Federal and Confederate troops in the Civil War. In Brownsville, on the night of the 13th of August 1906, certain persons unknown fired into houses and at citizens on the streets, killing one man and injuring two. Suspicion pointed to negro soldiers of Companies B, C and D of the 25th Infantry, stationed at Fort Brown, and as it appeared that the culprits were being shielded by their comrades by a "conspiracy of silence," President Roosevelt dismissed the 170 men of the three companies "without honor." Both in Congress and in the press a bitter attack was made on the president for his action. In 1907 the military reservation of Fort Brown was transferred to the Department of Agriculture. In March 1909 Congress provided for a commission of army officers to report as to the eligibility of members of the negro regiments for re-enlistment.

BRUAY, a town of northern France, in the department of Pas-de-Calais, on the Lawe, 19 m. N.N.W. of Arras by road. Pop. (1906) 16,169. The town is situated in a rich coal-mining district. Brewing is also a leading industry.

BRUCE, the name of an old Scottish family of Norman descent, taken from Bruis between Cherbourg and Vallonges. Variations of the name are Braose, Breaux and Brus. The first Robert de Brus, a follower of William the Conqueror, was rewarded by the gift of many manors, chiefly in Yorkshire, of which Skelton was the principal. His son, the second Robert, received from David I., his comrade at the court of Henry I., a grant of the lordship of Annandale. The fourth Robert married Isabel, natural daughter of William the Lion, and their son, the fifth Robert, married Isabel, second daughter of David, earl of Huntingdon, niece of the same Scottish king. The most famous member of the family is the eighth Robert, "the Bruce," who became king of Scotland in 1306. (See ROBERT THE BRUCE.)

BRUCE, ALEXANDER BALMAIN (1831-1899), Scottish divine, was born at Aberargie near Perth on the 31st of January 1831. His father suffered for his adherence to the Free Church at the Disruption in 1843, and removed to Edinburgh, where the son was educated, showing exceptional ability from the first. His early religious doubts, awakened especially by Strauss's *Life of Jesus*, made him throughout life sympathetic with those who underwent a similar stress. After serving as assistant first at Ancrum, then at Lochwinnoch, he was called to Cardross in Dumbartonshire in 1859, and to Broughty Ferry in 1868. There he published his first considerable exegetical work, the *Training of the Twelve*. In 1874 he delivered his Cunningham Lectures, afterwards published as *The Humiliation of Christ*, and in the following year was appointed to the chair of Apologetics and New Testament exegesis at the Free Church College, Glasgow. This post he held for twenty-four years. He was one of the first British New Testament students whose work was received with consideration by German scholars of repute. The character and work of Christ were, he held, the ultimate proof and the best defence of Christianity; and his tendency was to concentrate attention somewhat narrowly on the historic Jesus. In *The Kingdom of God* (1889), which first encountered serious hostile criticism in his own communion, he accounted for some of the differences between the first and third evangelists on the principle of accommodation—maintaining that Luke had altered both the text and the spirit of his sources to suit the needs of those for whom he wrote. It was held that these admissions were not consistent with the views of inspiration professed by the Free Church. When the case was tried, the assembly held that the charge of heresy was based on a misunderstanding, but that "by want of due care in his mode of statement he had given some ground for the painful impressions which had existed."

Bruce rendered signal service to his own communion in connexion with its service of praise. He was convener of the committee which issued the Free Church hymn book, and he threw into this work the same energy and catholicity of mind which marked the rest of his activities. He died on the 7th of August 1899, and was buried at Broughty Ferry. His chief works, beside the above, are: *The Chief End of Revelation* (Lond., 1881); *The Parabolic Teaching of Christ* (Lond., 1882); [v.04 p.0676] *F.C. Baur and his Theory of the Origin of Christianity and of the New Testament Writings* in "Present Day Tracts" (Lond., 1885); *Apologetics, or Christianity Defensively Stated* (Edin., 1892); *St Paul's Conception of Christianity* (Lond., 1894); *Expos. Gk. Test.* (the Synoptic Gospels, Lond., 1897). *With Open Face* (Lond., 1896); *The Epistle to the Hebrews* (Edin., 1899); *The Providential Order of the World*, and the *Moral Order of the World in Ancient and Modern Thought* (Gifford Lectures, 1896-1897; Lond., 1897, 1899).

(D. MN.)

BRUCE, JAMES (1730-1794), Scottish explorer in Africa, was born at Kinnaird House, Stirlingshire, on the 14th of December 1730. He was educated at Harrow and Edinburgh

University, and began to study for the bar; but his marriage to the daughter of a wine merchant resulted in his entering that business. His wife died in October 1754, within nine months of marriage, and Bruce thereafter travelled in Portugal and Spain. The examination of oriental MSS. at the Escurial led him to the study of Arabic and Geez and determined his future career. In 1758 his father's death placed him in possession of the estate of Kinnaird. On the outbreak of war with Spain in 1762 he submitted to the British government a plan for an attack on Ferrol. His suggestion was not adopted, but it led to his selection by the 2nd earl of Halifax for the post of British consul at Algiers, with a commission to study the ancient ruins in that country, in which interest had been excited by the descriptions sent home by Thomas Shaw[1] (1694-1751), consular chaplain at Algiers, 1719-1731. Having spent six months in Italy studying antiquities, Bruce reached Algiers in March 1763. The whole of his time was taken up with his consular duties at the piratical court of the dey, and he was kept without the assistance promised. But in August 1765, a successor in the consulate having arrived, Bruce began his exploration of the Roman ruins in Barbary. Having examined many ruins in eastern Algeria, he travelled by land from Tunis to Tripoli, and at Ptolemeta took passage for Candia; but was shipwrecked near Bengazi and had to swim ashore. He eventually reached Crete, and sailing thence to Sidon, travelled through Syria, visiting Palmyra and Baalbek. Throughout his journeyings in Barbary and the Levant, Bruce made careful drawings of the many ruins he examined. He also acquired a sufficient knowledge of medicine to enable him to pass in the East as a physician.

In June 1768 he arrived at Alexandria, having resolved to endeavour to discover the source of the Nile, which he believed to rise in Abyssinia. At Cairo he gained the support of the Mameluke ruler, Ali Bey; after visiting Thebes he crossed the desert to Kosseir, where he embarked in the dress of a Turkish sailor. He reached Jidda in May 1769, and after some stay in Arabia he recrossed the Red Sea and landed at Massawa, then in possession of the Turks, on the 19th of September. He reached Gondar, then the capital of Abyssinia, on the 14th of February 1770, where he was well received by the negus Tekla Haimanot II., by Ras Michael, the real ruler of the country, by the ras's wife, Ozoro Esther, and by the Abyssinians generally. His fine presence (he was 6 ft. 4 in. high), his knowledge of Geez, his excellence in sports, his courage, resource and self-esteem, all told in his favour among a people who were in general distrustful of all foreigners. He stayed in Abyssinia for two years, gaining knowledge which enabled him subsequently to present a perfect picture of Abyssinian life. On the 14th of November 1770 he reached the long-sought source of the Blue Nile. Though admitting that the White Nile was the larger stream, Bruce claimed that the Blue Nile was the Nile of the ancients and that he was thus the discoverer of its source. The claim, however, was not well founded (see NILE: *Story of Exploration*). Setting out from Gondar in December 1771, Bruce made his way, in spite of enormous difficulties, by Sennar to Nubia, being the first to trace the Blue Nile to its confluence with the White Nile. On the 29th of November 1772 he reached Assuan, presently returning to the desert to recover his journals and his baggage, which had been abandoned in consequence of the death of all his camels. Cairo was reached in January 1773, and in March Bruce arrived in France, where he was welcomed by Buffon and other *savants*. He came to London in 1774, but, offended by the incredulity with which his story was received, retired to his home at Kinnaird. It was not until 1790 that, urged by his friend Daines Barrington, he published his *Travels to Discover the Source of the Nile in the Years 1768-73*, in five octavo volumes, lavishly illustrated. The work was very popular, but was assailed by other travellers as being unworthy of credence. The manner in which the book was written—twelve years after Bruce's return from Africa and without reference to his journals—gave some handle to his critics, but the substantial accuracy of every statement concerning his Abyssinian travels has since been amply demonstrated. He died on the 27th of April 1794.

Bruce wrote an autobiography, part of which is printed in editions of his *Travels*, published in 1805 and 1813, accompanied by a biographical notice by the editor, Alexander Murray. The best edition of the *Travels* is the third (Edinburgh, 1813, 8 vols.). Of the abridgments the best is that of Major (afterwards Sir Francis) Head, the author of a well-informed *Life of Bruce* (London, 1830). The best account of Bruce's travels in Barbary is contained in Sir R. Lambert Playfair's *Travels in the Footsteps of Bruce* (London, 1877), in which a selection of his drawings was published for the first time. Several of Bruce's drawings were presented to George III. and are in the royal collection at Windsor.

[1] Dr Shaw's *Travels relating to Several Parts of Barbary ...* was first printed at Oxford (1738).

BRUCE, MICHAEL (1746-1767), Scottish poet, was born at Kinnesswood in the parish of Portmoak, Kinross-shire, on the 27th of March 1746. His father, Alexander Bruce, was a weaver, and a man of exceptional ability. Michael was taught to read before he was four years old, and one of his favourite books was a copy of Sir David Lyndsay's works. He was early sent to school, but his attendance was often interrupted. He had frequently to herd cattle on the Lomond Hills in summer, and this early companionship with nature greatly influenced his poetic genius. He was a delicate child, and grew up contemplative, devotional and humorous, the pet of his family and his friends. His parents gave him an education superior to their position; he studied Latin and Greek, and at fifteen, when his school education was completed, a small legacy left to his mother, with some additions from kindly neighbours, provided means to send Michael to Edinburgh University, which he attended during the four winter sessions 1762-1765. In 1765 he taught during the summer months at Gairney Bridge, receiving about £11 a year in fees and free board in one or other of the homes of his pupils. He became a divinity student at Kinross of a Scottish sect known as the Burghers, and in the first summer (1766) of his divinity course accepted the charge of a

new school at Forest Hill, near Clackmannan, where he led a melancholy life. Poverty, disease and want of companions depressed his spirits, but there he wrote "Lochleven," a poem inspired by the memories of his childhood. He had before been threatened with consumption, and now became seriously ill. During the winter he returned on foot to his father's house, where he wrote his last and finest poem, "Elegy written in Spring," and died on the 5th of July 1767.

As a poet his reputation has been spread, first, through sympathy for his early death; and secondly, through the alleged theft by John Logan (*q.v.*) of several of his poems. Logan, who had been a fellow-student of Bruce, obtained Bruce's MSS. from his father, shortly after the poet's death. For the letters, poems, &c., that he allowed to pass out of his hands, Alexander Bruce took no receipt, nor did he keep any list of the titles. Logan edited in 1770 *Poems on Several Occasions, by Michael Bruce*, in which the "Ode to the Cuckoo" appeared. In the preface he stated that "to make up a miscellany, some poems written by different authors are inserted." In a collection of his own poems in 1781, Logan printed the "Ode to the Cuckoo" as his own; of this the friends of Bruce were aware, but did not challenge its appropriation publicly. In a MS. *Pious Memorials of Portmoak*, drawn up by Bruce's friend, David Pearson, Bruce's authorship of the "Ode to the Cuckoo" is emphatically asserted. This book was in the possession of the Birrell family, and John Birrell, another friend of the poet, adds a testimony to the same effect. Pearson and Birrell also wrote to Dr Robert Anderson while he was publishing his *British Poets*, pointing
[v.04 p.0677] out Bruce's claims. Their communications were used by Anderson in the "Life" prefixed to Logan's works in the *British Poets* (vol. ii. p. 1029). The volume of 1770 had struck Bruce's friends as being incomplete, and his father missed his son's "Gospel Sonnets," which are supposed by the partisans of Bruce against Logan to have been the hymns printed in the 1781 edition of Logan's poems. Logan tried to prevent by law the reprinting of Bruce's poems (see James Mackenzie's *Life of Michael Bruce*, 1905, chap. xii.), but the book was printed in 1782, 1784, 1796 and 1807. Dr William M^{c}Kelvie revived Bruce's claims in *Lochleven and Other Poems, by Michael Bruce, with a Life of the Author from Original Sources* (1837). Logan's authorship rests on the publication of the poems under his own name, and his reputation as author during his lifetime. His failure to produce the "poem book" of Bruce entrusted to him, and the fact that no copy of the "Ode to the Cuckoo" in his handwriting was known to exist during Bruce's lifetime, make it difficult to relieve him of the charge of plagiarism. Prof. John Veitch, in *The Feeling for Nature in Scottish Poetry* (1887, vol. ii. pp. 89-91), points out that the stanza known to be Logan's addition to this ode is out of keeping with the rest of the poem, and is in the manner of Logan's established compositions, in which there is nothing to suggest the direct simplicity of the little poem on the cuckoo.

Bibliography.—Additions to *Poems on Several Occasions* (1770) were made by Dr M^{c}Kelvie in his 1837 edition. He gives (p. 97) a list of the poems not printed in Logan's selection, and of those that are lost. See the "Lives" of Bruce and of Logan in Anderson's *British Poets* (1795); an admirable paper on Bruce in *The Mirror* (No. 36, 1779), said to be by William Craig, one of the lords of session; *The Poetical Works of Michael Bruce, with Life and Writings* (1895), by William Stephen, who, like Dr A.B. Grosart in his edition (1865) of *The Works of Michael Bruce*, adopts M^{c}Kelvie's view. A restatement of the case for Bruce's authorship, coupled with a rather violent attack on Logan, is to be found in the *Life of Michael Bruce, Poet of Loch Leven, with Vindication of his Authorship of the "Ode to the Cuckoo" and other Poems, also Copies of Letters written by John Logan now first published* (1905), by James Mackenzie.

BRUCH, MAX (1838-), German musical composer, son of a city official and grandson of the famous Evangelical cleric, Dr Christian Bruch, was born at Cologne on the 6th of January 1838. From his mother (*née* Almenräder), a well-known musician of her time, he learnt the elements of music, but under Breidenstein he made his first serious effort at composition at the age of fourteen, by the production of a symphony. In 1853 Bruch gained the Mozart Stipendium of 400 gulden per annum for four years at Frankfort-on-Main, and for the following few years studied under Hiller, Reinecke and Breunung. Subsequently he lived from 1858 to 1861 as pianoforte teacher at Cologne, in which city his first opera (in one act), *Scherz, List und Roche*, was produced in 1858. On his father's death in 1861, Bruch began a tour of study at Berlin, Leipzig, Vienna, Munich, Dresden and Mannheim, where his opera *Lorelei* was brought out in 1863. At Mannheim he lived till 1864, and there he wrote some of his best-known works, including the beautiful *Frithjof*. After a further period of travel he became musical-director at Coblenz (1865-1867), Hofkapellmeister at Sondershausen (1867-1870), and lived in Berlin (1871-1873), where he wrote his *Odysseus*, his first violin concerto and two symphonies being composed at Sondershausen. After five years at Bonn (1873-1878), during which he made two visits to England, Bruch, in 1878, became conductor of the Stern Choral Union; and in 1880 of the Liverpool Philharmonic. In 1892 he was appointed director of the Berlin Hochschule. In 1893 he was given the honorary degree of Mus. Doc. by Cambridge University. Max Bruch has written in almost every conceivable musical form, invariably with straight-forward honest simplicity of design. He has a gift of refined melody beyond the common, his melodies being broad and suave and often exceptionally beautiful.

BRUCHSAL, a town of Germany, in the grand-duchy of Baden, prettily situated on the Saalbach, 14 m. N. from Karlsruhe, and an important junction on the main railway from Mannheim to Constance. Pop. (1900), including a small garrison, 13,555. There are an Evangelical and four Roman Catholic churches, among the latter that of St Peter, the burial-place of the bishops of Spires, whose princely residence (now used as a prison) lies in the vicinity. Bruchsal has a fine palace, with beautiful grounds attached, a town hall, a classical, a modern and a commercial

school, and manufactures of machinery, paper, tobacco, soap and beer, and does a considerable trade in wine. Bruchsal (mentioned in 937 as *Bruxolegum*) was originally a royal villa (*Königshof*) belonging to the emperors and German kings. Given in 1002 to Otto, duke of Franconia, it was inherited by the cadet line of Spires, the head of which, the emperor Henry III., gave it to the see of Spires in 1095. From 1105 onward it became the summer residence of the bishops, who in 1190 bought the *Vogtei* (advocateship) from the counts of Calw, and the place rapidly developed into a town. It remained in the possession of the bishops till 1802, when by the treaty of Lunéville it was ceded, with other lands of the bishopric on the right bank of the Rhine, to Baden. The Peasants' War during the Reformation period first broke out in Bruchsal. In 1609 it was captured by the elector palatine, and in 1676 and 1698 it was burnt down by the French. In 1849 it was the scene of an engagement between the Prussians and the Baden revolutionists.

See *Rössler, Geschichte der Stadt Bruchsal* (2nd ed., Bruchsal, 1894).

BRUCINE, $C_{23}H_{26}N_2O_4$, an alkaloid isolated in 1819 by J. Pelletier and J.B. Caventou from "false Angustura bark." It crystallizes in prisms with four molecules of water; when anhydrous it melts at 178°. It is very similar to strychnine (*q.v.*), both chemically and physiologically.

BRUCITE, a mineral consisting of magnesium hydroxide, $Mg(OH)_2$, and crystallizing in the rhombohedral system. It was first described in 1814 as "native magnesia" from New Jersey by A. Bruce, an American mineralogist, after whom the species was named by F.S. Beudant in 1824; the same name had, however, been earlier applied to the mineral now known as chondrodite. Brucite is usually found as platy masses, sometimes of considerable size, which have a perfect cleavage parallel to the surface of the plates. It is white, sometimes with a tinge of grey, blue or green, varies from transparent to translucent, and on the cleavage surfaces has a pronounced pearly lustre. In general appearance and softness (H = 2½) it is thus not unlike gypsum or talc, but it may be readily distinguished from these by its optical character, being uniaxial with positive birefringence, whilst gypsum is biaxial and talc has negative birefringence. The specific gravity is 2.38-2.40. In the variety known as nemalite the structure is finely fibrous and the lustre silky: this variety contains 5 to 8% of ferrous oxide replacing magnesia, and has consequently a rather higher specific gravity, viz. 2.45. Another variety, manganbrucite, has the magnesia partly replaced by manganous oxide (14%), and thus forms a passage to the isomorphous mineral pyrochroite, $Mn(OH)_2$.

Brucite is generally associated with other magnesian minerals, such as magnesite and dolomite, and is commonly found in serpentine, or sometimes as small scales in phyllites and crystalline schists; it has also been observed in metamorphosed magnesian limestone, such as the rock known as predazzite from Predazzo in Tirol. The best crystals and foliated masses are from Texas in Pennsylvania, U.S.A., and from Swinaness in Unst, one of the Shetland Isles. Nemalite is from Hoboken, New Jersey, and from Afghanistan. At all these localities the mineral forms veins in serpentine.

(L. J. S.)

BRÜCKENAU, a town and fashionable watering-place of Germany, in the kingdom of Bavaria, on the Sinn, 16 m. N.W. of Kissingen. The mineral springs, five in number, situated in the pleasant valley of the Sinn, 2 m. from the town, were a favourite resort of Louis I. of Bavaria. Pop. 1700.

BRUCKER, JOHANN JAKOB (1696-1770), German historian of philosophy, was born at Augsburg. He was destined for the church, and graduated at the university of Jena in 1718. He returned to Augsburg in 1720, but became parish minister of Kaufbeuren in 1723. In 1731 he was elected a member of the Academy of Sciences at Berlin, and was invited to Augsburg as pastor and senior minister of the church of St Ulrich. His chief work, *Historia Critica Philosophiae*, [v.04 p.0678] appeared at Leipzig (5 vols., 1742-1744). Its success was such that a new edition was published in six volumes (1766-1767; English translation by W. Enfield, 1791). It is by this work alone that Brucker is now known. Its merit consists entirely in the ample collection of materials. He also wrote *Tentamen Introductionis in Historiam Doctrinae de Ideis*, afterwards completed and republished under the title of *Historia Philosophicae Doctrinae de Ideis* (Augsburg, 1723); *Otium Vindelicum* (1731); *Kurze Fragen aus der philosophischen Historie* (7 vols., Ulm, 1731-1736), a history of philosophy in question and answer, containing many details, especially in the department of literary history, which he omitted in his chief work; *Pinacotheca Scriptorum nostra aetate literis illustrium, &c.* (Augsburg, 1741-1755); *Ehrentempel der deutschen Gelehrsamkeit* (Augsburg, 1747-1749); *Institutiones Historiae Philosophicae* (Leipzig, 1747 and 1756; 3rd ed. with a continuation by F.G.B. Born (1743-1807) of Leipzig, in 1790); *Miscellanea Historiae Philosophicae Literariae Criticae olim sparsim edita* (Augsburg, 1748); *Erste Anfangsgrunde der philosophischen Geschichte* (Ulm, 1751). He superintended an edition of Luther's translation of the Old and New Testament, with a commentary extracted from the writings of the English theologians (Leipzig, 1758-1770, completed by W.A. Teller). He died at Augsburg in 1770.

BRÜCKMANN, FRANZ ERNST (1697-1753), German mineralogist, was born on the 27th of September 1697 at Marienthal near Helmstädt. Having qualified as a medical man in 1721, he practised at Brunswick and afterwards at Wolfenbüttel. His leisure time was given up to natural history, and especially to mineralogy and botany. He appears to have been the first to introduce the term *oolithus* to rocks that resemble in structure the roe of a fish; whence the terms oolite and oolitic. He died at Wolfenbüttel on the 21st of March 1753. He published *Magnalia Dei in locis subterraneis* (Brunswick, 1727), *Historia naturalis curiosa lapidis* (1727), and *Thesaurus subterraneus Ducatus Brunsvigii* (1728).

BRUCKNER, ANTON (1824-1896), Austrian musical composer, was born on the 4th of September 1824 at Ansfelden in upper Austria. He successfully competed for the organistship for Linz Cathedral in 1855. In 1867 he succeeded his former master of counterpoint, Sechter, as organist of the *Hofkapelle* in Vienna, and also became professor in the conservatorium. In 1875 he was appointed to a lectureship in the university. His most striking talent was shown in his extemporizations on the organ. His success in an organ competition at Nancy in 1869 led to his playing in Paris and London (six recitals at the Albert Hall, 1871). His permanent reputation, however, rests on his compositions, especially his nine symphonies. In these gigantic efforts the influence of Wagner is paramount in almost every feature of harmony and orchestration; and if sustained seriousness of purpose and style were all that was necessary to give coherence to works in which these influences are stultified by the rhythmic uniformities of an experienced *improvisatore* and the impressions of classical form as taught in schools, then Bruckner would certainly have been what the extreme Wagnerian party called him, the symphonic successor of Beethoven, or the Wagner of the symphony. But their lack of organization and proportion, to say nothing of humour, will always make their revival a somewhat severe task. No composer has ever been more consistent to lofty ideals, though few who have ever had an ideal have shown less adroitness in their methods of embodying it. The most poetic and admired feature of his style is a slow growth to a gigantic climax, slow enough and gigantic enough for any situation in Wagner's *Nibelungen* tetralogy. The symphonies in which these climaxes occur are in obviously unskilful classical form, with only an outward appearance of freedom; and the Great Pyramid would hardly be more out of place in an Oxford quadrangle than Bruckner's climaxes in his four-movement symphonies with their "second subjects" and recapitulations. Nor is it likely that Bruckner would have been much more successful in handling these gigantic things in their legitimate Wagnerian dramatic environment, for even in his last three symphonies he hardly ever frees himself from the trammels of square rhythm; and, as he accepts the classical sonata-forms without inquiry into their meaning or relevance, so he accepts the Wagnerian stage orchestra in its minutest details, without inquiry as to its relevance for the purposes and acoustics of the concert-room, and with the same lack of sense of relief that ruins the balance of his rhythmic periods. So unsophisticated a temperament may be not unpoetical, but it is eminently undramatic, as well as unsymphonic. Of Bruckner's choral works, which include three masses and several psalms and motets, the most famous is the *Te Deum* (1885?),[1] which shows his characteristic power in massive effect. Bruckner wished this to be appended to the three complete movements of his 9th symphony, which his last illness (ending in his death at Vienna on the 11th of October 1896) prevented him from finishing. This 9th symphony is designed, with characteristic tactlessness and simplicity, to follow Beethoven's 9th symphony in every possible point which could challenge comparison; in key (D minor), opening (mysterious tremolo leading to tremendous unison *tutti*), contrasts (return in first movement) and choral finale. The three complete movements were first performed in Vienna in 1903, and have done more for Bruckner's fame than anything since the production in 1884 of his 7th symphony (of which the slow movement is an elegy on the death of Wagner). It is probable that the impression produced by this 9th symphony is the deeper as owing little or nothing to the musical politics which had gone far to prevent the 7th symphony from standing on its own unmistakable merits. It does not, however, seem likely that Bruckner's work will have much influence on musical progress; for the modern characteristics in which its strength lies are obviously better realized in other forms which have often been handled successfully by composers greatly Bruckner's inferiors both in invention and sincerity.

(D. F. T.)

[1] This date is given in Grove (new ed.), but the style of the work is far earlier than that of the 7th symphony (1884) which quotes it in the slow movement.

BRUGES (Flemish *Brugge*, a name signifying the bridge or place of bridges), the capital of West Flanders, Belgium. Pop. (1904) 53,728. The city contains some of the finest monuments of the great period of the Flemish communes, while its medieval appearance is better preserved, as a whole, than in the case of any other Belgian city. The cathedral of St Sauveur and the church of Notre-Dame, both specimens of early Pointed Gothic, date from the 13th and 14th centuries. Both are full of interest, but the cathedral was much injured by fire in 1839. The interior, however, is finely proportioned and exhibits beautiful modern polychrome decorations, numerous pictures and interesting monumental brasses. The church of Notre-Dame contains a fine De Crayer (The Adoration of the Magi), Michelangelo's marble group of the Virgin and Child, and the fine monuments with gilded copper effigies of Charles the Bold and his daughter, Mary of Burgundy. The hospital of St Jean, where the sick have been cared for since the 12th century, contains the chief works of Memling, including the famous reliquary of St Ursula. The market-hall was built in 1561-1566 on the site of an older building, some portions of which were utilized in its successor. The belfry which rises in the centre of the façade dates from the end of the 13th century; it has long been famous for its chime of bells, but the civic fathers have caused modern airs to be substituted for the old hymn. The hôtel de ville, the Chapelle du Saint-Sang and the church of St Jacques are all of interest. The first is Gothic and was begun about 1376. The second is a chapel of two storeys, the lower dating from 1150, while the upper was rebuilt in the 15th century, and there is a rich Flamboyant entrance with a stairway (1533). St Jacques' church is a foundation of the 13th century, but has extensive additions of the close of the 15th and 17th centuries. The Palais de Justice, of the 18th century, on the site of the House of the Franc—the outside burghers of the Franc district admitted to the full privileges of citizenship—contains a fine carved chimney-piece (1530). The house is supposed to have formed part of the residence of the counts of Flanders. There are numerous other buildings of minor antiquarian interest; the fine museum

[v.04 p.0679]

contains a representative gallery of early Flemish paintings; and of the old fortifications three gates remain. The manufacture of lace now gives employment to at least 6000 persons in the town, and horticulture is carried on extensively in the suburbs. Commercial activity has been assisted by the new ship-canal to Zeebrugge, and by direct steamship service from Hull to Bruges. The steady growth of the population is evidence of increased prosperity. In 1880 the population was only 44,500, but it had risen in 1900 to 51,657 and in 1904 it was 53,728.

Bruges is said to have been a city in the 7th century, and the name Flanders was originally applied to it and not to the district. Baldwin II., count of Flanders, who married Elstrud, daughter of Alfred the Great, first fortified it, and made it his chief residence. Before the year 1180 Bruges was the recognized capital of Flanders, and the formality of proclaiming the new counts was always performed on the *marché du vendredi*, where the railway station is to-day. After 1180 the premier position was assumed by Ghent, but until access by sea was stopped by the silting up of the Zwyn, which was complete by the year 1490, Bruges was the equal in wealth and power of its neighbour. Proof of this is supplied by the marriage festivities in 1430, when Philip the Good, duke of Burgundy, wedded Isabel of Portugal, and founded the famous order of the Golden Fleece out of compliment to the staple industry of Bruges. Bruges was at the height of its prosperity in the 14th century, when it was the northern counterpart of Venice and its Bourse regulated the rate of exchange in Europe.

(D. C. B.)

BRUGSCH, HEINRICH KARL (1827-1894), German Egyptologist, was the son of a Prussian cavalry officer, and was born in the barracks at Berlin, on the 18th of February 1827. He early manifested a great inclination to Egyptian studies, in which, though encouraged by Humboldt, he was almost entirely self-taught. After completing his university course and visiting foreign museums he was sent to Egypt by the Prussian government in 1853, and contracted an intimate friendship with Mariette. On his return he received an appointment in the Berlin museum. In 1860 he was sent to Persia on a special mission under Baron Minutoli, travelled over the country, and after Minutoli's death discharged the functions of ambassador. In 1864 he was consul at Cairo, in 1868 professor at Gõttingen, and in 1870 director of the school of Egyptology, founded at Cairo by the khedive. From this post he was unceremoniously dismissed in 1879 by the European controllers of the public revenues, determined to economize at all hazards; and French influence prevented his succeeding his friend Mariette at the Bulaq Museum in 1883. He afterwards resided principally in Germany until his death on the 9th of September 1894, but frequently visited Egypt, took part in another official mission to Persia, and organized an Egyptian exhibit at the Philadelphia Exposition in 1876. He had been made a pasha by the khedive in 1881. He published his autobiography in 1894, concluding with a warm panegyric upon British rule in Egypt. Brugsch's services to Egyptology are most important, particularly in the decipherment of demotic and the making of a vast hieroglyphic-demotic dictionary (1867-1882).

See H. Brugsch, *Mein Leben und mein Wandern*, also art. EGYPT, section *Language and Writing*.

BRÜHL, HEINRICH, COUNT VON (1700-1763), German statesman at the court of Saxony, was born on the 13th of August 1700. He was the son of Johann Moritz von Brühl, a noble who held the office of *Oberhofmarschall* at the small court of Sachsen-Weissenfels. The father was ruined and compelled to part with his family estate, which passed into the hands of the prince. The son was first placed as page with the dowager duchess of Weissenfels, and was then received at her recommendation into the court of the elector of Saxony as *Silberpage* on the 16th of April 1719. He rapidly acquired the favour of the elector Frederick Augustus, surnamed the Strong, who had been elected to the throne of Poland in 1697. Brühl, who began as page and chamberlain, was largely employed in procuring money for his profuse master. He made himself useful in muzzling the Saxon states and was successively chief receiver of taxes and minister for the interior in 1731. He was at Warsaw when his master died in 1733, and he secured a hold on the confidence of the electoral prince, Frederick Augustus, who was at Dresden, by laying hands on the papers and jewels of the late ruler and bringing them promptly to his successor. During the whole of the thirty years of the reign of Frederick Augustus II. he was the real inspirer of his master and the practical chief of the Saxon court. He had for a time to put up with the presence of old servants of the electoral house, but after 1738 he was in effect sole minister. The title of prime minister was created for him in 1746, but he was not only a prime minister—he filled all the offices. His titles spread over several lines of print, and he drew the combined pay of the places besides securing huge grants of land. Brühl must therefore be held wholly responsible for the ruinous policy which destroyed the position of Saxony in Germany between 1733 and 1763; for the mistaken ambition which led Frederick Augustus II. to become a candidate for the throne of Poland; for the engagements into which he entered in order to secure the support of the emperor Charles VI.; for the shameless and ill-timed tergiversations of Saxony during the wars of the Austrian Succession; for the intrigues which entangled the electorate in the alliance against Frederick the Great, which led to the Seven Years' War; and for the waste and want of foresight which left the country utterly unprepared to resist the attack of the king of Prussia. He was not only without political or military capacity, but was so garrulous that he could not keep a secret. His indiscretion was repeatedly responsible for the king of Prussia's discoveries of the plans laid against him. Nothing could shake the confidence of his master, which survived the ignominious flight into Bohemia, into which he was trapped by Brühl at the time of the battle of Kesseldorf, and all the miseries of the Seven Years' War. The favourite abused the confidence of his master shamelessly. Not content with the 67,000 talers a month which he drew as salary for his

innumerable offices, he was found when an inquiry was held in the next reign to have abstracted more than five million talers of public money for his private use. He left the work of the government offices to be done by his lackeys, whom he did not even supervise. His profusion was boundless. Twelve tailors, it is said, were continually employed in making clothes for him, and he wore a new suit every day. His library of 70,000 volumes was one of his forms of ostentation, and so was his gallery of pictures. He died on the 28th of October 1763, having survived his master only for a few weeks. The new elector, Frederick Christian, dismissed him from office and caused an inquiry to be held into his administration. His fortune was found to amount to a million and a half of talers, and was sequestered but afterwards restored to his family. In 1736 he had been made a count of the Empire and had married the countess Franziska von Kolowrat-Kradowska, a favourite of the wife of Frederick Augustus. Four sons and a daughter survived him.

His youngest son, Hans Moritz von Brühl (d. 1811), was before the Revolution of 1789 a colonel in the French service, and afterwards general inspector of roads in Brandenburg and Pomerania. By his wife Margarethe Schleierweber, the daughter of a French corporal, but renowned for her beauty and intellectual gifts, he was the father of Karl Friedrich Moritz Paul von Brühl (1772-1837), the friend of Goethe, who as intendant-general of the Prussian royal theatres was of some importance in the history of the development of the drama in Germany. In 1830 he was appointed intendant-general of the royal museums.

See J. G. H. von Justi, *Leben und Charakter des Grafen von Brühl* (Göttingen, 1760-1761).

BRÜHL, a town of Germany, in the Prussian Rhine province, 8 m. S.W. from Cologne on the main railway to Coblenz. Pop. (1900) 5000. Its pleasant situation at the foot of one of the spurs of the Eifel range and the beautiful grounds surrounding the royal palace render it a favourite resort of the inhabitants of Cologne. The palace, in Renaissance style, built in 1728 by Clement Augustus, elector of Cologne (1700-1761), was from 1809 until 1813 in the possession of the French marshal Davout, and in 1842 was restored by King Frederick William IV. of Prussia.

[v.04 p.0680] **BRUMAIRE,** the name of the second month in the republican calendar which was established in France by a decree of the National Convention on the 5th of October in the year II. (1793), completed with regard to nomenclature by Fabre d'Églantine, and promulgated in its new form on the 4th of Frimaire in the year II. (the 24th of November 1793). The month of Brumaire began on the day which corresponded, according to the year, to the 22nd or to the 23rd of October of the old calendar, and ended on the 20th or 21st of November, It was divided into "decades" like the other months of the republican calendar. Its name alludes to the fogs and mists frequent at that time of the year. The most important event in French history which took place during that month was the *coup d'état* of the 18th Brumaire in the year VIII. (the 9th of November 1799), by which General Bonaparte overthrew the government of the Directory to replace it by the Consulate.

On the republican calendar, see G. Villain, "Le Calendrier républicain," in *La Révolution française* for 1884-1885.

BRUMATH, or Brumpt, a town of Germany, in the imperial territory of Alsace-Lorraine, on the Zorn and the Strassburg-Avricourt railway. Pop. 5500. It has a Roman Catholic and a Protestant church, and occupies the site of the Roman Brocomagus. Its industries comprise tanning and saw-milling, and it has some trade in wine and tobacco and hops.

BRUMMAGEM (an old local form of "Birmingham"), a name first applied to a counterfeit coin made in the city of Birmingham, England, in the I7th century, and later to the plated and imitation articles made there; hence cheap, showy or tawdry. The name was particularly used of the supporters of the Exclusion Bill in 1680, with the meaning of "sham Protestant." Similarly the Tory opponents of the Bill were nicknamed "Anti-Birminghams" or "Brummagems."

BRUMMELL, GEORGE BRYAN (1778-1840), English man of fashion, known as "Beau Brummell," was born in London on the 7th of June 1778. His father was private secretary to Lord North from 1770 to 1782, and subsequently high sheriff of Berkshire; his grandfather was a shopkeeper in the parish of St James, who supplemented his income by letting lodgings to the aristocracy. From his early years George Brummell paid great attention to his dress. At Eton, where he was sent to school in 1790, and was extremely popular, he was known as Buck Brummell, and at Oxford, where he spent a brief period as an undergraduate of Oriel College, he preserved this reputation, and added to it that of a wit and good story-teller, while the fact that he was second for the Newdigate prize is evidence of his literary capacity. Before he was sixteen, however, he left Oxford, for London, where the prince of Wales (afterwards George IV.), to whom he had been presented at Eton, and who had been told that Brummell was a highly amusing fellow, gave him a commission in his own regiment (1794). Brummell soon became intimate with his patron—indeed he was so constantly in the prince's company that he is reported not to have known his own regimental troop. In 1798, having then reached the rank of captain, he left the service, and next year succeeded to a fortune of about £30,000. Setting up a bachelor establishment in Mayfair, he became, thanks to the prince of Wales's friendship and his own good taste in dress, the recognized *arbiter elegantiarum*. His social success was instant and complete, his repartees were the talk of the town, and, if not accurately speaking a wit, he had a remarkable talent for presenting the most ordinary circumstances in an amusing light. Though he always dressed well, he was no mere fop—Lord Byron is credited with the remark that there was nothing remarkable about his dress save "a certain exquisite propriety." For a time Brummell's sway was undisputed. But eventually gambling and extravagance exhausted his fortune, while his

tongue proved too sharp for his royal patron. They quarrelled, and though for a time Brummell continued to hold his place in society, his popularity began to decline. In 1816 he fled to Calais to avoid his creditors. Here he struggled on for fourteen years, receiving help from time to time from his friends in England, but always hopelessly in debt. In 1830 the interest of these friends secured him the post of British consul at Caen, to which a moderate salary was attached, but two years later the office was abolished. In 1835 Brummell's French creditors in Calais and Caen lost patience and he was imprisoned, but his friends once more came to the rescue, paid his debts and provided him with a small income. He had now lost all his interest in dress; his personal appearance was slovenly and dirty. In 1837, after two attacks of paralysis, shelter was found for him in the charitable asylum of Bon Sauveur, Caen, where he died on the 30th of March 1840.

See Captain William Jesse, *Life of Brummell* (London, 1844, revised edition 1886); Percy H. Fitzgerald, *Life of George IV.* (London, 1881); R. Boutet de Monvel, *Beau Brummel* (trans. 1908).

BRUNCK, RICHARD FRANÇOIS PHILIPPE (1729-1803), French classical scholar, was born at Strassburg on the 30th of December 1729. He was educated at the Jesuits' College at Paris, and took part in the Seven Years' War as military commissary. At the age of thirty he returned to his native town and resumed his studies, paying special attention to Greek. He spent considerable sums of money in publishing editions of the Greek classics. The first work which he edited was the *Anthologia Graeca* or *Analecta veterum Poetarum Graecorum* (1772-1776), in which his innovations on the established mode of criticism startled European scholars; for wherever it seemed to him that an obscure or difficult passage might be made intelligible and easy by a change of text, he did not scruple to make the necessary alterations, whether the new reading were supported by manuscript authority or not. Other works by him are:—Editions of Anacreon (1778), several plays of the Greek tragedians, Apollonius Rhodius (1780), Aristophanes, with an excellent Latin translation (1781-1783), *Gnomici poetae Graeci* (1784), Sophocles (1786), with Latin translation, his best work, for which he received a pension of 2000 francs from the king. He also published editions of Virgil (1785), Plautus (1788) and Terence (1797). At the outbreak of the French Revolution, in which he took an active part, he was imprisoned at Besançon, and lost his pension, being reduced to such extremities that he was obliged to sell a portion of his library. In 1802 his pension was restored to him, but too late to prevent the sale of the remainder of his books. He died on the 12th of June 1803.

BRUNDISIUM (Gr. Βρεντέσιον, mod. *Brindisi*), an important harbour town of Calabria (in the ancient sense), Italy, on the E.S.E. coast. The name is said to mean "stag's head" in the Messapian dialect, in allusion to the shape of the harbour. Tradition varies as to its founders; but we find it hostile to Tarentum, and in friendly relations with Thurii. With a fertile territory round it, it became the most important city of the Messapians, but it was developed by the Romans, into whose hands it only came after the conquest of the Sallentini in 266 B.C. They founded a colony there in 245 B.C., and the Via Appia was perhaps extended through Tarentum as far as Brundisium at this period. Pacuvius was born here about 220 B.C. After the Punic Wars it became the chief point of embarkation for Greece and the East, via Dyrrachium or Corcyra. In the Social War it received Roman citizenship, and was made a free port by Sulla. It suffered, however, from a siege conducted by Caesar in 49 B.C. (*Bell. Civ.* i.) and was again attacked in 42 and 40 B.C. Virgil died here in 19 B.C. on his return from Greece. Trajan constructed the Via Trajana, a more direct route from Beneventum to Brundisium. The remains of ancient buildings are unimportant, though a considerable number of antiquities, especially inscriptions, have been discovered here: one column 62 ft. in height, with an ornate capital, still stands, and near it is the base of another, the column itself having been removed to Lecce. They are said to have marked the termination of the Via Appia.

See Ch. Hülsen in Pauly-Wissowa, *Realencyclopädie*, iii. (1899), 902; *Notizie degli Scavi*, passim. Also BRINDISI.

(T. AS.)

BRUNE, GUILLAUME MARIE ANNE (1763-1815), marshal of France, the son of an advocate, was born at Brives-la-Gaillarde (Corrèze), on the 13th of March 1763. Before the Revolution he went to Paris to study law, and here he became a political journalist, a Jacobin and a friend of
[v.04 p.0681] Danton. He was appointed in 1793 to a superior command in the army direct from civil life, and as a general of brigade he took part in the fighting of the 13th Vendémiaire. In 1796 he fought under Bonaparte in Italy, and was promoted general of division for good service in the field. In 1798 he commanded the French army which occupied Switzerland, and in the following year he was in command of the French troops in Holland. His defence of Amsterdam against the Anglo-Russian expedition under the duke of York was completely successful; the invaders were defeated, and compelled, after a miserable retreat, to re-embark. He rendered further good service in Vendée and in Italy, and was made a marshal by Napoleon on the assumption by the latter of the imperial title in 1804. In 1807 Brune held a command in North Germany, but he was not afterwards employed during the First Empire. It is said that he was accused of venality, and on that account disgraced, but of this there is no proof. He was recalled to active service during the Hundred Days, and as commander of the army of the Var he defended the south of France against the Austrians. He was murdered by royalists during the White Terror at Avignon on the 2nd of August 1815.

See *Notice historique sur la vie politique et militaire du maréchal Brune* (Paris, 1821), and Vermeil de Conchard, *L'Assassinat du maréchal Brune* (Paris, 1887).

BRUNEAU, ALFRED (1857-), French musical composer, was born in Paris. His parents were devoted to music, and he was brought up to play the 'cello, being educated at the Paris Conservatoire. He played in Pasdeloup's orchestra, and soon began to compose, writing a cantata, *Geneviève de Paris*, at an early age. In 1884 his *Ouverture héroïque* was performed, followed by the choral symphonies, *Léda* (1884), *La Belle au bois dormant* (1886) and *Penthésilée*. But he is best known as a dramatic composer. In 1887 his first opera, *Kérim*, was produced; and in 1891 his successful opera *Le Rêve*, with a libretto founded on Zola's story. Another subject from Zola resulted in the opera *L'Attaque du moulin* (1893), and libretti by Zola himself were written for his next operas *Messidor* (1897) and *L'Ouragan* (1901). Among Bruneau's other works may be mentioned his *Requiem* (1896), and his two collections of songs, *Lieds de France* and *Chansons à danser*. He was decorated with the Legion of Honour in 1895. His musical criticisms, published in several volumes, are remarkable for literary quality and vigour.

See Arthur Hervey's volume on Bruneau (1907).

BRUNEI, a state situated in the north-west of Borneo. It has been so diminished in area since the beginning of the 19th century as to have become in comparison with the other states of Borneo territorially insignificant. It formerly included the whole of northern Borneo and southern Palawan, and stretched down the west coast as far as Sambas. What remains of this once powerful sultanate is a triangular-shaped territory, the base of the triangle being represented by 80 m. of coast-line, and the two sides by the frontiers of Sarawak. The area is calculated to be about 1700 sq. m. This great reduction of the extent of the territory has been brought about by the cession on successive occasions of strips of territory to Sarawak and to the British North Borneo Company on condition of annual payments of money. In 1888 the state was placed under British protection. On the 2nd of January 1906 a treaty was made whereby the sultan of Brunei agreed to hand over the general administration of his state to a British resident. The sultan Mahommed Jomal-ul-alam, born in 1889, succeeded his father in May 1906. He receives an allowance of 12,000 dollars a year from state funds, and his two principal ministers receive allowances of 6000 dollars a year each. The interior people have for centuries been subject to petty oppression, and there is too much of the old spirit left among the Malays to avoid acrimonious dispute and rebellion.

The bulk of the inhabitants, who consist of Malays, Kadayans, Orang Bukits and a few Muruts, are to be found in and about the capital—also called Brunei—the population of the city being estimated at about 15,000, and the population of the whole territory being about 25,000. The city is prettily situated on the river, with a background of cleared hills, and in the distance heights clothed with magnificent forest. The dwelling-houses are built over the river on slender piles obtained from the Nibong palm which resists the action of the water for several years. Though there are practically no exports and imports, there is a certain amount of inland commerce, the Brunei Malay usually earning a living by trading with the interior tribes of Sarawak and British North Borneo. Some of them are skilled workers of brass, and the Brunei women make very beautiful cloth, interwoven and embroidered with gold thread. Sago is worked in the important river-valleys of the Tutong and the Balait, but only a small quantity of rice is cultivated.

The history of this ancient and decaying sultanate is of some interest. Brunei, or, as it is called by the natives Bruni or Dar-ul-Salam (city of peace), possesses a historic tablet of stone upon which, in A.H. 1221 (1804), was engraved in Malay characters the genealogy of the sovereigns who have ruled over the country. The engraving was the work of Datu Imaum Yakub, the high priest at the time, who received the genealogy from the lips of Merhoum Bongsu, otherwise Sultan Muadin, and Sultan Kemal-Udin, who ordered this record of their forefathers to be written. This stone tablet now stands on the tomb of Sultan Mahommed Jemal-ul-Alam at the foot of Panggal hill, in the city of Brunei. The Selesilah, or book of descent, is kept in the palace by the sultan. The other heirlooms, which are also kept in the sultan's palace, and which descend to each sultan in turn, are the "Nobab Nagara" (two royal drums) from Johore and Menang-Kabau, and the "Gunta Alamat" (bells), the gift of Sultan Bahkei of Johore or Malacca. The first sultan of Brunei was Alak-ber-Tata, who was probably of Bisaya stock, and governed the country before the introduction of Islam, in the 15th century. He assumed the name of Mahommed on his conversion to Islam, which was brought about during a visit to the Malay peninsula. Brunei, at this time, was a dependency of Majapahit (Java), and paid a yearly tribute of a jar of areca juice obtained from the young green nuts of the areca palm, and of no monetary value. The Hindu kingdom of Menjapahit was destroyed by the Mahommedans in 1478, and Brunei is mentioned in the history of Java as one of the countries conquered by Adaya Mingrat, the general of Angka Wijaya. Sultan Mahommed's only child was a daughter. His brother Akhmed married the daughter of Ong Chum Ping, a Chinese officer said to have been sent by his emperor to obtain a jewel from Mount Kinabalu in North Borneo, and was the successor of Sultan Mahommed in the sovereignty of Brunei. He was succeeded by Sultan Berkat, an Arab sherif of high rank, from the country of Taif in Arabia, who had married Sultan Akhmed's only child. Sultan Berkat built a mosque and enforced Mahommedan law, and with the assistance of the Chinese built the stone wall, which is still in existence between the islands of Kaya Orang and Chermin, by sinking forty junks filled with rock across the mouth of the Brunei river. This work was completed before the arrival of Pigafetta in 1521. In the reign of Sultan Bulkeiah Magellan's squadron anchored off the mouth of Brunei river in August 1521, and Pigafetta makes mention of the splendid court and the imperial magnificence of the Borneo capital. Sultan Bulkeiah was otherwise known as Nakoda Ragam; he was the greatest warrior of Brunei and made military expeditions to Java, Malacca, Luzon and all the coasts of Borneo. His tomb, which is handsomely built of stone, is still to be seen in Brunei,

and is constantly visited by Malays, who leave money and various articles on the tomb as offerings to his memory. Others, again, come and take away anything they can find, which they keep as charms and mementoes. The Spaniards captured Brunei in 1580, the reigning sultan and his court retiring to Suai in the Baram district. The invaders were compelled to evacuate the place, however, in consequence of the heavy losses they sustained in the numerous attempts made for its recovery. The golden age of Brunei was nevertheless at an end, and there is little more of importance to record. Disputed successions and civil war, maladministration and the untrustworthiness of the Malay character, caused a steady decline in prosperity. The East India Company started a factory in the town in the 18th century, but commerce had already decayed
[v.04 p.0682] and the establishment was abandoned. In the early part of the 19th centuiy Brunei was but a resort for pirates and a market for the slave trade. During the 'forties Admiral (then Captain) Keppel and other officers of the British navy suppressed piracy in the neighbourhood. Sarawak was handed over to Raja Brooke, and, after the capture and temporary occupation of Brunei by Sir Thomas Cochrane, Labuan was ceded to the British empire. From this island it was possible to exercise a certain control over the townspeople, and a consul was stationed there to watch affairs. Nowadays the political consequence of Brunei largely arises from the existence there of valuable seams of coal, leased to the Sarawak government.

(C. H.)

BRUNEL, ISAMBARD KINGDOM (1806-1859), English engineer, only son of Sir M.I. Brunel, was born at Portsmouth on the 9th of April 1806. He displayed in childhood singular powers of mental calculation, great skill and rapidity as a draughtsman, and a true feeling for art. At the age of fourteen he was sent to Paris, to study at the Collège Henri Quatre. In 1823 he entered his father's office as assistant-engineer, just at the time when the project of the Thames Tunnel was beginning to take shape; and during the later portion of the time, from 1825, when the work was begun, till 1828, when it was stopped by an irruption of the river, he was both nominal and actual resident engineer. In November 1829 he sent in designs and plans for the projected suspension bridge over the Avon at Clifton, but in consequence of objections raised by Thomas Telford, the referee of the bridge committee, his plans were rejected. But a new design which he sent in on a second competition in 1831 was accepted, and he was appointed engineer. The works were begun in 1836, but owing to lack of funds were not completed until 1864, after Brunel's death; his design, however, was closely adhered to, and the chains employed came from the old Hungerford suspension bridge (London), which he had built in 1841-1845, but which was displaced in 1862 by the Charing Cross railway bridge.

In March 1833 Brunel, at the age of twenty-seven, was appointed engineer of the newly-projected Great Western railway. For several years his energies were taxed to the utmost by the conflict with obstructive landowners and short-sighted critics; but he showed himself equal to the occasion, not only as a professional man, but as a persuasive negotiator. Among the engineering triumphs on that railway are the Hanwell viaduct, the Maidenhead bridge and the Box tunnel, at the time the longest in the world. The famous "battle of the gauges" took its rise from his introduction of the broad (7 ft.) gauge on that line. In 1846 he resigned his office as engineer of the Great Western railway. In 1844 he had recommended the adoption of the atmospheric system on the South Devon railway, but after a year's trial the system was abandoned. The last and greatest of Brunel's railway works was the Royal Albert bridge over the river Tamar at Saltash. This work, sanctioned by parliament in 1845, was constructed between 1853 and 1859.

In addition to the arduous labours of railway engineering Brunel took a leading part in the systematic development of ocean steam navigation. As early as October 1835 he had suggested to the directors of the Great Western railway, that they should "make it longer, and have a steamboat to go from Bristol to New York, and call it the 'Great Western.'" The project was taken up, and the "Great Western" steamship was designed by Brunel, and built at Bristol under his superintendence. It was much longer than any steamer of the day, and was the first steamship built to make regular voyages across the Atlantic. While the vessel was building a controversy was raised about the practicability of Brunel's scheme, Dr D. Lardner asserting dogmatically that the voyage could not be made, and backing his assertion with an array of figures. His view was widely accepted, but the work went on, and the voyage was accomplished in 1838. Brunel at once undertook a still larger design in the "Great Britain," which was the first large iron steamship, the largest ship afloat at that time, and the first large ship in which the screw-propeller was used. She made her first voyage from Liverpool to New York in August and September 1845; but in the following year was carelessly run upon the rocks in Dundrum Bay on the coast of Ireland. After lying there nearly a year without material damage she was got off and was employed in the Australian trade. Brunel soon after began to meditate a still vaster project, the construction of a vessel large enough to carry all the coal required for a long voyage out, and if coal could not be had at the out port, then to carry enough also for the return voyage. It seemed to him, further, that a great increase of size would give many advantages for navigation. During his connexion as engineer with the Australian Mail Company he worked out into a practical shape his conception of a "great ship"; and in 1852 his scheme was laid before the directors of the Eastern Steam Navigation Company. It was adopted, the projector being appointed engineer, and after much time occupied about contracts and specifications the work was begun in December 1853. Immense difficulties in the progress of construction caused delays from time to time. The operation of launching was several times attempted in vain; but at length the gigantic vessel, the "Great Eastern," was got afloat on the 31st of January 1858. Much remained to be done to complete the ship; and her engineer, overworked and worn out with worry, broke down and did not see her begin her first voyage on the 7th of September 1859. On the 5th he was brought

home from the ship suffering from a paralytic stroke, and on the 15th he died at his house in Westminster.

In addition to the great works already described, Brunel was employed in the construction of many docks and piers, as at Monkwearmouth, Bristol, Plymouth, Briton Ferry, Brentford and Milford Haven. He was a zealous promoter of the Great Exhibition of 1851, and was a member of the committee on the section of machinery and of the building committee. He paid much attention to the improvement of large guns, and designed a floating gun-carriage for the attack on Kronstadt in the Russian War (1854); he also designed and superintended the construction of the hospital buildings at Erenkeni on the Dardanelles (1855). He was elected a fellow of the Royal Society in 1830, and in 1858 declined the presidency of the Institution of Civil Engineers through ill-health. He received the degree of D.C.L. from Oxford in 1857. In his work he was singularly free from professional jealousy, and was always ready to commend and help others, though, himself a man of remarkable industry and energy, he demanded a high standard of faithful service from his subordinates.

See *The Life of I.K. Brunel, C.E.* (1870), by his son, Isambard Brunel.

BRUNEL, SIR MARC ISAMBARD (1769-1849), British inventor and engineer, was born at Hacqueville in Normandy on the 25th of April 1769. His father, a small landowner and farmer, intended him for the church, but his taste for mathematics and mechanics inclined him to another career, and he obtained a nomination for the navy, in which he served for six years. When his ship was paid off in 1792 and he returned to France, he found the Revolution at its height, and owing to his pronounced royalist opinions he was obliged to leave the country. Reaching New York in September 1793 he began to practise as an architect and civil engineer. His first employment was in land-surveying and canal-engineering. Later he submitted a highly ornamental design for the National Capitol at Washington, which, however, was not accepted, and was engaged to design and superintend the construction of the Bowery theatre, New York, burnt down in 1821. He fitted novel and ingenious machinery in the arsenal and cannon factory which he was commissioned to erect in New York, and he was asked to supply plans for the defences of the Narrows between the upper and lower bays of that port. Early in 1799 he sailed for England in order to submit to the British government his plans for the mechanical production of ships' blocks, in substitution for the manual processes then employed. After the usual difficulties and delays his proposals were adopted, largely through the recommendation of Sir Samuel Bentham, and about 1803 the erection of his machines was begun at Portsmouth dockyard. They were constructed by Henry Maudslay, and formed one of the earliest examples of
[v.04 p.0683] a complete range of machine tools, each performing its part in a long series of operations. Not only was the quality of the product much improved but the cost was greatly diminished, and the saving effected in the first year in which the machines were in full work was estimated at £24,000, of which about two-thirds was awarded to Brunel. A little later he was occupied in devising improved machines for sawing and bending timber, and in 1811 and 1812 he was employed by the government in erecting saw-mills at Woolwich and Chatham, carrying out at the latter dockyard a complete reorganization of the system for handling timber. About 1812 he devised machinery for making boots which was adopted for the purposes of the army, but abandoned a few years later when, owing to the cessation of war, the demand became less and the supply of manual labour cheaper. At the same time he interested himself in the establishment of steam navigation on the Thames between London and Ramsgate. In 1814 he succeeded in persuading the admiralty to try steam-tugs for towing warships out to sea. The experiments were made at his own expense, for a few months after undertaking to contribute to the cost the admiralty revoked its promise on the ground that the attempt was "too chimerical to be seriously entertained." Another vain enterprise on which he wasted much time and money was an attempt to use liquefied gases as a source of motive power. His round stocking-frame or *tricoteur* was patented in 1816, and among his other inventions were machines for winding cotton-thread into balls, for copying drawings, for making small wooden boxes such as are used by druggists, and for the manufacture of nails, together with processes of preparing tinfoil for decorative purposes and improvements in stereotype plates for printing.

In 1821, partly as the result of the damage done by fire in 1814 to the saw-mills he owned at Battersea, and partly because his commercial abilities were far from equal to his mechanical genius, he got into financial difficulties and was thrown into prison for debt, only regaining his freedom through a grant of £5000 which his friends obtained for him from the government. Subsequently his attention was mainly devoted to projects of civil engineering, the most noteworthy being the Thames Tunnel. In 1820 he had prepared plans of bridges for erection in Rouen and St Petersburg and in the island of Bourbon. In 1823 he designed swing-bridges, and in 1826 floating landing-stages, for the port of Liverpool. A company, which was supported by the duke of Wellington, was formed in 1824 to carry out his scheme for boring a tunnel under the Thames between Wapping and Rotherhithe. The work was begun at the beginning of 1825, the excavation being accomplished by the aid of a "shield," which he had patented in 1818. Many difficulties were encountered. The river broke through the roof of the tunnel in 1827, and after a second irruption in 1828 work was discontinued for lack of funds. Seven years later it was resumed with the aid of money advanced by the government, and after three more irruptions the tunnel was completed and opened in 1843. Aided by his son, Brunel displayed extraordinary skill and resource in the various emergencies with which he had to deal, but the anxiety broke down his health. He recovered sufficiently from one paralytic stroke to attend the opening ceremony, but he was able to undertake little more professional work. A second stroke followed in 1845, and four years later he died in London on the 12th of December 1849. He received the order of the

Legion of Honour in 1829 and was knighted in 1841.

See Richard Beamish, *Memoirs of Sir Marc Isambard Brunel* (1862).

BRUNELLESCHI (or Brunellesco), **FILIPPO** (1379-1446), Italian architect, the reviver in Italy of the Roman or Classic style, was born at Florence in 1379. His father, a notary, had destined him for his own profession, but observing the boy's talent for all sorts of mechanism, placed him in the gild of goldsmiths. Filippo quickly became a skilled workman, and perfected himself in the knowledge of sculpture, perspective and geometry. He designed some portions of houses in Florence, and in 1401 he was one of the competitors for the design of the gates of the baptistery of San Giovanni. He was unsuccessful, though his work obtained praise, and he soon afterwards set out for Rome. He studied hard, and resolved to do what he could to revive the older classical style, which had died out in Italy. Moreover, he was one of the first to apply the scientific laws of perspective to his work. In 1407 he returned to Florence, just at the time when it was resolved to attempt the completion of the cathedral church of Santa Maria del Fiore. Brunelleschi's plan for effecting this by a cupola was approved, but it was not till 1419, and after innumerable disputes, that the work was finally entrusted to him. At first he was hampered by his colleague Ghiberti, of whom he skilfully got rid. He did not live to see the completion of his great work, and the lantern on the summit was put up not altogether in accordance with the instructions and plans left by him. The great cupola, one of the triumphs of architecture, exceeds in some measurements that of St Peter's at Rome, and has a more massive and striking appearance. Besides this masterpiece Brunelleschi executed numerous other works, among the most remarkable of which are the Pitti palace at Florence, on the pattern of which are based the Tuscan palaces of the 15th century, the churches of San Lorenzo and Spirito Santo, and the still more elegant Capella del Pazza. The beautiful carved crucifix in the church of Santa Maria Novella in Florence is also the work of Brunelleschi. He died in Florence on the 16th of April 1446, and was buried in the cathedral church of his native city.

See Manetti, *Vita di Brunelleschi* (Florence, 1812); Guasti, *La cupola di Santa Maria del Fiore* (Florence, 1857); von Fabriczy, *Filippo Brunelleschi* (Stuttgart, 1892).

BRUNET, JACQUES CHARLES (1780-1867), French bibliographer, was born in Paris on the 2nd of November 1780. He was the son of a bookseller, and in 1802 he printed a supplement to the *Dictionnaire bibiographique de livres rares* (1790) of Duclos and Cailleau. In 1810 there appeared the first edition of his *Manuel du libraire et de l'amateur des livres* (3 vols.). Brunet published successive editions of his great bibliographical dictionary, which rapidly came to be recognized as the first book of its class in European literature. He died on the 14th of November 1867. Among his other works are *Nouvelles Recherches bibliographiques* (1834), *Recherches ... sur les éditions originales ... de Rabelais* (1852), and an edition of the French poems of J.G. Alione d'Asti, dating from the beginning of the 16th century (1836).

See also a notice by Le Roux de Lincy, prefixed to the catalogue (1868) of his own valuable library. A supplement to the 5th edition (1860-1865) of the *Manuel du libraire* was published (1878-1880) by P. Deschamps and G. Brunet.

BRUNETIÈRE, FERDINAND (1849-1906), French critic and man of letters, was born at Toulon on the 19th July 1849. After attending a school at Marseilles, he studied in Paris at the Lycée Louis-le-Grand. Desiring to follow the profession of teaching, he entered for examination at the École Normale Supérieure, but failed, and the outbreak of war in 1870 debarred him from a second attempt. He turned to private tuition and to literary criticism. After the publication of successful articles in the *Revue Bleue*, he became connected with the *Revue des Deux Mondes*, first as contributor, then as secretary and sub-editor, and finally, in 1893, as principal editor. In 1886 he was appointed professor of French language and literature at the École Normale, a singular honour for one who had not passed through the academic mill; and later he presided with distinction over various *conférences* at the Sorbonne and elsewhere. He was decorated with the Legion of Honour in 1887, and became a member of the Academy in 1893. The published works of M. Brunetière consist largely of reprinted papers and lectures. They include six series of *Études critiques* (1880-1898) on French history and literature; *Le Roman naturaliste* (1883); *Histoire et Littérature*, three series (1884-1886); *Questions de critique* (1888; second series, 1890). The first volume of *L'Évolution de genres dans l'histoire de la littérature*, lectures in which a formal classification, founded on the Darwinian theory, is applied to the phenomena of literature, appeared in 1890; and his later works include a series of studies (2 vols., 1894) on the
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evolution of French lyrical poetry during the 19th century, a history of French classic literature begun in 1904, a monograph on Balzac (1906), and various pamphlets of a polemical nature dealing with questions of education, science and religion. Among these may be mentioned *Discours académiques* (1901), *Discours de combat* (1900, 1903), *L'Action sociale du christianisme* (1904), *Sur les chemins de la croyance* (1905). M. Brunetière was an orthodox Roman Catholic, and his political sympathies were in the main reactionary. He possessed two prime qualifications of a great critic, vast erudition and unflinching courage. He was never afraid to diverge from the established critical view, his mind was closely logical and intensely accurate, and he rarely made a trip in the wide field of study over which it ranged. The most honest, if not the most impartial, of magisterial writers, he had a hatred of the unreal, and a contempt for the trivial; nobody was more merciless towards those who affected effete and decadent literary forms, or maintained a vicious standard of art. On the other hand, his intolerance, his sledge-hammer methods of attack and a certain dry pedantry alienated the sympathies of many who recognized the remarkable qualities of his mind. The application of universal principles to every question of letters is a check to dilettante habits of thought, but it is apt to detain the critic in a

somewhat narrow and dusty path. M. Brunetière's influence, however, cannot be disputed, and it was in the main thoroughly sound and wholesome. He died on the 9th of December 1906.

His *Manual of the History of French Literature* was translated into English in 1898 by R. Derechef. Among critics of Brunetière see J. Lemaître, *Les Contemporains* (1887, &c.), and J. Sargeret, *Les Grands Corvertis* (1906).

BRUNHILD (M.H. Ger. *Brünhilt* or *Prünhilt*, Nor. *Brynhildr*), the name of a mythical heroine of various versions of the legend of the Nibelungs. The name means "the warrior woman in armour" (from O.H. Ger. *brunjô*, *brunja*, M.H. Ger. *brunige*, *brünje*, *brünne*, a cuirass or coat of mail, O. Eng. *byrnie*, and O.H. Ger. *hiltja*, *hilta*, war), and in the Norse versions of the Nibelung myth, which preserves more of the primitive traditions than the *Nibelungenlied*, Brunhild is a valkyrie, the daughter of Odin, by whom, as a punishment for having against his orders helped a warrior to victory, she has been cast under a spell of sleep on Hindarfjell, a lonely rock summit, until the destined hero shall penetrate the wall of fire by which she is surrounded, and wake her. This is a variant of the widespread myth which survives in the popular fairy-story of "the sleeping beauty." The ingenuity of some German scholars has made of Brunhild a personification of the day, held prisoner upon the hill-tops till in the morning the sun-god comes to her rescue, then triumphing with him awhile, only to pass once more under the spell of the powers of mist and darkness. She is thus by some commentators contrasted with "the masked warrior woman" Kriemhild (*q.v.*), a personification of the power of night and death. But whatever be the dim original of the character of Brunhild—as to which authorities are by no means agreed—even in the northern versions its mythical interest is quite subordinate to its purely human interest. In the *Volsungasaga* she is the heroine of a tragedy of passion and wounded pride; it is she who compasses the death of Sigurd, who has broken his troth plighted to her, and then immolates herself on his funeral pyre in order that in the world of the dead he may be wholly hers. In the *Nibelungenlied*, on the other hand, she plays a comparatively colourless rôle. She still possesses superhuman attributes: like Atalanta, she can only be won by the man who is able to overcome her in trials of speed and strength; but, instead of a valkyrie sleeping on a lonely rock, she is, when Sigfrid goes to woo her on behalf of Gunther, queen of Îslant (Îsenlant), living in a castle called the Isenstein. In the tragedy of the death of Sigfrid her part is completely overshadowed by that of "the grim Hagen," and from the moment that the murder is decided on she drops almost completely out of the story. The poet of the *Nibelungenlied* evidently knew nothing of the tale of her self-immolation; for, though he has nothing definite to say about her after Sigfrid's death, he keeps her alive in a sort of dignified retirement. In the last 5000 lines or so of the poem Brunhild is only mentioned four times and takes no active part in the story. (See further under NIBELUNGENLIED.)

(W. A. P.)

BRUNHILDA (Brunechildis), queen of Austrasia (d. 613), was a daughter of Athanagild, king of the Visigoths. In 567 she was asked in marriage by Sigebert, who was reigning at Metz. She now abjured Arianism and was converted to the orthodox faith, and the union was celebrated at Metz; on which occasion Fortunatus, an Italian poet, who was then at the Frankish court, composed the epithalamium. Chilperic, brother of Sigebert, and king of the west Frankish kingdom, jealous of the renown which this marriage brought to his elder brother, hastened to ask the hand of Galswintha, sister of Brunhilda; but at the instigation of his mistress Fredegond, he assassinated his wife. Sigebert was anxious to avenge his sister-in-law, but on the intervention of Guntram, he accepted the compensation offered by Chilperic, namely the cities of Bordeaux, Cahors and Limoges, with Béarn and Bigorre.

This treaty did not prevent war soon again breaking out between Sigebert and Chilperic. So long as her husband lived, Brunhilda played a secondary part, but having been made captive by Chilperic after her husband's assassination (575), she succeeded in escaping from her prison at Rouen, after a series of extraordinary adventures, by means of a marriage with Merovech, the son of her conqueror. From this time on, she took the lead; in Austrasia she engaged in a desperate struggle against the nobles, who wished to govern in the name of her son Childebert II.; but she was worsted in the conflict and for some time had to seek refuge in Burgundy. After the death of Childebert II. (597) she aspired to govern Austrasia and Burgundy in the name of her grandsons Theudebert and Theuderich II. She was expelled from Austrasia, and then stirred up Theuderich II. against his brother, whom he defeated at Toul and Tolbiac, and put to death. Theuderich II. died shortly after this victory, and Brunhilda caused one of her great-grandchildren to be proclaimed king. The nobles of Austrasia and Burgundy, however, now summoned Clotaire II., son of Fredegond, and king of Neustria, to help them against the queen. Brunhilda was given up to him, and died a terrible death, being dragged at the heels of a wild horse (613).

Brunhilda seems to have had political ideas, and to have wished to attain to the royal power. She was a protectress of the Church, and Pope Gregory I. (590-604) addressed a series of letters to her, in which he showered praises upon her. She took it upon herself, however, to supervise the bishoprics and monasteries, and came into conflict with Columban (Columbanus), abbot of Luxeuil. As Brunhilda was a great queen, tradition ascribes to her the construction of many old castles, and a number of old Roman roads are also known by the name of *Chaussées de Brunehaut*.

AUTHORITIES.—Gregory of Tours, *Historia Francorum*, bks. iv.-x.; the so-called *Chronicle of Fredegarius*; Aug. Thierry, *Récits des temps mérovingiens* (2 vols., Paris, 8th ed., 1864); G. Kurth, "La Reine Brunehaut," in the *Revue des questions historiques*, vol. xxvi. (1891).

(C. Pf.)

BRUNI, LEONARDO (1369-1444), Italian scholar, author of the *History of Florence*, was born at Arezzo, and is generally known as Leonardo Aretino. He was secretary to the papal chancery under Innocent VII. and John XXII. From 1427 to his death in 1444 he was chancellor to the republic of Florence. He was buried at the expense of the state in Sta Croce, where his laurelled statue is still to be seen. He was the first to free the history of Florence from its fabulous elements, but his book, though not unintelligent, only repays very laborious study. The only Latin edition is *Historiarum Florentinarum libri xii ... exempto in lucem edit. stud, et op. Sixti Brunonis* (Argentor. 1610, fol.). A translation into Tuscan was published by Donato Acciajuoli in 1476 at Venice, was republished at Florence in 1492, and again, with Sansovino's continuation, at Venice in 1561.

BRÜNN (Czech *Brno*), the capital of the Austrian margraviate and crownland of Moravia, 89 m. N. of Vienna by rail. Pop. (1900) 108,944, of whom 70% are Germans and 30% are Czechs. Brünn is situated for the most part between two hills at the confluence of the Schwarzawa and the
[v.04 p.0685] Zwittawa, and consists of the old town and extensive suburbs. On one of the hills, known as the Spielberg (945 ft.), stands a castle which has long been used as a prison, famous for its connexion with Silvio Pellico, who was confined within its walls from 1822 to 1830. The fortifications of the old town have now been entirely removed, giving place to handsome gardens and well-built streets, which put it in communication with its adjoining suburbs. The old town, although comparatively small, with narrow and crooked but well-paved streets, contains the most important buildings in the city. The Rathaus, which dates from 1511, has a fine Gothic portal, and contains several interesting antiquities. The ecclesiastical buildings comprise the cathedral of St Peter, situated on the lower hill; the fine Gothic church of St Jacob, built in the 15th century, with its iron tower added in 1845, and a remarkable collection of early prints; the church of the Augustinian friars, dating from the 14th century; and that of the Minorites, with its frescoes, its holy stair and its Loretto-house. Amongst the new buildings are the hall of the provincial diet, opened in 1881; a handsome new synagogue; the national museum of Moravia and Silesia and several high educational establishments, including a technical academy and a theological seminary, which are the remnants of the former university of Brünn. It is the seat of a Roman Catholic bishop and of a Protestant consistory. Brünn, which is sometimes styled "the Austrian Manchester," is one of the most industrial towns of Austria and the chief seat of the cloth industry in the whole empire. Other important branches of industry are: the manufacture of various woollen, cotton and silk goods, leather, the machinery required in the textile factories, brewing, distilling and milling, and the production of sugar, oil, gloves and hardware. It is also an important railway junction and carries on a very active trade.

Brünn probably dates from the 9th century. In the 11th century it was bestowed by Duke Wratislas II. on his son Otto. A place of great strength, it held out successfully against sieges—in 1428 by the Hussites, in 1467 by King George of Bohemia, in 1645 by the Swedish general Torstenson, and in 1742 by the Prussians. In 1805 it was the headquarters of Napoleon before the battle of Austerlitz.

See Trautenberger, *Die Chronik der Landeshauptstadt Brünn* (Brünn, 1893-1897, 5 vols.).

BRUNNER, HENRY (1840-), German historian, was born at Wels in Upper Austria on the 22nd of June 1840. After studying at the universities of Vienna, Göttingen and Berlin, he became professor at the university of Lemberg in 1866, and in quick succession held similar positions at Prague, Strassburg and Berlin. From 1872 Brunner devoted himself especially to studying the early laws and institutions of the Franks and kindred peoples of western Europe, and on these subjects his researches have been of supreme value. He also became a leading authority on modern German law. He became a member of the Berlin Academy of Sciences in 1884, and in 1886, after the death of G. Waitz, undertook the supervision of the *Leges* section of the *Monumenta Germaniae historica*. His chief works are: *Die Entstehung der Schwurgerichte* (Berlin, 1872); *Zeugen und Inquisitionsbeweis der karolingischen Zeit* (Vienna, 1866); *Das anglonormännische Erbfolgesystem, nebst einem Excurs über die älteren normännischen Coutumes* (Leipzig, 1869); *Zur Rechtsgeschichte der römischen und germanischen Urkunde* (Berlin, 1880); *Deutsche Rechtsgeschichte* (Leipzig, 1887-1892); *Mithio und Sperantes* (Berlin, 1885); *Die Landschenkungen der Merowinger und Agilolfinger* (Berlin, 1885); *Das Gerichtszeugnis und die fränkische Königsurkunde* (Berlin, 1873); *Forschungen zur Geschichte des deutschen und französischen Rechts* (Stuttgart, 1894); *Grundzüge der deutschen Rechtsgeschichte* (Leipzig, 1901).

BRÜNNOW, FRANZ FRIEDRICH ERNST (1821-1891), German astronomer, was born in Berlin on the 18th of November 1821. Between the ages of eight and eighteen he attended the Friedrich-Wilhelm gymnasium. In 1839 he entered the university of Berlin, where he studied mathematics, astronomy and physics, as well as chemistry, philosophy and philology. After graduating as Ph.D. in 1843, he took an active part in astronomical work at the Berlin observatory, under the direction of J. F. Encke, contributing numerous important papers on the orbits of comets and minor planets to the *Astronomische Nachrichten*. In 1847 he was appointed director of the Bilk observatory, near Düsseldorf, and in the following year published the well-known *Mémoire sur la comète elliptique de De Vico*, for which he received the gold medal of the Amsterdam Academy. In 1851 he succeeded J. G. Galle as first assistant at the Berlin observatory, and accepted in 1854 the post of director of the new observatory at Ann Arbor, Michigan, U.S.A. Here he published, 1858-1862, a journal entitled *Astronomical Notices*, while his tables of the minor planets Flora, Victoria and Iris were severally issued in 1857, 1859 and

1869. In 1860 he went, as associate director of the observatory, to Albany, N. Y.; but returned in 1861 to Michigan, and threw himself with vigour into the work of studying the astronomical and physical constants of the observatory and its instruments. In 1863 he resigned its direction and returned to Germany; then, on the death of Sir W. R. Hamilton in 1865, he accepted the post of Andrews professor of astronomy in the university of Dublin and astronomer-royal of Ireland. His first undertaking at the Dublin observatory was the erection of an equatorial telescope to carry the fine object-glass presented to the university by Sir James South; and on its completion he began an important series of researches on stellar parallax. The first, second and third parts of the *Astronomical Observations and Researches made at Dunsink* contain the results of these labours, and include discussions of the distances of the stars α Lyrae, σ Draconis, Groombridge 1830, 85 Pegasi, and Bradley 3077, and of the planetary nebula H. iv. 37. In 1873 the observatory, on Dr Brünnow's recommendation, was provided with a first-class transit-circle, which he proceeded to test as a preliminary to commencing an extended programme of work with it, but in the following year, in consequence of failing health and eyesight, he resigned the post and retired to Basel. In 1880 he removed to Vevey, and in 1889 to Heidelberg, where he died on the 20th of August 1891. The permanence of his reputation was secured by the merits of his *Lehrbuch der sphärischen Astronomie*, which were at once and widely appreciated. In 1860 part i. was translated into English by Robert Main, the Radcliffe observer at Oxford; Brünnow himself published an English version in 1865; it reached in the original a 5th edition in 1881, and was also translated into French, Russian, Italian and Spanish.

See *Month. Notices Roy. Astr. Society*, lii. 230; J. C. Poggendorff's *Biog. Lit. Handwörterbuch*, Bd. iii.; *Nature*, xliv. 449.

BRUNO, SAINT, founder of the Carthusians, was born in Cologne about 1030; he was educated there and afterwards at Reims and Tours, where he studied under Berengar. He was ordained at Cologne, and thence, in 1057, he was recalled to Reims to become *scholasticus*, or head of the cathedral school, and overseer of the schools of the diocese. He was made also canon and diocesan chancellor. Having protested against the misdoings of a new archbishop, he was deprived of all his offices and had to fly for safety (1076). On the deposition of the archbishop in 1080, Bruno was presented by the ecclesiastical authorities to the pope for the see, but Philip I. of France successfully opposed the appointment. After this Bruno left Reims and retired, with six companions, to a desert among the mountains near Grenoble, and there founded the Carthusian order (1084). After six years Urban II. called him to Rome and offered him the archbishopric of Reggio; but he refused it, and withdrew to a desert in Calabria, where he established two other monasteries, and died in 1101. He wrote Commentaries on the Psalms and the Pauline Epistles, to be found in Migne, *Patr. Lat.* clii. and cliii.; some works by namesakes have been attributed to him.

His Life will be found in the Bollandists' *Acta Sanctorum* (6th of October). The best study on St Bruno's life and works is Hermann Löbbel, *Der Stifter des Karthäuser-Ordens*, 1899 (vol. v. No. 1 of "Kirchengeschichtliche Studien," Münster).

(E. C. B.)

BRUNO, or BRUN (925-965), archbishop of Cologne, third son of the German king, Henry I., the Fowler, by his second wife Matilda, was educated for the church at Utrecht, where he
[v.04 p.0686] distinguished himself by his studious zeal. In 940 his brother, King Otto, afterwards the emperor Otto the Great, appointed him chancellor, and some years later arch-chaplain, and under his leadership the chancery was reformed and became a training ground for capable administrators. He rendered valuable assistance to his brother Otto in his efforts to suppress the risings which marked the earlier part of his reign, services which were rewarded in 953 when Bruno was made archbishop of Cologne, and about the same time duke of Lorraine. Bruno is chiefly renowned as a scholar and a patron of learning. He consorted eagerly with learned foreigners, tried to secure a better education for the clergy, and was mainly instrumental in making his brother's court a centre of intellectual life. He built many churches, and, aided by the tendency of the time, sought to purify monastic life. He died at Reims on the 11th of October 965, and was buried in the church of St Pantaleon at Cologne.

See Ruotger, "Vita Brunonis archiepiscopi Coloniensis," in the *Monumenta Germaniae Historica, Scriptures*, Band iv. (Hanover and Berlin, 1826-1892); E. Meyer, *De Brunone I. Archiepiscopo Coloniensi* (Berlin, 1867); J.P. Pfeiffer, *Historisch-Kritische Beitrage zur Geschichte Bruns I.* (Cologne, 1870); K. Martin, *Beitrage zur Geschichte Brunos I. von Koln* (Jena, 1878).

BRUNO, GIORDANO (c. 1548-1600), Italian philosopher of the Renaissance, was born near Nola in the village of Cicala. Little is known of his life. He was christened Filippo, and took the name Giordano only on entering a religious order. In his fifteenth year he entered the order of the Dominicans at Naples, and is said to have composed a treatise on the ark of Noah. Why he submitted to a discipline palpably unsuited to his fiery spirit we cannot tell. In consequence of his views on transubstantiation and the immaculate conception he was accused of impiety, and after enduring persecution for some years, he fled from Rome about 1576, and wandered through various cities, reaching Geneva in 1579. The home of Calvinism was no resting-place for him (T. Dufour, *Giordano Bruno à Genève*, Geneva, 1884), and he travelled on through Lyons, Toulouse and Montpellier, arriving at Paris in 1581. Everywhere he bent his energies to the exposition of the new thoughts which were beginning to effect a revolution in the thinking world. He had drunk deeply of the spirit of the Renaissance, the determination to see for himself the noble universe, unclouded by the mists of authoritative philosophy and church tradition. The

discoveries of Copernicus were eagerly accepted by him, and he used them as the lever by which to push aside the antiquated system that had come down from Aristotle, for whom, indeed, he had a perfect hatred. Like Bacon and Telesio he preferred the older Greek philosophers, who had looked at nature for themselves, and whose speculations had more of reality in them. He had read widely and deeply, and in his own writings we come across many expressions familiar to us in earlier systems. Yet his philosophy is no eclecticism. He owed something to Lucretius, something to the Stoic nature-pantheism, something to Anaxagoras, to Heraclitus, to the Pythagoreans, and to the Neoplatonists, who were partially known to him; above all, he was a profound student of Nicolas of Cusa, who was indeed a speculative Copernicus. But his own system has a distinct unity and originality; it breathes throughout the fiery spirit of Bruno himself.

Bruno had been well received at Toulouse, where he had lectured on astronomy; even better fortune awaited him at Paris, especially at the hands of Henry III. He was offered a chair of philosophy, provided he would receive the Mass. He at once refused, but was permitted to deliver lectures. These seem to have been altogether devoted to expositions of a certain logical system which Bruno had taken up with great eagerness, the *Ars Magna* of Raimon Lull. With the exception of a satiric comedy, *Il Candelajo*, all the works of this period are devoted to this logic —*De Umbris Idearum, Ars Memoriae, De compendiosa architectura et complemento artis Lullii*, and *Cantus Circaeus*. To many it has seemed a curious freak of Bruno's that he should have so eagerly adopted a view of thought like that of Lull, but in reality it is in strict accordance with the principles of his philosophy. Like the Arabian logicians, and some of the scholastics, who held that ideas existed in a threefold form—*ante res*, *in rebus* and *post res*—he laid down the principle that the archetypal ideas existed metaphysically in the ultimate unity or intelligence, physically in the world of things, and logically in signs, symbols or notions. These notions were shadows of the ideas, and the *Ars Magna* furnished him with a general scheme, according to which their relations and correspondences should be exhibited. It supplied not only a *memoria technica*, but an *organon*, or method by which the genesis of all ideas from unity might be represented intelligibly and easily. It provided also a substitute for either the Aristotelian or the Ramist logic, which was an additional element in its favour.

Under the protection of the French ambassador, Michel de Castelnau, sieur de Mauvissière, Bruno passed over in 1583 to England, where he resided for about two years. He was disgusted with the brutality of English manners, which he paints in no flattering colours, and he found pedantry and superstition as rampant in Oxford as in Geneva. Indeed, there still existed on the statute a provision that "Masters and Bachelors who did not follow Aristotle faithfully were liable to a fine of five shillings for every point of divergence, and for every fault committed against the logic of the Organon." But he indulges in extravagant eulogies of Elizabeth. He is generally said to have formed the acquaintance of Sir Philip Sidney, Fulke Greville and other eminent Englishmen, but there has been much controversy as to the facts of his life in London. It seems probable that he lived in the French embassy in some secretarial or tutorial position. He may conceivably have met Bacon, but it is quite incredible that he met Shakespeare in the printing shop of Thomas Vautrollier. In Oxford he was allowed to hold a disputation with some learned doctors on the rival merits of the Copernican and so-called Aristotelian systems of the universe, and, according to his own report, had an easy victory. The best of his works were written in the freedom of English social life. The *Cena de le Ceneri*, or Ash Wednesday conversation, devoted to an exposition of the Copernican theory, was printed in 1584. In the same year appeared his two great metaphysical works, *De la Causa, Principio, ed Uno*, and *De l'Infinito, Universo, e Mondi*; in the year following the *Eroici Furori* and *Cabala del Cavallo Pegaseo*. In 1584 also appeared the strange dialogue, *Spaccio della Bestia Trionfante* (*Expulsion of the Triumphant Beast*), an allegory treating chiefly of moral philosophy, but giving the essence of Bruno's philosophy. The gods are represented as resolving to banish from the heavens the constellations, which served to remind them of their evil deeds. In their places are put the moral virtues. The first of the three dialogues contains the substance of the allegory, which, under the disguise of an assault on heathen mythology, is a direct attack on all forms of anthropomorphic religion. But in a philosophical point of view the first part of the second dialogue is the most important. Among the moral virtues which take the place of the beasts are Truth, Prudence, Wisdom, Law and Universal Judgment, and in the explanation of what these mean Bruno unfolds the inner essence of his system. Truth is the unity and substance which underlies all things; Prudence or Providence is the regulating power of truth, and comprehends both liberty and necessity; Wisdom is providence itself in its supersensible aspect—in man it is reason which grasps the truth of things; Law results from wisdom, for no good law is irrational, and its sole end and aim is the good of mankind; Universal Judgment is the principle whereby men are judged according to their deeds, and not according to their belief in this or that catechism. Mingled with his allegorical philosophy are the most vehement attacks upon the established religion. The monks are stigmatized as pedants who would destroy the joy of life on earth, who are avaricious, dissolute and the breeders of eternal dissensions and squabbles. The mysteries of faith are scoffed at. The Jewish records are put on a level with the Greek myths, and miracles are laughed at as magical tricks. Through all this runs the train of thought resulting naturally from Bruno's fundamental principles, and familiar in modern philosophy as Spinozism, the denial of particular providence, the doctrine of the uselessness of prayer, the identification in a sense of liberty and necessity, and the peculiar definition of good and evil.

[v.04 p.0687] In 1585-1586 he returned with Castelnau to Paris, where his anti-Aristotelian views were taken up by the college of Cambrai, but was soon driven from his refuge, and we next find him at Marburg and Wittenberg, the headquarters of Lutheranism. There is a tradition that here or in

England he embraced the Protestant faith; nothing in his writings would lead one to suppose so. Several works, chiefly logical, appeared during his stay at Wittenberg (*De Lampade combinatoria Lulliana*, 1587, and *De Progressu et Lampade venatoria logicorum*, 1587). In 1588 he went to Prague, then to Helmstadt. In 1591 he was at Frankfort, and published three important metaphysical works, *De Triplici Minimo et Mensura*; *De Monade, Numero, et Figura*; *De Immenso et Innumerabilibus*. He did not stay long at Prague, and we find him next at Zürich, whence he accepted an invitation to Venice from a young patrician, Giovanni Mocenigo. It was a rash step. The emissaries of the Inquisition were on his track; he was thrown into prison, and in 1593 was brought to Rome. Seven years were spent in confinement. On the 9th of February 1600 he was excommunicated, and on the 17th was burned at the stake.

For more than two centuries Bruno received scarcely the consideration he deserved. On the 9th of June 1889, however, as a result of a strong popular movement, a statue to him was unveiled in Rome in the Campo dei Fiori, the place of his execution.

To Bruno, as to all great thinkers, philosophy is the search for unity. Amid all the varying and contradictory phenomena of the universe there is something which gives coherence and intelligibility to them. Nor can this unity be something apart from the things; it must contain in itself the universe, which develops from it; it must be at once all and one. This unity is God, the universal substance,—the one and only principle, or *causa immanens*,—that which is in things and yet is distinct from them as the universal is distinct from the particular. He is the efficient and final cause of all, the beginning, middle, and end, eternal and infinite. By his action the world is produced, and his action is the law of his nature, his necessity is true freedom. He is living, active intelligence, the principle of motion and creation, realizing himself in the infinitely various forms of activity that constitute individual things. To the infinitely actual there is necessary the possible; that which determines involves somewhat in which its determinations can have existence. This other of God, which is in truth one with him, is matter. The universe, then, is a living cosmos, an infinitely animated system, whose end is the perfect realization of the variously graduated forms. The unity which sunders itself into the multiplicity of things may be called the *monas monadum*, each thing being a *monas* or self-existent, living being, a universe in itself. Of these monads the number is infinite. The soul of man is a thinking monad, and stands mid-way between the divine intelligence and the world of external things. As a portion of the divine life, the soul is immortal. Its highest function is the contemplation of the divine unity, discoverable under the manifold of objects.

Such is a brief summary of the principal positions of Bruno's philosophy. It seems quite clear that in the earlier works, particularly the two Italian dialogues, he approached more nearly to the pantheistic view of things than in his later Latin treatises. The unity expounded at first is simply an *anima mundi*, a living universe, but not intelligent. There is a distinct development traceable towards the later and final form of his doctrine, in which the universe appears as the realization of the divine mind.

Bruno's writings had been much neglected when Jacobi brought them into notice in his *Briefe über die Lehre Spinozas* (2nd ed., 1879). Since then many have held that Descartes, Spinoza and Leibnitz were indebted to him for their main principles. So far as Descartes is concerned, it is highly improbable that he had seen any of Bruno's works. Schelling, however, called one of his works after him, *Bruno*.

Bibliography.—The chief edition of the Latin works is that published at the public expense by F. Fiorentino, F. Tocco and H. Vitelli (Naples, 1879-1891), which superseded that of A.F. Gfrörer (Stuttgart, 1834, incomplete). The Italian works were collected by A. Wagner (Leipzig, 1830), and a new edition was published by P. de Lagarde (Göttingen, 1888-1889); also *Opere Italiane*, ed. Croce and G. Gentile (1907 foll.), with notes by the latter. In Germany, *Gesammelte Werke*, trans. L. Kuhlenbeck (1904 foll.). English translations:—The *Spaccio*, by Morehead, not as has been supposed by J. Toland (dated 1713, but probably printed earlier and very rare); of the preface to *De l' Infinito* (J. Toland in posthumous works); *Eroici Furores*, L. Williams (1888). There are also French and German translations.

The chief English work on Giordano Bruno is that of J. Lewis M^{c}Intyre (London, 1903), containing life, commentary and bibliography. See also C. Bartholmess, *J. Bruno* (Paris, 1846-1847); Domenico Berti, *Giordano Bruno da Nola* (2nd ed., 1889); H. Brunnhofer, *Giordano Brunos Weltanschauung* (Leipzig, 1883); M. Carrière, *Philosophische Weltanschauung der Reformationszeit*, pp. 411-494 (2nd ed., 1887); F.J. Clemens, *Giordano Bruno und Nicolaus von Cusa* (Bonn, 1847); Miss I. Frith, *Life of Giordano Bruno the Nolan* (London, 1887); C.E. Plumptre, *Life and Works of Giordano Bruno* (London, 1884); Chr. Sigwart, in *Kleine Schriften*, 1st series, pp. 49-124, 293-304; A. Riehl, *G. Bruno* (1889, ed. 1900; Eng. trans. Agnes Fry, 1905); Landsbeck, *Bruno, der Martyrer der neuen Weltanschauung* (1890); Owen, in *Sceptics of the Italian Renaissance* (London, 1893); C.H. von Stein, *G. Bruno* (1900); R. Adamson, *Development of Modern Philosophy* (Edinburgh and London, 1903); G. Louis, *G. Bruno, seine Weltanschauung und Lebensauffassung* (1900); O. Juliusberger, *G. Bruno und die Gegenwart* (1902); J. Reiner, *G. Bruno und seine Weltanschauung* (1907). The most important critical works are perhaps those of Felice Tocco, *Le Opere Latine di Giordano Bruno* (Florence, 1889), *Le Opere Inedite di Giordano Bruno* (Naples, 1891), *Le Fonti piu recenti della filos. del Bruno* (Rome, 1892). See also H. Höffding, *History of Modern Philosophy* (Eng. trans., 1900); J.M. Robertson, *Short History of Freethought* (London, 1906); G. Gentile, *Giordano Bruno nella Storia della cultura* (1907). For other works see G. Graziano, *Bibliografia Bruniana* (1900).

(R. Ad.; J. M. M.)

BRUNO (Brun, Bruns) **OF QUERFURT, SAINT** (c. 975-1009), German missionary bishop and martyr, belonged to the family of the lords of Querfurt in Saxony. He was educated at the famous cathedral school at Magdeburg, and at the age of twenty was attached to the clerical household of the emperor Otto III. In 996 he accompanied the emperor to Rome, and there gave up his post and entered the monastery of SS. Alexius and Bonifacius on the Aventine, taking "in religion" the name of Bonifacius. When the news reached Rome of the martyrdom of Adalbert, bishop of Prague (997), Bruno determined to take his place, and in 1004, after being consecrated by the pope as archbishop of the eastern heathen, he set out for Germany to seek aid of the emperor Henry II. The emperor, however, being at war with Boleslaus of Poland, opposed his enterprise, and he went first to the court of St Stephen of Hungary, and, finding but slight encouragement there, to that of the grand prince Vladimir at Kiev. He made no effort to win over Vladimir to the Roman obedience, but devoted himself to the conversion of the pagan Pechenegs who inhabited the country between the Don and the Danube. In this he was so far successful that they made peace with the grand prince and were for a while nominally Christians. In 1008 Bruno went to the court of Boleslaus, and, after a vain effort to persuade the emperor to end the war between Germans and Poles, determined at all hazards to proceed with his mission to the Prussians. With eighteen companions he set out; but on the borders of the Russian (Lithuanian) country he and all his company were massacred by the heathens (February 14, 1009).

During his stay in Hungary (1004) Bruno wrote a life of St Adalbert, the best of the three extant biographies of the saint (in Pertz, *Mon. Germ. Hist. Scriptores*, iv. pp. 577, 596-612), described by A. Potthast (*Bibliotheca hist. med. aev.*) as "in the highest degree attractive both in manner and matter."

A life of St Bruno was written by Dietmar, bishop of Merseburg (976-1019). This, with additions from the life of St Romuald, is published in the Bollandist *Acta Sanctorum* (June 19), vi. 1, pp. 223-225. See further U. Chevalier, *Répertoire des sources historiques, Bio-Bibliographie* (Paris, 1904), s.v. "Brunon de Querfurt."

BRUNSBÜTTEL, a seaport town of Germany, in the Prussian province of Schleswig-Holstein, on the N. bank of the Elbe, 60 m. N.W. from Hamburg. Pop. (1905) 2500. Brunsbüttel is the west terminus of the Kaiser Wilhelm Canal, which is closed there by double locks. Here also are an inner harbour, 1640 ft. long and 656 ft. wide, a coaling station, and a small harbour for the tugs and other vessels belonging to the canal company.

BRUNSWICK, KARL WILHELM FERDINAND, Duke of (1735-1806), German general, was born on the 9th of October 1735 at Wolfenbüttel. He received an unusually wide and thorough education, and travelled in his youth in Holland, France and various parts of Germany. His first military experience was in the North German campaign of 1757, under the duke of Cumberland. At the battle of Hastenbeck he won great renown by a gallant charge at the head of an infantry brigade; and upon the capitulation of Kloster Zeven he was easily persuaded by his uncle Ferdinand of Brunswick, who succeeded Cumberland, to continue in the war as a general officer. The exploits of the hereditary prince, as he was called, soon gained him further reputation, and he became an acknowledged master of irregular warfare. In pitched battles, and in particular at Minden and Warburg, he proved himself an excellent subordinate. After the close of the Seven Years' War, the prince visited England with his bride, the daughter of Frederick, prince of Wales, and in 1766 he went to France, being received both by his allies and his late enemies with every token of respect. In Paris he made the acquaintance of Marmontel; in Switzerland, whither he continued his tour, that of Voltaire; and in Rome , where he remained for a long time, he explored the antiquities of the city under the guidance of Winckelmann. After a visit to Naples he returned to Paris, and thence, with his wife, to Brunswick. His services to the dukedom during the next few years were of the greatest value; with the assistance of the minister Féronce von Rotenkreuz he rescued the state from the bankruptcy into which the war had brought it. His popularity was unbounded, and when he succeeded his father, Duke Karl I., in 1780, he soon became known as a model to sovereigns. He was perhaps the best representative of the benevolent despot of the 18th century—wise, economical, prudent and kindly. His habitual caution, if it induced him on some occasions to leave reforms uncompleted, at any rate saved him from the failures which marred the efforts of so many liberal princes of his time. He strove to keep his duchy from all foreign entanglements. At the same time he continued to render important services to the king of Prussia, for whom he had fought in the Seven Years' War; he was a Prussian field marshal, and was at pains to make the regiment of which he was colonel a model one, and he was frequently engaged in diplomatic and other state affairs. He resembled his uncle Frederick the Great in many ways, but he lacked the supreme resolution of the king, and in civil as in military affairs was prone to excessive caution. As an enthusiastic adherent of the Germanic and anti-Austrian policy of Prussia he joined the *Fürstenbund*, in which, as he now had the reputation of being the best soldier of his time, he was the destined commander-in-chief of the federal army.

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Between 1763 and 1787 his only military service had been in the brief War of the Bavarian Succession; in the latter year, however, the Duke, as a Prussian field marshal, led the army which invaded Holland. His success was rapid, complete and almost bloodless, and in the eyes of contemporaires the campaign appeared as an example of perfect generalship. Five years later Brunswick was appointed to the command of the allied Austrian and German army assembled to invade France and crush the Revolution. In this task he knew that he must encounter more than a formal resistance. He was so far in acknowledged sympathy with French hopes of reform, that when he gave an asylum in his duchy to the "comte de Lille" (Louis XVIII.) the revolutionary

government made no protest. Indeed, earlier this year (1792) he had been offered supreme command of the French army. As the king of Prussia took the field with Brunswick's army, the duke felt bound as a soldier to treat his wishes as actual orders. (For the events of the Valmy campaign see FRENCH REVOLUTIONARY WARS). The result of Brunswick's cautious advance on Paris was the cannonade of Valmy followed by a retreat of the allies. The following campaign of 1793 showed his perhaps at his best as a careful and exact general; even the fiery Hoche, with the "nation in arms" behind him, failed to make any impression on the veteran leader of the allies. But difficulties and disagreements at headquarters multiplied, and when Brunswick found himself unable to move or direct his army without interference from the king, he laid down his command and returned to govern his duchy. He did not, however, withdraw entirely from Prussian service, and in 1803 he carried out a successful and diplomatic mission to Russia. In 1806, at the personal request of Queen Louise of Prussia, he consented to command the Prussian army, but here again the presence of the king of Prussia and the conflicting views of numerous advisers of high rank proved fatal. At the battle of Auerstadt the old duke was mortally wounded. Carried for nearly a month in the midst of the routed Prussian army he died at last on the 10th of November 1806 at Ottensen near Hamburg.

His son and successor, FRIEDRICH WILHELM (1771-1815), who was one of the bitterest opponents of Napoleonic domination in Germany, took part in the war of 1809 at the head of a corps of partisans; fled to England after the battle of Wagram, and returned to Brunswick in 1813, where he raised fresh troops. He was killed at the battle of Quatre Bras on the 16th of June 1815.

See Lord Fitzmaurice, *Charles W.F., duke of Brunswick* (London, 1901); memoir in *Allgemeine deutsche Biographie*, vol. ii. (Leipzig, 1882); and, for an interesting sketch of his military character, A. Chuquet, *Les Guerres de la Révolution—La Premiére Invasion prussienne* (Paris, N.D.).

BRUNSWICK, a city and the county-seat of Glynn county, Georgia, U.S.A., and a port of entry, on St Simon Sound, about 12 m. from the Atlantic Ocean, and about 100 m. S. of Savannah. Pop. (1890) 8459; (1900) 9081, of whom 5184 were of negro descent; (1910 U.S. census) 10,182. It is one of the seaports of Georgia, the Federal government having dredged a channel in the inner harbour 21 ft. deep at mean low water and a channel across the outer bar 19.3 ft. deep at mean low water—there is a rise of 7.2 ft. at high tide. St Simon Island and Jekyl Island (a winter resort of wealthy men), lying between the ocean and the mainland, protect the harbour. The city is served by the Southern, the Atlanta, Birmingham & Atlantic, and the Atlantic Coast Line railways; it is also connected by lines of steamboats with various ports along the coast, including New York and Boston. Brunswick's growth has been retarded by the successful rivalry of other cities, notably Savannah; but it has a considerable export trade, principally in lumber, cross-ties and naval stores—its exports were valued at $13,387,838 in 1908—and various manufactories, including planing mills, cooperage works and oyster canneries. It was settled about 1772, and received a city charter in 1856.

BRUNSWICK (Ger. *Braunschweig*), a sovereign duchy of northern Germany, and a constituent state of the German empire, comprising three larger and six smaller portions of territory. The principal or northern part, containing the towns of Brunswick, Wolfenbüttel and Helmstedt, is situated between the Prussian provinces of Hanover and Saxony to the south-east of the former. The western part, containing Holzminden and Gandersheim, extends eastward from the river Weser to Goslar. The Blankenburg, or eastern portion, lies to the south-east of the two former, between Prussia, the duchy of Anhalt and the Prussian province of Hanover. The six small enclaves, lying in the Prussian provinces of Hanover and Saxony, are the districts Thedinghausen, Harzburg and Kalvörde, and the three demesnes of Bodenburg, Olsburg and Ostharingen. A portion of the Harz mountains was, down to 1874, common to Brunswick and Prussia (Hanover) and known as the Communion Harz. In 1874 a partition was effected, but the mines are still worked in common, four-sevenths of the revenues derived from them falling to Prussia and the remaining three-sevenths to Brunswick.

The northern portion of the duchy has its surface diversified by hill and plain; it is mostly arable and has little forest. The other two principal portions are intersected by the Harz mountains, and its spurs and the higher parts are covered with forests of fir, oak and beech. The greatest elevations are the Wurmberg (3230 ft.), and the Achtermannshöhe (3100 ft.), lying south of the Brocken. Brunswick belongs almost entirely to the basin of the river Weser, into which the Oker, the Aller and the Leine, having their sources in the Harz, discharge their waters. The climate is mild in the north, but in the hilly country raw and cold in winter, and in autumn and spring damp. The area of the duchy is 1424 sq. m., and of this total fully one-half is arable land, 10% meadow and pasture, and 33% under forest. The population in 1905 was 485,655. The religion is, in the main, that of the Lutheran Evangelical church; but there is a large Roman Catholic community centred in and round Hildesheim, the seat of the bishopric of North Germany. The Jews have several synagogues, with a rabbinate in Brunswick. The birth-rate is 35.3, and the death-rate 21.6 per thousand inhabitants. In the rural districts, broad Low German is spoken; but the language of the upper and educated classes is distinguished by its purity of style and pronunciation.

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The land devoted to agriculture is excellently farmed, and cereals, beet (for sugar), potatoes and garden produce of all kinds, particularly fruit, obtain the best market prices. The pasture land rears cattle and sheep of first-rate quality, and great attention is paid to the breeding of horses, in which the famous stud farm at Harzburg has of late years been eminently conspicuous. Timber cutting, in the forests of the Harz, employs a large number of hands. But agriculture, which, until

recently, formed the chief wealth of the duchy, has now given way to the mining industry, both in point of the numbers of inhabitants employed and in the general prosperity distributed by it. The chief seat of the mining industry is the Harz, and its development annually increases in extent and importance. Coal (bituminous), iron, lead, copper, sulphur, alum, marble, alabaster, lime and salt are produced in large quantities, and the by-products of some of these, particularly chemicals and asphalt, constitute a great source of revenue. The manufactures embrace sugar (from beet), spinning, tobacco, paper, soap machines, glass, china, beer and sausages. The last are famous throughout Germany. The principal articles of export are thread, dyes, cement, chicory, beer, timber, preserves, chemicals and sausages. The railways, formerly belonging to the state, were, in 1870, leased to private companies and in 1884 purchased by Prussia, and have a length of about 320 m. The roads, of which one quarter are in the hands of the state, are excellently kept, and vie with those of any European country.

The constitution is that of a limited monarchy, and dates from a revision of the fundamental law on the 12th of October 1832. The throne is hereditary in the house of Brunswick-Lüneburg, according to the law of primogeniture, and in the male line of succession, but the rightful heir, Ernest, duke of Cumberland, was not allowed to take possession. The parliament of the duchy (*Landes-* or *Ständeversammlung*) is an assembly of estates forming one house of 48 deputies, of whom 30 are elected by municipal and rural communities, while the remainder represent the Evangelical church, the large landed proprietors, manufacturers and the professions. The house, however, has little power in initiating legislation, but it can refuse taxation, impeach ministers and receive petitions. The executive functions of the administration and government reside in the ministry (*Staatsministerium*) consisting of three responsible ministers, assisted by a council of the holders of the other chief offices of state. The public debt amounts to about 3¼ millions sterling, and the civil list to about £56,000 a year, mostly derived from the revenues of the state domains. By virtue of a convention with Prussia, of March 1886, the Brunswick contingent to the imperial forces forms a part of the Prussian army and is attached to the X. army corps. The convention can be rescinded only after a two years' notice.

History.—The lands which comprise the modern duchy of Brunswick belonged in the 10th century to the family of the Brunos, whence the name Brunswick is derived, of the counts of Nordheim, and the counts of Supplinburg. Inherited during the 12th century by Henry the Proud, duke of Saxony and Bavaria, and a member of the family of Welf, they subsequently formed part of the extensive Saxon duchy ruled by his son, Henry the Lion.

When Henry was placed under the imperial ban and his duchy dismembered in 1181, he was allowed to retain his hereditary possessions, which consisted of a large part of Brunswick and Lüneburg. The bulk of these lands came subsequently to Henry's grandson, Otto, and in 1235 the emperor Frederick II., anxious to be reconciled with the Welfs, recognized Otto's title and created him duke of Brunswick and Lüneburg. Otto added several counties and the town of Hanover to his possessions, and when he died in 1252 was succeeded by his sons Albert and John. In 1267 these princes divided the duchy, Albert becoming duke of Brunswick, and John duke of Lüneburg. The dukes of Lüneburg increased the area of their duchy, and when the family died out in 1369 a stubborn contest took place for its possession. Claimed by Magnus II., duke of Brunswick-Wolfenbüttel, this prince was forced by the emperor Charles IV. to abandon his pretensions, but in 1388 his sons succeeded in incorporating Lüneburg with Brunswick-Wolfenbüttel. In 1285 the duchy of Brunswick had been divided between Duke Albert's three sons, whose relations with each other were far from harmonious, and the lines of Wolfenbüttel, Göttingen and Grubenhagen had been established. The Wolfenbüttel branch died out in 1292, but was refounded in 1345 by Magnus I., a younger member of the Göttingen family; the elder Göttingen branch died out in 1463, and the Grubenhagen branch in 1596. Magnus I., duke of Brunswick-Wolfenbüttel from 1345 to 1369, was the ancestor of the later dukes of Brunswick. His grandsons, Frederick, Bernard and Henry, secured Lüneburg in 1388, but in 1428 Bernard, the only survivor of the three, was forced to make a division of the duchy, by which he received Lüneburg, while his nephews, William and Henry, obtained Brunswick, which in 1432 they divided into Calenberg and Wolfenbüttel. In 1473, however, William, who had added Göttingen to his possessions in 1463, united these lands; but they were again divided from 1495 to 1584. In 1584 Brunswick was united by Duke Julius, and in 1596 Grubenhagen was added to it. Duke Frederick Ulrich, however, was obliged to cede this territory to Lüneburg in 1617, and when he died in 1634 his family became extinct, and Brunswick was divided between the two branches of the Lüneburg family.

The duchy of Lüneburg, founded by Bernard in 1428, remained undivided until 1520, when Duke Henry abdicated and his three sons divided the duchy. Two of the branches founded at this time soon died out; and in 1569, after the death of Ernest I., the representative of the third branch, his two sons agreed upon a partition which is of considerable importance in the history of Brunswick, since it established the lines of Dannenberg and of Lüneburg-Celle, and these two families divided the duchy of Brunswick-Wolfenbüttel in 1635. The dukes of Lüneburg-Celle subsequently took the name of Hanover, and were the ancestors of the later kings of Hanover (*q.v.*). After the acquisition of 1635 the family of Dannenberg took the title of Brunswick-Wolfenbüttel, and ruled in the direct line until 1735. It was then followed by the family of Brunswick-Bevern, which had split off from the parent line in 1666 and ruled until 1884.

Brunswick has not played a very important part in German politics. Many counties were added to its area, but it was weakened by constant divisions of territory, and during the period of the Reformation some of the princes took one side and some the other. The treaty of Westphalia in

1648 made little difference to its prestige, but its subsequent position was greatly affected by the growth of Prussia. During the Seven Years' War Brunswick supported Frederick the Great, and in return was severely ravaged by the French. Duke Charles I., who accumulated a large amount of debt, sought to discharge his liabilities by sending his soldiers as mercenaries to assist England during the American War of Independence. The succeeding duke, Charles William Ferdinand, brought order into the finances, led the Prussian troops against Napoleon, and died in 1806 from wounds received at the battle of Auerstadt. Napoleon then declared the ducal family deposed and included Brunswick in the kingdom of Westphalia. In 1813 it was restored to Duke Frederick William, who was killed in 1815 at the battle of Quatre Bras. His son, Charles II., while a minor, was under the regency of George, afterwards the English king George IV., who ruled the duchy through Ernest, Count Münster-Ledenburg (1766-1839), assisted by Justus von Schmidt-Phiseldeck (1769-1851). A new constitution was granted in 1820, but after Charles came of age in 1823 a period of disorder ensued. The duke, who was very unpopular with his subjects, quarrelled with his relatives, and in 1830 a revolution drove him from the country. The
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government was undertaken by his brother William, and in 1831 Charles was declared incapable of ruling, and William was appointed as his successor. The ex-duke, who made a fine collection of diamonds, died childless at Geneva in August 1873. William's long reign witnessed many excellent and necessary reforms. A new constitution was granted in 1832, and in 1844 Brunswick joined the Prussian Zollverein. Trial by jury and freedom of the press were established, many religious disabilities were removed, and measures were taken towards the freedom of trade.

Brunswick took very little part in the war between Prussia and Austria in 1866, but her troops fought for Prussia during the Franco-German War of 1870-71. The duchy joined the German Confederation in 1815, the North German Confederation in 1866, and became a state of the German empire in 1871.

In 1866 the question of the succession to Brunswick became acute. Duke William was unmarried, and according to the existing conventions it would pass to George, king of Hanover, who had just been deprived of his kingdom by the king of Prussia. In 1879, however, the duke and the estates, with the active support of Prussia, concluded an arrangement for a temporary council of regency to take over the government on William's death. Moreover, if in this event the rightful heir was unable to take possession of the duchy, the council was empowered to appoint a regent. William died on the 18th of October 1884, and George's son, Ernest, duke of Cumberland, claimed Brunswick and promised to respect the German constitution. This claim was disregarded by the council of regency, and the Bundesrat declared that the accession of the duke of Cumberland would be inimical to the peace and security of the empire on account of his attitude towards Prussia. In the following year the council chose Albert, prince of Prussia, as regent, a step which brought Brunswick still more under the influence of her powerful neighbour. Albert died in September 1906, and after some futile negotiations with the duke of Cumberland, the Brunswick diet chose Duke John Albert of Mecklenburg-Schwerin (b. 1857) as regent in May 1907.

See O. von Heinemann, *Geschichte Braunschweigs und Hannovers* (Gotha, 1882-1892); W. Havemann, *Geschichte der Lande Braunschweig und Lüneburg* (Göttingen, 1853-1857); H. Sudendorf, *Urkundenbuch zur Geschichte der Herzöge von Braunschweig und Lüneburg und ihrer Lande* (Hanover, 1859-1883); H. Guthe, *Die Lande Braunschweig und Hannover* (Hanover, 1890); J. Beste, *Geschichte der braunschweigischen Landeskirche von der Reformation bis auf unsere Tage* (Wolfenbüttel, 1889); A. Köcher, *Geschichte von Hannover und Braunschweig 1648-1714* (Leipzig, 1884).

BRUNSWICK, a city of Germany, capital of the duchy of that name, situated in a fertile and undulating country, on the Oker, 37 m. S.E. from Hanover and 53 N.W. from Magdeburg, on the main line of railway from Berlin. Pop. (1900) 128,226; (1905) 136,423, of which number about 9000 were Roman Catholics and 1000 Jews. Brunswick is an interesting place and retains much of its medieval character. The fortifications which formerly environed it were dismantled in 1797, and have given place to a regular circle of gardens and promenades, which rank among the finest in Germany. Within them lies the old town, with somewhat narrow and crooked streets, remarkable for its numerous ancient houses, with high gables and quaintly carved exteriors. In picturesqueness it vies with Lübeck and Lüneburg among North German towns. Among its churches, the cathedral, St Blasius, or Burgkirche, a Romanesque structure begun by Henry the Lion about 1173 and finished in 1194, is of interest. The chancel is decorated with 12th-century frescoes by Johannes Gallicus, and contains the tombs of the founder and his consort, with beautiful effigies in relief, and also that of the emperor Otto IV. In the vault beneath rest the remains of the Guelphs of the Brunswick line (since 1681). Remarkable among other churches are the Magnikirche (consecrated in 1031; the present edifice being built between the 13th and 15th centuries and restored in 1877); the Martinikirche, with Romanesque towers, originally a Romanesque basilica (1180-1190), enlarged in the 13th century in early Gothic by the addition of vaulted aisles and a choir (1490-1500), and remarkable further for the splendid late Gothic Annenkapelle (1434) and three magnificent portals; the Katharinenkirche, with a fine tower, begun by Henry the Lion in 1172, added to in 1252 and finished (choir) in 1500; the Brüderkirche (1361-1451, restored 1869-1870), formerly the church of a Franciscan house, the refectory of which (1486) is now used for military stores; the Andreaskirche (1200, 1360-1420), partly transitional, partly late Gothic, with a tower 318 ft. high; and the Aegidienkirche (1278-1434), now used for exhibitions and concerts.

In secular buildings, both ancient and modern, Brunswick is also rich. The most noticeable of these is the town hall (14th and 15th centuries), a gem of Gothic architecture. In front of it is a

beautiful Gothic leaden fountain of the early 15th century. Close by the cathedral is the Dankwarderode, a two-storeyed Romanesque building, erected in 1884 on the site of the ancient citadel of the same name which was destroyed by fire in 1873; the cloth merchants' hall (Gewandhaus) of the 13th century, with a richly ornamented facade in Renaissance style, now occupied by the chamber of commerce; the restored Huneborstelsche Haus with its curious and beautiful oak carving of the 16th century. The ducal palace is a fine modern structure, erected since 1865, when most of the previous building, which dated only from 1831, was destroyed by fire. The famous Quadriga of Rietschel, which perished at the same time, has been replaced by a copy by Georg Howaldt (1802-1883). The theatre lies on a spacious square close to the ducal gardens, and immediately outside the promenades; to the south is the handsome railway station. Among other numerous buildings of modern erection may be mentioned the new town hall (1895-1900) and the ministry of finance, both in early Gothic style. The scientific and art collections of Brunswick are numerous. The ducal museum contains a rich collection of antique and medieval curiosities, engravings and pictures. There are also a municipal museum, a museum of natural history, a mineralogical collection, a botanical garden and two libraries. The educational and charitable institutions of Brunswick are many. Of the former may be mentioned the Collegium Carolinum, founded in 1745, the technical high school, two gymnasia and an academy of forestry. Among the latter are a deaf and dumb institution, a blind asylum, an orphanage and various hospitals and infirmaries. A monument, 60 ft. high, to Duke Frederick William, who was slain at Quatre Bras, gives its name to the Monumentsplatz. Another to the south-east of the town perpetuates the memory of Schill Ferdinand (1776-1809) and his companions. There are also statues of Franz Abt, the composer, of Lessing and of the astronomer K.F. Gauss.

The industries of the town are considerable. Especially important are the manufacture of machinery, boilers, gasometers, pianos, preserves, chemicals, beer and sausages. Brunswick is also a leading centre of the book trade. The communications between the inner town and the extensive suburbs are maintained by an excellent service of electric tramways.

Brunswick is said to have been founded about 861 by Bruno, son of Duke Ludolf of Saxony, from whom it was named Brunswick (from the Old High German *Wich*, hamlet). Afterwards fortified and improved by Henry the Lion, it became one of the most important cities of northern Germany. For a long time its constitution was rather peculiar, as it consisted of five separate townlets, each with its own walls and gates, its own council and Rathaus—a condition traces of which are still evident. In the 13th century it ranked among the first cities of the Hanseatic League. After this era, however, it declined in prosperity, in consequence of the divisions of territory among the branches of the reigning house, the jealousy of the neighbouring states, the Thirty Years' War, and more recently the French occupation, under which it was assigned to the kingdom of Westphalia. During the time of the Reformation the sympathies of the citizens were with the new teaching, and the city was a member of the League of Schmalkalden. In 1830 it was the scene of a violent revolution, which led to the removal of the reigning duke. In 1834 it attained municipal self-government.

See F. Knoll, *Braunschweig und Umgebung* (1882); Sack, *Kurze Geschichte der Stadt Braunschweig* (1861); and H. Dürre, *Geschichte der Stadt Braunschweig im Mittelalter* (1875).

[v.04 p.0691] **BRUNSWICK,** a village of Cumberland county, Maine, U.S.A., in the township of Brunswick, on the Androscoggin river, 9 m. W. of Bath, and 27 m. N.N.E. of Portland. Pop. of the township (1900) 6806; (1910) 6621; of the village (1900) 5210 (1704 foreign-born); (1910) 5341. Brunswick is served by the Maine Central railway, and by the Lewiston, Brunswick & Bath, and the Portland & Brunswick electric railways. Opposite Brunswick and connected with it by a bridge is the township of Topsham (pop. in 1910, 2016). The village of Brunswick lies only 63 ft. above sea-level, shut within rather narrow bounds by hills or bluffs, from which good views may be obtained of the island-dotted sea and deeply-indented coast to the south and east and of the White Mountains to the west. The river falls in three successive stages for a total distance of 41 ft., furnishing good water-power for paper and cotton mills and other manufactories; the first cotton-mill in Maine was built here about 1809. The settlement of the site of Brunswick was begun by fishermen in 1628 and the place was called Pejepscot; in 1717 Brunswick was constituted a township under its present name by the Massachusetts general court, and in 1739 the township was regularly incorporated. The village was incorporated in 1836.

Brunswick is best known as the seat of Bowdoin College, a small institution of high educational rank. There are eleven buildings on a campus of about 40 acres, 1 m. from the riverbank at the end of the principal village thoroughfare. The chapel (King Chapel, named in honour of William King, the first governor of Maine), built of undressed granite, is of Romanesque style, and has twin towers and spires rising to a height of 120 ft.; the interior walls are beautifully decorated with frescoes and mural paintings. The Walker Art Building (built as a memorial to Theophilus W. Walker) is of Italian Renaissance style, has mural decorations by John la Farge, Elihu Vedder, Abbott H. Thayer and Kenyon Cox, and contains a good collection of paintings and other works of art. Among the paintings, many of which were given by the younger James Bowdoin, are examples of van Dyck, Titian, Poussin and Rembrandt. The library building is of Gothic style, and in 1908 contained 88,000 volumes (including the private library of the younger James Bowdoin). Among the other buildings are an astronomical observatory, a science building, a memorial hall, a gymnasium and three dormitories. The building of the Medical School of Maine (1820), which is a department of the college, is on the same campus. Bowdoin was incorporated by the general court of Massachusetts in 1794, but was not opened until 1802. It was named in honour of James Bowdoin (1726-1790), whose son was a liberal benefactor. The college has been maintained as a

non-sectarian institution largely by Congregationalists, and is governed by a board of trustees and a board of overseers. Among the distinguished alumni have been Nathaniel Hawthorne, Franklin Pierce, Henry W. Longfellow, John P. Hale, William P. Fessenden, Melville W. Fuller, and Thomas B. Reed.

BRUNSWICK-BEVERN, AUGUST WILHELM, DUKE OF (1715-1781), Prussian soldier, son of Ernst Ferdinand, duke of Brunswick-Bevern, was born at Brunswick in 1715, and entered the Prussian army in 1731, becoming colonel of an infantry regiment in 1739. He won great distinction at Hohenfriedeberg as a major-general, and was promoted lieutenant-general in 1750. He was one of the most experienced and exact soldiers in the army of Frederick the Great. He commanded a wing in the battle of Lobositz in 1756, and defeated the Austrians under Marshal Konigsegg in a well-fought battle at Reichenberg on the 21st of April 1757. He took part in the battles of Prague and Kolin and the retreat to Görlitz, and subsequently commanded the Prussians left behind by Frederick in the autumn of 1757 when he marched against the French. Bevern conducted a defensive campaign against overwhelming numbers with great skill, but he soon lost the valuable assistance of General Winterfeld, who was killed in a skirmish at Moys; and he was eventually brought to battle and suffered a heavy defeat at Breslau on the 22nd of November. He fell into the hands of the Austrians on the following morning, and remained prisoner for a year. He was made general of infantry in 1759, and on the 11th of August 1762 inflicted a severe defeat at Reichenbach on an Austrian army endeavouring to relieve Schweidnitz. Bevern retired, after the peace of Hubertusburg, to his government of Stettin, where he died in 1781.

BRUNTON, MARY (1778-1818), Scottish novelist, was born on the 1st of November 1778 in the island of Varra, Orkney. She was the daughter of Captain Thomas Balfour of Elwick. At the age of twenty she married Alexander Brunton, minister of Bolton in Haddingtonshire, and afterwards professor of oriental languages at Edinburgh. Mrs Brunton died on the 19th of December 1818. She was the author of two novels, popular in their day, *Self-control* (1810), and *Discipline* (1814; 1832 edition with memoir); and of a posthumous fragment, *Emmeline* (1819).

BRUSA, or BROUSSA (anc. *Prusa*), the capital of the Brusa (Khudavendikiar) vilayet of Asia Minor, which includes parts of ancient Mysia, Bithynia, and Phrygia, and extends in a southeasterly direction from Mudania, on the Sea of Marmora, to Afium-Kara-Hissar on the Smyrna-Konia railway. The vilayet is one of the most important in Asiatic Turkey, has great mineral and agricultural wealth, many mineral springs, large forests, and valuable industries. It exports cereals, silk, cotton, opium, tobacco, olive-oil, meerschaum, boracite, &c. The Ismid-Angora and Eskishehr-Konia railways pass through the province. Population of the province, 1,600,000 (Moslems, 1,280,000; Christians, 317,000; Jews, 3000).

The city stretches along the lower slopes of the Mysian Olympus or Kechish Dagh, occupying a position above the valley of the Nilufer (*Odrysses*) not unlike that of Great Malvern above the vale of the Severn. It is divided by ravines into three quarters, and in the centre, on a bold terrace of rock, stood the ancient *Prusa*. The modern town has clean streets and good roads made by Ahmed Vefyk Pasha when Vali, and it contains mosques and tombs of great historic and architectural interest; the more important are those of the sultans Murad I., Bayezid (Bajazet) I., Mahommed I., and Murad II., 1403-1451, and the Ulu Jami'. The mosques show traces of Byzantine, Persian and Arab influence in their plan, architecture and decorative details. The circular church of St Elias, in which the first two sultans, Osman and Orkhan, were buried, was destroyed by fire and earthquake, and rebuilt by Ahmed Vefyk Pasha. There are in the town an American mission and school, and a British orphanage. Silk-spinning is an important industry, the export of silk in 1902 being valued at £620,000. There are also manufactories of silk stuffs, towels, burnús, carpets, felt prayer-carpets embroidered in silk and gold. The hot iron and sulphur springs near Brusa, varying in temperature from 112° to 178° F., are still much used. The town is connected with its port, Mudania, by a railway and a road. There is a British vice-consul. Pop. 75,000 (Moslems, 40,000; Christians, 33,000; Jews, 2000).

Prusa, founded, it is said, at the suggestion of Hannibal, was for a long time the seat of the Bithynian kings. It continued to flourish under the Roman and Byzantine emperors till the 10th century, when it was captured and destroyed by Saif-addaula of Aleppo. Restored by the Byzantines, it was again taken in 1327 by the Ottomans after a siege of ten years, and continued to be their capital till Murad I. removed to Adrianople. In 1402 it was pillaged by the Tatars; in 1413 it resisted an attack of the Karamanians; in 1512 it fell into the power of Ala ed-Din; and in 1607 it was burnt by the rebellious Kalenderogli. In 1883 it was occupied by the Egyptians under Ibrahim Pasha, and from 1852-1855 afforded an asylum to Abd-el-Kader.

See L. de Laborde, *Voyage de l'Asie Mineure* (Paris, 1838); C. Texier, *Asie Mineure* (Paris, 1839).

BRUSH, GEORGE DE FOREST (1855-), American painter, was born at Shelbyville, Tennessee, on the 28th of September 1855. He was a pupil of J.L. Gérôme at Paris, and became a member of the National Academy of Design, New York. From 1883 onwards, he attracted much attention by his paintings of North American Indians, his "Moose Hunt," "Aztec King" and "Mourning her Brave" achieving great popularity and showing the strong influence of Gérôme. These were followed by picture portraits, particularly of mother and child, largely suggestive of the work of the Dutch, Flemish and German masters, carefully arranged as to line and mass, and worked out in great detail with consummate technical skill. Several of his paintings have for subject his own children and his wife; one of these is in the Boston Museum of Fine Arts.

BRUSH (from Fr. *brosse*, which, like the English word, means both the undergrowth of a wood and the instrument; if the word in both these meanings is ultimately the same, then the origin is from a bundle of brushwood used as a brush or broom, but this is historically doubtful, and others connect it with the Ger. *Borste*, bristle), an instrument for removing dust or dirt from surfaces or for applying paint, whitewash, &c., composed of a tuft or tufts of some fibrous or flexible material secured to a solid basis or stock. Brushes made of the twigs of trees like the birch and provided with long handles are often called brooms, and the same term is applied to some brushes used in the household for removing dust (*e.g.* carpet-broom, whisk-broom) but not to those used for applying paint. Among the numerous materials employed for the manufacture of brushes of various kinds are feathers, pig's bristles, the hair of certain animals, whalebone, rubber, split-cane, broom-corn (a variety of sorghum) and coir.

Brushes are of two kinds, simple and compound. The former consist of but one tuft, as hair pencils and painters' tools. The latter have more than one tuft. Brushes with the tufts placed side by side on flat boards, as plasterers' brushes, are called stock-brushes. The single tuft brushes, or pencils for artists, are made of the hair of the camel, badger, goat and other animals for the smaller kind, and pig's bristles for the larger. The hairs for pencils are carefully arranged so as to form a point in the centre, and, when tied together, are passed into the wide end of the quill or metal tube and drawn out at the other end to the extent required. The small ends of the quills, having been previously moistened, contract as they dry and bind the hair. A similar effect is produced with metal tubes by compression. Compound brushes are—first, set or pan-work; second, drawn-work. Of the former, an example is the common house-broom, into the stock of which holes are drilled of the size wanted. The necessary quantity of bristles, hair, or fibre to fill each hole being collected together, the thick ends are dipped into molten cement chiefly composed of pitch, bound round with thread, dipped again, and then set into a hole of the stock with a peculiar twisting motion. In drawn-brushes, of which those for shoes, teeth, nails and clothes are examples, the holes are more neatly bored, and have smaller ones at the top communicating with the back of the brush, through which a bight or loop of wire passes from the back of the stock. Half the number of hairs of fibres needed for the tufts to fill the holes are passed into the bight of the wire, which is then pulled smartly so as to double the hairs and force them into the loop-hole as far as possible. With all brushes, when the holes have been properly filled, the ends of the fibres outside are cut with shears, either to an even length or such form as may be desired. The backs are then covered with veneer or other material to conceal the wire and other crudities of the work. In trepanned brushes the bristles are inserted in holes that do not pass right through the stock, and are secured by threads or wires running in drawholes which are drilled through the stock at right angles to them. The ends of these drawholes are plugged so as to be as inconspicuous as possible, and the method avoids the necessity of a veneer on the back. The Woodbury machine, one of the earliest mechanical devices for the manufacture of brushes, which was invented in America about 1870, produced brushes of this kind. One of the most important purposes to which brushes have been applied is that of sweeping chimneys, and so far back as 1789 John Elin patented an arrangement of brushes for this purpose. Revolving brushes for sweeping rooms were patented in 1811, and the first patent in which they were applied to hair-dressing appears in 1862. Many inventions for sweeping and cleaning roads by means of revolving brushes and other contrivances have been introduced, one of the first being that of Edmund Henning in 1699 for "a new engine for sweeping the streets of London, or any city or town."

Brushes with tufts formed of steel wire are used for cleaning tubes and flues of steam boilers, for the purpose of removing the scale formed by the products of combustion. Steel-wire brushes are also used for cleaning scale from the interior surfaces of a boiler, and for removing the sand from the surface of a casting. Occasionally such brushes are revolved in a machine, for more convenient use on the article to be cleaned or polished. Snyer's patent elastic clutch or coupling, used for such purposes as coupling up or disconnecting a steam-engine from a line of shafting or dynamo, consists essentially of two disks, the adjacent faces of which are provided, one with a ring of brushes made of flat steel wire, the other with a number of finely serrated teeth. One of the disks is movable longitudinally on its shaft, and with the brushes clear of the serrations the clutch is free. On bringing the disks together, which may be done with the engine running at speed, the elasticity of the brush permits the motion to be imparted gradually and without shock to the standing part, until both rotate and are locked together. These clutches are very powerful, and are capable of transmitting as much as 3000 horse-power.

In dynamo-electric machinery the device used to conduct current into or out of the rotating armature is termed a "brush." There are usually two brushes to each dynamo or motor, and they are placed diametrically opposite, lightly touching the commutator of the armature. It is important that there should be good metallic contact between the brushes and the commutator, and at the same time the frictional resistance resulting from the contact must be a minimum. To effect this result brushes are variously made. A kind of brush frequently used consists of a number of copper wires laid side by side and soldered together at one end, where the brush is held. Brushes are also made of strips of spongy copper cut like a comb, which give a number of bearing points on the commutator. Very good results are obtained from brushes made of copper gauze wound closely until it takes the exterior form of a rectangular block, which is held radially in a spring holder, and bears at the end on the commutator. In place of the gauze block "brushes" of hard carbon blocks are frequently used (see Dynamo).

BRUSSELS (Fr. *Bruxelles*, Flem. *Brussel*), the capital of the kingdom of Belgium, and of the province of Brabant, situated in 50° 51′ N., 4° 22′ E., about 70 m. from the sea at Ostend. It

occupies the plain or valley of the Senne, and the sides and crest of the hill lying to the east and south-east of that valley. It is now extending over the hills west of the valley, and to the north is the town or commune of Laeken, which is practically part of the city. Brussels suffered severely in 1695 from the bombardment of the French under Villeroi, who fired into the town with red-hot shot. Sixteen churches and 4000 houses were burnt down, and the historic buildings on the Grand Place were seriously injured, the houses of the Nine Nations on the eastern side being completely destroyed. In 1731 the famous palace of the Netherlands was destroyed by fire, and the only remains of this edifice are some ruined arches and walls in a remote comer of the grounds of the king's palace. The Porte de Hal is the only one of the eight gates in the old wall left standing. It dates from 1381, and is well worth more careful examination than it receives. In the latter half of the 18th century it served as a kind of bastille for political prisoners, and is now used as a museum in which a rather nondescript collection of articles, some from Mexico, has been allowed to accumulate. With regard to the fine boulevards of the Upper Town, it may be mentioned that about 1765 they were planted with the double row of lime trees which still constitute their chief ornament by Prince Charles of Lorraine while governing the Netherlands for his sister-in-law, the empress Maria Theresa. The residence of this prince was the palace of William the Silent, before he declared against Spam, and it is now used partly for the royal
[v.04 p.0693] library, which contains the famous *librairie de Bourgogne*, and partly for the museum of modern pictures. The only other "hotel" or palace in Brussels is that of the duke d'Arenberg. In the 16th century this was the residence of Count Egmont, but very little of the building of his day remains. In the same street, the rue des Petits Carmes, was the Hôtel Culembourg in which the famous oath of the beggars was taken. It has long been demolished and the new barracks of the Grenadier regiment have been erected on the site.

The only other buildings of importance dating from medieval times are the three churches of Ste Gudule (often erroneously called the cathedral), Notre-Dame des Victoires or Church of the Sablon, and Notre-Dame de la Chapelle, or simply la Chapelle, and the hotel de ville and the Maison du Roi on the Grand Place. The church of Ste Gudule, also dedicated to St Michael, is built on the side of the hill originally called St Michael's Mount, and now covered by the fashionable quarters which are included under the comprehensive description, of the Upper Town. It was begun about the year 1220, and is considered one of the finest specimens left of pointed Gothic. It is said to have been completed in 1273, with the exception of the two towers which were added in the 14th or 15th century. Some of the stained glass is very rich, dating from the 13th to the 15th century. In many of the windows there are figures of leading members of the houses of Burgundy and Habsburg. The curious oak pulpit representing Adam and Eve expelled from the Garden of Eden came originally from the Jesuit church at Louvain, and is considered the masterpiece of Verbruggen. The church of the Sablon is said to have been founded in 1304 by the gild of Crossbowmen to celebrate the battle of Woeringen. In a side chapel is a fine monument to the princely family of Thurn and Taxis, which had the monopoly of the postal service in the old empire. La Chapelle is still older, dating nominally from 1210, the choir and transept being considered to date from about fifty years later. There are some fine monuments, especially one to the duke de Croy who died in 1624. The two churches last named have undergone much renovation both outside and inside.

The Grand Place is by its associations one of the most interesting public squares in Europe. On its flags were fought out many feuds between rival gilds; Egmont and Horn, and many other gallant men whose names have been forgotten, were executed here under the shadow of its ancient buildings, and in more recent times Dumouriez proclaimed the French Republic where the dukes of Brabant and Burgundy were wont to hold their jousts. Apart from its associations the Grand Place contains two of the finest and most ornate buildings not merely in the capital but in Belgium. Of these the hôtel de ville, which is far the larger of the two, occupies the greater part of the south side of the square. Its facade has the disadvantage of having had one half begun about half a century before the other. The older, which is the richer in design, forms the left side of the building and dates from 1410, while the right, less rich and shorter, was begun in 1443. The fine tower, 360 ft. in height, is crowned by the golden copper figure of St Michael, 16 ft. in height, erected here as early as 1454. This tower lies behind the extremity of the left wing of the building. Opposite the town-hall is the smaller but extremely ornate Maison du Roi. This was never a royal residence as the name would seem to imply, but its description appears to have been derived from the fact that it was usually in this building that the royal address was read to the states-general. As this building was almost destroyed by Villeroi's bombardment it possesses no claim to antiquity, indeed the existing building was only completed in 1877. Egmont and Horn were sentenced in the hôtel de ville, and passed their last night in the Maison du Roi.

Among the principal buildings erected in the city during the 18th century are the king's palace and the house of parliament or Palais de la Nation, which face the south and north sides of the park respectively. The palace occupies part of the site covered by the old palace burnt down in 1731, and it was built in the reign of the empress Maria Theresa. It originally consisted of two detached buildings, but in 1826-1827 King William I. of the Netherlands caused them to be connected. The palace contains two fine rooms used for court ceremonies, and a considerable number of pictures. In 1904 a bill was passed in the chambers for the enlargement and embellishment of the palace. The adjacent buildings, viz. the department of the civil list, formerly the residence of the marquis d'Assche, and the Hôtel de Bellevue, held under a kind of perpetual lease granted by the empress Maria Theresa, were absorbed in the palace, and a new façade was constructed which occupies the entire length of the Place du Palais. At the same time a piece was cut off the park to prevent the undue contraction of the Place by the necessary bringing forward of the palace, and the pits which played a certain part in the revolution of 1830 when the Dutch

defended the park for a few days against the Belgians were filled up. The Palais de la Nation was constructed between 1779 and 1783, also during the Austrian period. It was intended for the states-general and government offices. During the French occupation the law courts sat there, and from 1817 to 1830 it was assigned for the sittings of the states-general. It is now divided between the senate and the chamber of representatives. In 1833 the part assigned to the latter was burnt out, and has since been reconstructed. The buildings flanking the chambers and nearer the park are government offices with residences for the ministers attached.

The improvements effected in Brussels during the 19th century were enormous, and completely transformed the city. The removal of the old wall was followed by the creation of the quartier Léopold, and at a later period of the quartier Louis in the Upper Town. In the lower, under the energetic direction of two burgomasters, De Brouckere and Anspach, not less sweeping changes were effected. The Senne was bricked in, and the fine boulevards du Nord, Anspach, Hainaut and Midi took the place of slums. The Bourse and the post-office are two fine modern buildings in this quarter of the city. The Column of the Congress—*i.e.* of the Belgian representatives who founded the kingdom of Belgium—surmounted by a statue of King Leopold I., was erected in 1859, and in 1866 the foundation-stone was laid of the Palais de Justice, which was not finished till 1883, at a cost of sixty million francs. This edifice, the design of the architect Poelaert, is in the style of Karnak and Nineveh, but surmounted with a dome, and impresses by its grandiose proportions (see ARCHITECTURE, Plate XI. fig. 121). It is well placed on the brow of the hill at the southern extremity of the rue de la Régence (the prolongation of the rue Royale), and can be seen from great distances. In the rue de la Régence are the new picture gallery, a fine building with an exceedingly good collection of pictures, the palace of the count of Flanders, and the garden of the Petit Sablon, which contains statues of Egmont and Horn, and a large number of statuettes representing the various gilds and handicrafts. Immediately above this garden is the Palais d'Arenberg. Perhaps the memorial that attracts the greatest amount of public interest in Brussels is that to the Belgians who were killed during the fighting with the Dutch in September 1830. This has been erected in a little square called the Place des Martyrs, not far from the Monnaie theatre. Outside Brussels at Evere is the chief cemetery, with fine monuments to the British officers killed at Waterloo (removed from the church in that village), to the French soldiers who died on Belgian soil in 1870-71, and another to the Prussians.

Many as were the changes in Brussels during the 19th century, those in progress at its close and at the beginning of the 20th have effected a marked alteration in the town. These have been rendered possible only by the excellent system of electric tramways which have brought districts formerly classed as pure country within reach of the citizens. The construction of the fine Avenue de Louise (1½ m. long) from the Boulevard de Waterloo to the Bois de la Cambre was the first of these efforts to bring the remote suburbs within easy reach, at the same time furnishing an approach to the "bois" of Brussels that might in some degree be compared with the Champs Élysées in Paris. Another avenue of later construction (6½ m. in length) connects the park of the
[v.04 p.0694] Cinquantenaire with Tervueren. This route is extremely picturesque, traverses part of the forest of Soignies, and is lined by many fashionable villas and country houses. Other improvements projected in 1908 on the slope of the hill immediately below the Place Royale included the removal of the old tortuous and steep street called the "Montagne de la Cour" to give place to a Mont des Arts. A little lower down and not far from the university (which occupies the house of the famous cardinal Granvelle of the 16th century) a central railway terminus was designed on a vast scale. These improvements connote the obliteration of the insanitary and overcrowded courts and alleys which were to be found between all the main streets, few in number, connecting the upper and the lower towns. The ridge on the west and north-west of the Senne valley never formed part of the town, and it was from it that Villeroi bombarded the city. The suburbs on this ridge, from south to north, are Anderlecht, Molenbeek and Koekelberg, and Laeken with its royal château and park forms the northern part of the Brussels conglomeration. Brussels has been growing at such a rapid rate that the inclusion of this ridge, and more particularly at Koekelberg, within the town limits, was contemplated in 1908.

The completion of the harbour works, making Brussels a seaport by giving sea-going vessels access thereto, was taken in hand in 1897. The completed work provides for a waterway for steamers drawing 24 ft. by the Willibroek Canal into the Ruppel and the Scheldt. There are steamers plying direct from Brussels to London, and 372 vessels of a total tonnage of 76,000 entered and left the port in 1905. The Willibroek Canal was made in the 16th century, and William I. of the Netherlands is entitled to the credit of having first thought of converting it into a ship canal from Brussels to the Scheldt. Nothing was done, however, in his time to carry out the scheme. The distance from Brussels to the Ruppel is only 20 m., and thus Brussels is only about 33 m. farther from the sea than Antwerp.

In addition to the advantages it enjoys from being the seat of the court and the government, Brussels is the centre of many prosperous industries. The manufactures of lace, carpets and curtains, furniture and carriages may be particularly mentioned, but it is chiefly as a place of residence for the well-to-do that the city has increased in size and population. Schools of all kinds are abundant. At the École Militaire youths are trained nominally for the army, but many go there who intend to enter one of the professions or the public service. This school used to occupy part of the old abbey of the Cambre, situated in a hollow near the bois and the avenue Louise, but owing to its insanitary position it has been removed to a new building near the Cinquantenaire. There is a university, to which admission is easy and where the fees are moderate, and the Conservatoire provides as good musical teaching as can be found in Europe. Music can be enjoyed every day in the year either out of doors or under cover. During the winter and spring

the opera continues without a break at the Théâtre de la Monnaie, which may be called the national theatre. Concerts are held frequently, as the Belgians are a musical people. Of late years sport has taken a prominent part in Belgian life. There are athletic institutions, and football is quite a popular game. Horse-racing has also come into vogue, and Boitsfort, in the bois, and Groenendael, farther off in the Forêt de Soignies, are fashionable places of reunion for society.

The town of Brussels has a separate administration, which is directed by a burgomaster and sheriffs at the head of a town council, whose headquarters are in the hôtel de ville. In the Brussels agglomeration are nine suburbs or communes, each self-governing with burgomaster and sheriffs located in a Maison Communale. These suburbs (beginning on the north and following the circumference eastward) are Schaerbeek, St Josse-ten-Noode, Etterbeek, Ixelles, St Gilles, Cureghem, Anderlecht, Molenbeek and Koekelberg. Laeken, which is really a tenth suburb, is classified as a town. In 1856 the population of Brussels alone was 152,828, and by 1880 it had only increased to 162,498. In 1890 the figures were 176,138; in 1900, 183,686; and in December 1904, 194,196. The great increase has been in the suburbs, amounting to nearly 80% in twenty-five years. In 1880 the population of the ten suburbs including Laeken was 248,079. In 1904 the total was 436,453, thus giving for the whole of Brussels a grand total of 630,649.

History.—The name Brussel seems to have been derived from Broeksele, the village on the marsh or brook, and probably it was the most used point for crossing the Senne on the main Roman and Frank road between Tournai and Cologne. The Senne, a small tributary of the Scheldt, flows through the lower town, but since 1868 it has been covered in, and some of the finest boulevards in the lower town have been constructed over the course of the little river. The name Broeksele is mentioned by the chroniclers in the 8th century, and in the 10th the church of Ste Gudule is said to have been endowed by the emperor Otto I. In the next two centuries Brussels grew in size and importance, and its trade gilds were formed on lines similar to those of Ghent. In 1312 Duke John II. of Brabant granted the citizens their charter, distinguished from others as that of Cortenberg. In 1356 Duke Wenceslas confirmed this charter and also the Golden Bull of the emperor Charles IV. of 1349 by his famous "Joyous Entry" into Louvain, the capital of the duchy. These three deeds or enactments constituted the early constitution of the South Netherlands, which, with one important modification in the time of Charles V., remained intact till the Brabant revolution in the reign of Joseph II. In 1357 Wenceslas ordered a new wall embracing a greater area than the earlier one to be constructed round Brussels, and this was practically intact until after the Belgian revolution in 1830-1831. It took twelve, or, according to others, twenty-two years to build. In 1383 the dukes of Brabant transferred their capital from Louvain to Brussels, although for some time they did not trust themselves out of the strong castle which they had erected at Vilvorde, half-way between the two turbulent cities. During this period the population of Brussels is supposed to have been 50,000, or one-fifth of that of Ghent. In 1420 the gilds of Brussels obtained a further charter recognizing their status as the Nine Nations, a division still existing. Having fixed their seat of government at Brussels the dukes of Brabant proceeded to build a castle and place of residence on the Caudenberg hill, which is practically the site of the Place Royale and the king's palace to-day. This ducal residence, enlarged and embellished by its subsequent occupants, became eventually the famous palace of the Netherlands which witnessed the abdication of Charles V. in 1555, and was destroyed by fire in 1731. In 1430 died Philip, last duke of Brabant as a separate ruler, and the duchy was merged in the possessions of the duke of Burgundy.

In the 17th century Brussels was described (Comte de Ségur, quoting the memoirs of M. de la Serre) as "one of the finest, largest and best-situated cities not only of Brabant but of the whole of Europe. The old quarters which preserve in our time an aspect so singularly picturesque with their sloping and tortuous streets, the fine hotels of darkened stone sculptured in the Spanish fashion, and the magnificence of the Place of the hôtel de ville were buried behind an enceinte of walls pierced by eight lofty gates flanked with one hundred and twenty-seven round towers at almost equal distance from each other like the balls of a crown. At a distance of less than a mile was the forest of Soignies with great numbers of stags, red and roe deer, that were hunted on horseback even under the ramparts of the town. On the promenade of the court there circulated in a long file ceaselessly during fashionable hours five or six hundred carriages, the servants in showy liveries. In the numerous churches the music was renowned, the archduke Leopold being passionately given to the art, maintaining at his own cost forty or fifty musicians, the best of Italy and Germany. Under the windows of the palace stretched the same park that we admire to-day, open all the year to privileged persons and twice a year to the public, a park filled with trees of rare essences and the most delicious flowers so artistically disposed, and so refreshing to the eyes, that M. de la Serre declared that if he had seen there an apple tree he would assuredly have taken it for an earthly Paradise."

(D. C. B.)

BRUT, Brute, or Brutus the Trojan, a legendary British character, who, according to Geoffrey of Monmouth and others, was the eponymous hero of Britain. He was reputed to be grandson of Aeneas, and the legend was that he was banished from Italy and made his way to Britain, where he founded New Troy (London). The name is an obvious confusion between Bryt (a Briton) and the classical name Brutus.

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For the romance literature of the subject see Wace; and Barbour.

BRUTÉ, SIMON WILLIAM GABRIEL (1779-1839), American prelate, first Roman Catholic

bishop of the diocese of Vincennes, Indiana, U.S.A., was born at Rennes, France, on the 20th of March 1779, his father, Simon Gabriel Guillaume Bruté de Remur (1729-1786), being superintendent of the crown lands in Brittany. He was educated for the medical profession, but entered the Sulpician Seminary of Paris in November 1803, was ordained priest in 1808, refused the post of chaplain to Napoleon, was professor of theology in the Diocesan Seminary at Rennes in 1808-1810, and in August 1810 settled in Baltimore, Maryland, whither his long general interest in missions, and particularly his acquaintance with Bishop Flaget of Kentucky, had drawn him. After teaching for two years (1810-1812) in Baltimore, he was sent to Mount St Mary's College, Emmitsburg, Maryland, where he remained until 1815, acting both as teacher and as pastor. He next visited France in the interest of American missions, and on his return in November 1815, became president of St Mary's College, Baltimore. In 1818 he resumed his labours at Emmitsburg, and from this time until 1834 he held an almost unparalleled place in the American church, being constantly consulted by clergy throughout the country, besides lecturing, teaching, preaching and caring for his parish. The see of Vincennes was created in 1834; and Bruté, nominated its first bishop and consecrated in the same year, went to France for financial aid, with which he built his cathedral and several useful institutions. Here, too, he was professor of theology in his seminary, teacher in one of his academies, as well as pastor and bishop. Interesting stories are told of the high respect in which he was held by the neighbouring Indians, who called him "chief of the Black robes" and "man of the true prayer." He died in Vincennes, Indiana, on the 26th of June 1839. His great influence on the entire church, his wonderful success in planning, financing, and carrying out necessary ecclesiastical reforms, and the constructive and executive ability he displayed in his diocese, make him one of the foremost Catholic emigrants to the United States. He wrote *Brief Notes* on his experiences in France in 1793, in which he describes state persecution of Catholic priests.

See James Roosevelt Bayley, *The Memoirs of the Rt. Rev. Simon William Gabriel Bruté, First Bishop of Vincennes* (New York, 1861), containing much autobiographical matter.

BRUTTII, an ancient tribe of lower Italy. This tribe, called Bruttii and Brittii in Latin inscriptions, and Βρέττιοι on Greek coins and by Greek authors, occupied the south-western peninsula of Italy in historical times, the *ager Bruttius* (wrongly called *Bruttium*) corresponding almost exactly to the modern Calabria. It was separated from Lucania on the north by a line drawn from the mouth of the river Lāus on the west to a point a little south of the river Crathis on the east. To part or the whole of this peninsula the name *Italia* was first applied. In alliance with the Lucanians the Bruttii made war on the Greek colonies of the coast and seized on Vibo in 356 B.C., and, though for a time overcome by the Greeks who were aided by Alexander of Epirus and Agathocles of Syracuse, they reasserted their mastery of the town from about the beginning of the 3rd century B.C., and held it until it became a Latin colony at the end of the same century (see *Corp. Inscr. Lat.* x. p. 7, and the references there given). At this time they were speaking Oscan as well as Greek, and two of three Oscan inscriptions in Greek alphabet still testify to the language spoken in the town in the 3rd century B.C. We know, however, that the Bruttians, though at this date speaking the same language (Oscan) as the Samnite tribe of the Lucani, were not actually akin to them. The name *Bruttii* was used by the Lucanians to mean "runaway slaves," but it is considerably more likely that this signification was attached to the tribal name of the Bruttii from the historical fact that they had been conquered and expelled by the Samnite invaders (cf. the use of Σκύθαι to mean "policemen" at Athens, and still more closely the German, French and English word "slave" derived from "Slav"), than that the tribe when living in territory it could call its own should have adopted an opprobrious name taken from the language of hostile neighbours (see Strabo vi. I, 4; Diod. Sic. xvi. 15). Mommsen pointed out (*Unterital. Dialekte*, p. 97) the evidence of tradition (especially Aristotle, *Pol.* 4 [7] 10) showing that the customs of the Bruttii had a certain affinity with those of the pre-Hellenic inhabitants of Greece, and it has been argued (Ridgeway *apud* Conway, *Ital. Dialects*, p. 16) that a tradition (preserved in Stephanus of Byzantium, *s.v.* Χῖοι) made it probable that they were called Πέλασγοι. This evidence points to the conjecture that they were part of what is now generally called the Mediterranean race (see, *e.g.* G. Sergi, *The Mediterranean Race*, Eng. trans., 1901; W.Z. Ripley, *Races of Europe*, p. 128). Many Indo-European elements appear in their place-names (*e.g. Sila*=Latin *silva*, Greek ὕλη; *Temesa*, cf. Gr. τέμενος or Sanskrit *tamas*, darkness, shadow), and none that suggest a non-Indo-European origin. *A priori* considerations suggest that they may have been akin to the Siceli, but of this at present no positive evidence can be given.

As we have seen, the Bruttii were at the height of their power during the 3rd century B.C. Their chief towns were Consentia (Cosenza), Petelia (near Strongoli), and Clampetia (Amantea). To this period (about the time of the Roman War against Pyrrhus) is to be assigned the series of their coins, and they appear to have retained the right of coinage even after their final subjugation by the Romans (see B.V. Head, *Historia Numorum*, p. 77). The influence of Hellenism over them is shown by finds in the tombs and the fact that they spoke the Greek language as well as their own (*bilingues* in Ennius). The mountainous country, ill-suited for agricultural purposes, was well adapted for these hardy warriors, whose training was Spartan in its simplicity and severity.

The Bruttii first came into collision with the Romans during the war with Pyrrhus, to whom they sent auxiliaries; after his defeat, they submitted, and were deprived of half their territory in the Sila forest, which was declared state property. In the war with Hannibal, they were among the first to declare in his favour after the battle of Cannae, and it was in their country that Hannibal held his ground during the last stage of the war (at Castrum Hannibalis on the gulf of Scylacium).

(R. S. C.)

The Bruttii entirely lost their freedom at the end of the Hannibalic war; in 194 colonies of Roman citizens were founded at Tempsa and Croton, and a colony with Latin rights at Hipponium called henceforward Vibo Valentia. In 132 the consul P. Popillius built the great inland road from Capua through Vibo and Consentia to Rhegium, while the date of the construction of the east and west coast roads is uncertain. Neither in the Social War, nor in the rising of Spartacus, who held out a long time in the Sila (71 B.C.), do the Bruttii play a part as a people. Vibo was the naval base of Octavian in the conflict with Sextus Pompeius (42-36 B.C.).

The most important product of the district was the wood from the forests of the Sila, and the pitch produced from it. The Sila also contained minerals, which were worked out in very early times. The coast plains were in parts very fertile, especially the (now malarious) lower valley of the Crathis. Under the empire, however, the whole district remained backward and was remarkable for the absence of important towns, as the scarcity of ancient inscriptions, both Greek and Latin, shows: the Sila was state domain, and most of the rest in the hands of large proprietors. Augustus joined it with Lucania (from which it was divided by the rivers Laus and Crathis) to form the third region of Italy. In the 2nd and 3rd centuries, for administrative and juridical purposes, it was sometimes (with Lucania) joined to Apulia and Calabria. Diocletian placed Lucania and Brittii (as the name was then spelt) under a *corrector*, whose residence was at Rhegium. The boundaries of the original third Augustan region had by that time become somewhat altered, Metapontum belonging to Calabria, and Salernum and the territory of the Picentini to the third region instead of the first (Campania). From the 6th century, after the fall of
[v.04 p.0696] the Ostrogothic power, and the establishment of that of Byzantium in its place in south Italy, the name Calabria was applied to the whole of the south Italian possessions of the Eastern empire, and the name of the Brittii entirely disappeared; and after the eastern peninsula (the ancient Calabria) had been taken by the Lombards about A.D. 668, the western retained the name, and has kept it till the present day.

(T. As.)

See Strabo vi. p. 253-265; Dion. Halic. xx. I, 4, 15; Pliny, *Nat. Hist.* iii. 71-74; Justin xii. 2, xxiii. 1; F. Lenormant, *La Grande-Grèce*, i. (1881-1884); H. Nissen, *Italische Landeskunde* (1883-1902); C. Hulsen in Pauly-Wissowa's *Realencyclopädie*, iii. pt. i. (1897); E.H. Bunbury in Smith's *Dictionary of Greek and Roman Geography*; R.S. Conway, *The Italic Dialects* (1897), for Bruttian inscriptions and local and personal names; P. Orsi in *Atti del congresso storico* (Rome, 1904), v. 193 seq.; M. Schipa, *La Migrazione del nome Calabria* (1895), whose conclusions are summarized in J.B. Bury's edition of Gibbon's *Decline and Fall*, v. p. 24, note; other authorities in J. Jung, "Geographie von Italien" (1897) in I. Müller's *Handbuch der klassischen Altertumswissenschaft*, iii. Abteilung 3.

BRUTUS (originally an adjective meaning "heavy," "stupid," kindred with Gr. βαρύς, cf. Eng. "brute," "brutal"), the surname of several distinguished Romans belonging to the Junian gens.

I. Lucius Junius Brutus, one of the first two consuls, 509 B.C. According to the legends, his mother was the sister of Tarquinius Superbus, the last of the Roman kings, and his father and his elder brother had been put to death by the reigning family in order to get possession of his wealth. Junius, the younger, owed his safety to his reputed dullness of intellect (whence his surname), which character, however, he had only assumed for prudential reasons (Dion. Halic. iv. 67, 77). The story is probably an invention to account for his name; in any case his dullness did not prevent his appointment as master of the horse. When Lucretia, wife of Collatinus, was outraged by Sextus Tarquinius (the incident which inspired Shakespeare's *Rape of Lucrece*), Brutus, together with her husband and father, took a leading part in expelling the Tarquinii from Rome. He and Collatinus were therefore elected consuls—or rather praetors, which was the original title (Livy i. 59). In a conspiracy formed for the restoration of the dynasty, the two sons of Brutus were deeply implicated, and were executed by sentence of their father, and in his sight (Livy ii. 3). The Etruscans of Veii and Tarquinii making an attempt to restore Tarquinius, a battle took place between them and the Romans, in which Junius Brutus engaged Aruns, son of the deposed king, in single combat on horseback, and each fell by the other's hand (Livy ii. 6; Dion. Halic. v. 14). The Roman matrons mourned a year for him, as "the avenger of woman's honour," and a statue was erected to him on the Capitol. The conspiracy of his sons is the subject of a tragedy by Voltaire.

The patrician branch of the family appears to have become extinct with L. Junius Brutus; the chief representatives of the plebeian branch in later times are dealt with below.

II. Decimus Junius Brutus, consul 138, surnamed Gallaecus from his victory over the Gallaeci (136) in the north-west of Spain (Plutarch, *Tib. Gracchus*, 21). He was a highly educated man, a patron of literature, and a friend of the poet Accius (Livy, *Epit.* 55; Appian, *Hisp.* 71-73; Vell. Pat. ii. 5; Cicero, *Brutus*, 28).

III. Marcus Junius Brutus, a jurist of high authority, was considered as one of the founders of Roman civil law (Cicero, *De Oratore*, ii. 33, 55).

IV. His son, of the same name, made a great reputation at the bar, and from the vehemence and bitterness of his speeches became known as "the Accuser" (Cicero, *De Officiis*, ii. 15).

V. Decimus Junius Brutus (Albinus), born about 84 B.C., first served under Caesar in Gaul, and afterwards commanded his fleet. Caesar, who esteemed him very highly, made him his master of the horse and governor of Gaul, and, in case of Octavian's death, nominated him as one of his

heirs. Nevertheless he joined in the conspiracy against his patron, and, like his relative Marcus Junius Brutus (see below), was one of his assassins. He afterwards resisted the attempt of Antony to obtain absolute power; and after heading the republican armies against him for some time with success, was deserted by his soldiers in Gaul, betrayed by one of the native chiefs, and put to death by order of Antony (43), while attempting to escape to Brutus and Cassius in Macedonia. He figures in Cicero's correspondence. (See Appian, *B.C.* iii. 97; Dio Cassius xlvi. 53; Caesar, *B.G.* iii. 11, *B.C.* i. 36, 45.)

VI. Marcus Junius Brutus (85, according to some, 79 or 78-42 B.C.), son of a father of the same name and of Servilia, half-sister of Cato of Utica, is the most famous of the name, and is the real hero of Shakespeare's *Julius Caesar.* His father had been treacherously put to death by order of Pompey during the civil wars. At that time young Marcus was only eight years old, and was educated with great care by his mother and uncles. He at first practised as an advocate. In spite of his father's fate, he supported the cause of Pompey against Caesar, but was pardoned by the latter after the victory of Pharsalus, and subsequently appointed by him to the government of Cisalpine Gaul (46). His justice and moderation won him great honour from the provincials under his rule. In 44 he was city praetor, and Caesar promised him the governorship of Macedonia at the expiration of his term of office. Influenced probably by his friend Gaius Cassius, he afterwards joined in the conspiracy against the great dictator, and was one of the foremost in his assassination. He maintained the cause of the republic by seizing and holding against Antony's forces the province of Macedonia, where he was joined by Cassius. But at Philippi (42) they were defeated by Antony and Octavian, and, rather than be taken prisoner, he fell on his sword. His wife Porcia, daughter of Cato of Utica, afterwards committed suicide, it is said, by swallowing red-hot coals (Dio Cassius xlvii. 20-49; Plutarch, *Brutus*; Appian, *B.C.* iv.; Vell. Paterculus ii. 72).

Brutus was an earnest student through all his active life, and is said to have been working on an abridgment of Pausanias the night before Pharsalus. He was generally friendly with Cicero, who dedicated several of his works to him (amongst them his *Orator*), and gave the name of *Brutus* to his dialogue on famous orators; but there were frequent disagreements between them, and Cicero frequently speaks of his coldness and lack of enthusiasm. It is difficult to understand his great influence over the Romans (he was only forty-three when he died); probably they admired him for his respectability, the old-fashioned *gravitas*. He was slow in decision, amazingly obstinate, lacking in sympathy save towards his womenkind—who unduly influenced him—and in his financial dealings with the provincials both extortionate and cruel (Cic. *ad Att.* vi. 1. 7). Shakespeare's portrait of him is far too flattering. It has been held that he was really an illegitimate son of Julius Caesar. If so we may find an explanation of his joining the conspirators by the fact that in 45 Caesar had appointed Octavian as his heir. He wrote several philosophical treatises (*de Virtute*, *de Officiis*, *de Patientia*) and some poetry, but nothing has survived. On the other hand, we possess part of his correspondence with Cicero (two books out of an original nine), the authenticity of which, though formerly disputed, is now regarded as firmly established, with the possible exception of two of the letters. The letters of Brutus written in Greek are probably the composition of some rhetorician.

See E.T. Bynum, *Das Leben des M.J. Brutus* (Halle a/S., 1898); Tyrrell and Purser's edition of Cicero's *Letters* (refs. in index vol. *s.v.*, "Iunius Brutus," especially introductions to vols. iii. and v.); G. Boissier, *Cicero and his Friends* (Eng. trans. 1897); J.L. Strachan-Davidson, *Cicero* (1894); other authorities under Caesar; Cicero.

BRÜX, a town of Bohemia, Austria, 93 m. N.N.W. of Prague by rail. Pop. (1900) 21,525. It is dominated by the Schlossberg (1307 ft.), on which is situated the ruins of an old castle, demolished in 1651, and possesses a very interesting church, in late-Gothic style, built in 1517. Brüx is situated in the centre of a region very rich in lignite deposits and has, besides, important sugar, iron and hardware, distilling, brewing and milling industries. To the south of Brüx are the villages of Püllna, Seidlitz and Seidschutz with well-known saline springs. Brüx is mentioned in documents of the early 11th century. It fell to the crown under Přemysl I. or Wenceslaus II. and was made a royal city by Ottakar II. in the 13th century. In 1421 the Hussites were defeated here by King Sigismund and the Saxons, and in 1426 besieged the town in vain. In 1456 George of Poděbrad captured the town and castle, which had for some time been occupied by the Saxon princes.

[v.04 p.0697]

BRY, THEODORUS [Dirk] **DE** (1528-1598), German engraver and publisher, was born at Liége in 1528. In the earlier years of his career he worked at Strassburg. Later he established an engraving and publishing business at Frankfort-On-Main, and also visited London in or before 1587. Here he became acquainted with the geographer Richard Hakluyt, with whose assistance he collected materials for a finely illustrated collection of voyages and travels, *Collectiones Peregrinationum in Indiam Orientalem et Indiam Occidentalem* (25 parts, 1590-1634). Among other works he engraved a set of 12 plates illustrating the Procession of the Knights of the Garter in 1576, and a set of 34 plates illustrating the Procession at the Obsequies of Sir Philip Sidney; plates for T. Hariot's *Briefe and True Report of the new found Land of Virginia* (Frankfort, 1595); the plates for the first four volumes of J.J. Boissard's *Romanae Urbis Topographia et Antiquitates* (1597-1598), and a series of portraits entitled *Icones Virorum Illustrium* (1597-1599). De Bry died at Frankfort on the 27th of March 1598. He had been assisted by his eldest son Johannes Theodorus de Bry (1561-1623), who after his father's death carried on the *Collectiones* and the illustration of Boissard's work, and also added to the *Icones.* His brother Johannes Israel de Bry (d. 1611) collaborated with him.

BRYAN, WILLIAM JENNINGS (1860-), American political leader, son of Silas Lillard Bryan, a

native of Culpeper county, Virginia, who was a lawyer and from 1860 to 1897 a state circuit judge, was born at Salem, Marion county, Illinois, on the 19th of March 1860. He graduated from Illinois College as valedictorian in 1881, and from the Union College of Law, Chicago, in 1883; during his course he studied in the law office of Lyman Trumbull. He practised law at Jacksonville from 1883 to 1887, when he removed to Lincoln, Nebraska. There he soon became conspicuous both as a lawyer and as a politician, attracting particular attention by his speeches during the presidential campaign of 1888 on behalf of the candidates of the Democratic party. From 1891 to 1895 he represented the First Congressional District of Nebraska, normally Republican, in the national House of Representatives, and received the unusual honour of being placed on the important Committee on Ways and Means during his first term. He was a hard and conscientious worker and became widely known for his ability in debate. Two of his speeches in particular attracted attention, one against the policy of protection (16th of March 1892), and the other against the repeal of the silver purchase clause of the Sherman Act (16th of August 1893). In the latter he advocated the unlimited coinage of silver, irrespective of international agreement, at a ratio of 16 to 1, a policy with which his name was afterwards most prominently associated. In a campaign largely restricted to the question of free-silver coinage he was defeated for re-election in 1894, and subsequently was also defeated as the Democratic candidate for the United States Senate. As editor of the *Omaha World-Herald* he then championed the cause of bimetallism in the press as vigorously as he had in Congress and on the platform, his articles being widely quoted and discussed.

The Democratic party was even more radically divided on the question of monetary policy than the Republican; and President Cleveland, by securing the repeal of the silver purchase clause in the Sherman Act by Republican votes, had alienated a great majority of his party. In the Democratic national convention at Chicago in 1896, during a long and heated debate with regard to the party platform, Bryan, in advocating the "plank" declaring for the free coinage of silver, of which he was the author, delivered a celebrated speech containing the passage, "You shall not press down upon the brow of labour this crown of thorns; you shall not crucify mankind upon a cross of gold." This speech made him the idol of the "silver" majority of the convention and brought him the Democratic nomination for the presidency on the following day. Subsequently he received the nominations of the People's and National Silver parties. In the ensuing presidential campaign he travelled over 18,000 m. and made altogether 600 speeches in 27 different states—an unprecedented number. In the election, however, he was defeated by William McKinley, the Republican candidate, receiving 176 electoral votes to 271. But though defeated, he remained the leader of his party. Between 1896 and 1900, except during the Spanish-American War when he was colonel of the 3rd Nebraska Volunteers, though he saw no active service, he devoted his time to the interest of his party. His ability, sincerity of character, and wide information, and his attitude towards the new issues arising from the war, in which he took the side opposed to "imperialism," increased his following. Although he had advised the ratification of the Peace Treaty, he opposed the permanent acquisition of the Philippine Islands. In 1900 he was nominated for the presidency by the Democratic, Silver Republican, and Populist party conventions; but although "imperialism" was declared to be the paramount issue, he had insisted that the "platforms" should contain explicit advocacy of free-coinage, and this declaration, combined with the popularity of President McKinley, the Republican candidate for re-election, again turned the scales against him. In the November election after a canvass that almost equalled in activity that of 1896 he was again defeated, receiving only 155 electoral votes to 292.

After the 1900 election he established and edited at Lincoln a weekly political journal, *The Commoner*, which attained a wide circulation. In 1904 although not actively a candidate for the Democratic nomination (which eventually went to Judge Parker), he was to the very last considered a possible nominee; and he strenuously opposed in the convention the repudiation by the conservative element of the stand taken in the two previous campaigns. The decisive defeat of Parker by President Roosevelt did much to bring back the Democrats to Mr Bryan's banner. In 1905-1906 he made a trip round the world, and in London was cordially received as a great American orator. He was again nominated for the presidency by the Democratic party in 1908. The free-silver theory was now dead, and while the main question was that of the attitude to be taken towards the Trusts it was much confused by personal issues, Mr Roosevelt himself intervening strongly in favour of the Republican nominee, Mr Taft. After a heated contest Mr Bryan again suffered a decisive defeat, President Taft securing 321 electoral votes to Mr Bryan's 162.

BRYANSK, a town of Russia, in the government of Orel, 83 m. by rail W.N.W. of the city of that name, in 53° 15′ N. and 34° 10′ E. on the river Desna. It is mentioned in 1146, being then also known as Debryansk. It afterwards formed a separate principality, which came to an end in 1356 with the death of the prince. After the Mongol invasion of 1241, Bryansk fell into the power of the Lithuanians; and finally became incorporated with the Russian empire in the beginning of the 17th century. Bryansk was taken by the followers of the first false Demetrius, but it successfully resisted the attacks of the second impostor of that name. Under the empress Anne a dock was constructed for the building of ships, but it was closed in 1739. In 1783 an arsenal was established for the founding of cannon. The cathedral was built in 1526, and restored in the end of the 17th century. There are two high schools; and the industrial establishments include iron, rope, brick and tallow-boiling works, saw-mills and flour-mills, tobacco-factories and a brewery. Some distance north of the town are the Maltsov iron-works, with glass factories and rope-walks, employing 20,000 men. A considerable trade is carried on, especially in wood, tar, hemp, pitch, hemp-seed-oil and cattle. In 1867 the population numbered 13,881, and in 1897 23,520.

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BRYANT, JACOB (1715-1804), English antiquarian and writer on mythological subjects, was born at Plymouth. His father had a place in the customs there, but was afterwards stationed at Chatham. The son was first sent to a school near Rochester, whence he was removed to Eton. In 1736 he was elected to a scholarship at King's College, Cambridge, where he took his degrees of B.A. (1740) and M.A. (1744), subsequently being elected a fellow. He returned to Eton as private tutor to the duke of Marlborough, then marquess of Blandford; and in 1756 he accompanied the duke, then master-general of ordnance and commander-in-chief of the forces in Germany, to the continent as private secretary. He was rewarded by a lucrative appointment in the ordnance department, which allowed him ample leisure to indulge his literary tastes. He twice refused the mastership of the Charterhouse. Bryant died on the 14th of November 1804 at Cippenham near Windsor. He left his library to King's College, having, however, previously made some valuable presents from it to the king and the duke of Marlborough. He bequeathed £2000 to the Society for the Propagation of the Gospel, and £1000 for the use of the superannuated collegers of Eton.

His principal works are: *Observations and Inquiries relating to various Parts of Ancient History* (1767); *A New System, or an Analysis, of Ancient Mythology, wherein an attempt is made to divest Tradition of Fable, and to reduce Truth to its original Purity* (1774-1776), which is fantastic and now wholly valueless; *Vindication of the Apamean Medal* (1775), which obtained the support of the great numismatist Eckhel; *An Address to Dr Priestley upon his Doctrine of Philosophical Necessity* (1780); *Vindiciae Flavianae, a Vindication of the Testimony of Josephus concerning Jesus Christ* (1780); *Observations on the Poems of Thomas Rowley, in which the Authenticity of those Poems is ascertained* (1781); *Treatise upon the Authenticity of the Scriptures, and the Truth of the Christian Religion* (1792); *Observations upon the Plagues inflicted upon the Egyptians* (1794); *Observations on a Treatise, entitled Description of the Plain of Troy, by Mr de Chevalier* (1795); *A Dissertation concerning the War of Troy, and the Expedition of the Grecians, as described by Homer, with the view of showing that no such expedition was ever undertaken, and that no such city as Phrygia existed* (1796); *The Sentiments of Philo Judaeus concerning the* Λόγος *or Word of God* (1797).

BRYANT, WILLIAM CULLEN (1794-1878), American poet and journalist, was born at Cummington, a farming village in the Hampshire hills of western Massachusetts, on the 3rd of November 1794. He was the second son of Peter Bryant, a physician and surgeon of no mean scholarship, refined in all his tastes, and a public-spirited citizen. Peter Bryant was the great-grandson of Stephen Bryant, an English Puritan emigrant to Massachusetts Bay about the year 1632. The poet's mother, Sarah Snell, was a descendant of "Mayflower" pilgrims. He was born in the log farmhouse built by his father two years before, at the edge of the pioneer settlement among those boundless forests, the deep stamp of whose beauty and majesty he carried on his own mind and reprinted upon the emotions of others throughout a long life spent mainly amid the activities of his country's growing metropolis. By parentage, by religious and political faith, and by hardness of fortune, the earliest of important American poets was appointed to a life typical of the first century of American national existence, and of the strongest single racial element by which that nation's social order has been moulded and promoted. Rated by the amount of time given to school books and college classes, Bryant's early education was limited. After the village school he received a year of exceptionally good training in Latin under his mother's brother, the Rev. Dr Thomas Snell, of Brookfield, followed by a year of Greek under the Rev. Moses Hallock, of Plainfield, and at sixteen entered the sophomore class of Williams College. Here he was an apt and diligent student through two sessions, and then, owing to the straitness of his father's means, he withdrew without graduating, and studied classics and mathematics for a year, in the vain hope that his father might yet be able to send him to Yale College. But the length of his school and college days would be a very misleading measure of his training. He was endowed by nature with many of those traits which it is often only the final triumph of books and institutional regimen to establish in character, and a double impulse toward scholarship and citizenship showed its ruling influence with a precocity and an ardour which gave every day of systematic schooling many times its ordinary value. It is his own word that, two months after beginning with the Greek alphabet, he had read the New Testament through. On abandoning his hope to enter Yale, the poet turned to and pursued, under private guidance at Worthington and at Bridgewater, the study of law. At twenty-one he was admitted to the bar, opened an office in Plainfield, presently withdrew from there, and at Great Barrington settled for nine years in the attorney's calling, with an aversion for it which he never lost. His first book of verse, *The Embargo, or Sketches of the Times; A Satire by a Youth of thirteen*, had been printed at Boston in 1808.

At the age of twenty-six Bryant married, at Great Barrington, Miss Frances Fairchild, with whom he enjoyed a happy union until her death nearly half a century later. In the year of his marriage he suffered the bereavement of his father's death. In 1825 he ventured to lay aside the practice of law, and removed to New York City to assume a literary editorship. Here for some months his fortunes were precarious, until in the next year he became one of the editors of the *Evening Post*. In the third year following, 1829, he came into undivided editorial control, and became also chief owner. He enjoyed his occupation, fulfilling its duties with an unflagging devotion to every worthy public interest till he died in 1878, in the month of his choice, as indicated in his beautiful poem entitled "June."

Though Bryant's retiring and contemplative nature could not overpower his warm human sympathies, it yet dominated them to an extent that made him always, even in his journalistic capacity and in the strenuous prose of daily debate, a councillor rather than a leader. It was after the manner of the poet, the seer, that he was a patriot, standing for principles much more than for measures, and, with an exquisite correctness which belonged to every phase of his being,

never prevailing by the accommodation of himself to inferiors in foresight, insight or rectitude. His vigorous and stately mind found voice in one of the most admirable models of journalistic style known in America. He was founder of a distinct school of American journalism, characterized by an equal fidelity and temperance, energy and dignity. Though it is as a poet that he most emphatically belongs to history, his verse was the expression of only the gentler motions of his mind; and it gathers influence, if not lustre, when behind it is seen a life intrepid, upright, glad, and ever potent for the nobler choice in all the largest affairs of his time. His renown as a poet antedated the appearance of his first volume by some four or five years. "American poetry," says Richard Henry Stoddard, "may be said to have commenced in 1817 with ... (Bryant's) 'Thanatopsis' and 'Inscription for the entrance of a wood.'" "Thanatopsis," which revealed a voice at once as new and as old as the wilderness out of which it reverberated, had been written at Cummington in the poet's eighteenth year, and was printed in 1817 in the *North American Review*; the "Inscription" was written in his nineteenth, and in his twenty-first, while a student of law at Bridgewater, he had composed his lines "To a Water-fowl," whose exquisite beauty and exalted faith his own pen rarely, if ever, surpassed. The poet's gift for language made him a frequent translator, and among his works of this sort his rendering of Homer is the most noted and most valuable. But the muse of Bryant, at her very best, is always brief-spoken and an interpreter initially of his own spirit. Much of the charm of his poems lies in the equal purity of their artistic and their moral beauty. On the ethical side they are more than pure, they are—it may be said without derogation—Puritan. He never commerces with unloveliness for any loveliness that may be plucked out of it, and rarely or never discovers moral beauty under any sort of mask. As free from effeminacy as from indelicacy, his highest and his deepest emotions are so dominated by a perfect self-restraint that they never rise (or stoop) to transports. There is scarcely a distempered utterance in the whole body of his poetical works, scarcely one passionate exaggeration. He faces life with an invincible courage, an inextinguishable hope and heavenward trust, and the dignity of a benevolent will which no compulsion can break or bend. The billows of his soul are not waves, but hills which tempests ruffle but can never heave. Even when he essays to speak for spirits unlike his own—characters of history or conceptions of his own imagination—
[v.04 p.0699] he never with signal success portrays them in the bonds, however transient, of any overmastering passion. For merriment he has a generous smile, for sorrow a royal one; but the nearest he ever comes to mirth is in his dainty rhyme, "Robert of Lincoln," and the nearest to a wail in those exquisite notes of grief for the loss of his young sister, "The Death of the Flowers," which only draw the tear to fill it with the light of a perfect resignation. As a seer of large and noble contemplation, in whose pictures of earth and sky the presence and care of the Divine mind, and every tender and beautiful relation of man to his Creator and to his fellow, are melodiously celebrated, his rank is among the master poets of America, of whom he is historically the first.

Bryant published volumes of *Poems* in 1821 (Cambridge) and 1832 (New York), and many other collections were issued under his supervision, the last being the *Poetical Works* (New York, 1876). Among his volumes of verse were "The Fountain" and other poems (New York, 1842); *The White-Footed Deer and Other Poems* (New York, 1844); *Thirty Poems* (New York, 1864); and blank-verse translations of *The Iliad of Homer* (Boston, 1870) and of *The Odyssey of Homer* (Boston, 1871). His *Poetical Works* and his *Complete Prose Writings* (New York, 1883 and 1884) were edited by Parke Godwin, who also wrote *A Biography of William Cullen Bryant, with Extracts from his private Correspondence* (New York, 1883). See also J. Grant Wilson, *Bryant and his Friends* (New York, 1886); John Bigelow, *William Cullen Bryant* (Boston, 1890), in the "American Men of Letters" series; W.A. Bradley, *Bryant*, in the "English Men of Letters" series (1905); E.C. Stedman, *Poets of America* (1885); and biographical and bibliographical introductions by Henry C. Sturges and Richard Henry Stoddard to the "Roslyn edition" of his *Poetical Works* (New York, 1903).

(G. W. Ca.)

BRYAXIS, one of the four great sculptors who worked on the mausoleum at Halicarnassus, about 350 B.C. His work on that monument cannot be separated from that of his companions, but a basis has been discovered at Athens bearing his signature, and adorned with figures of horsemen in relief. He is said to have made a great statue of Serapis for Sinope, but as to this there are grave historic difficulties. He also made a great statue of Apollo, set up at Daphne near Antioch (see E.A. Gardner, *Handbook of Greek Sculpture*, ii. 374).

BRYCE, JAMES (1838-), British jurist, historian and politician, son of James Bryce (LL.D. of Glasgow, who had a school in Belfast for many years), was born at Belfast, Ireland, on the 10th of May 1838. After going through the high school and university courses at Glasgow, he went to Trinity College, Oxford, and in 1862 was elected a fellow of Oriel. He went to the bar and practised in London for a few years, but he was soon called back to Oxford as regius professor of civil law (1870-1893). His reputation as a historian had been made as early as 1864 by his *Holy Roman Empire*. He was an ardent Liberal in politics, and in 1880 he was elected to parliament for the Tower Hamlets division of London; in 1885 he was returned for South Aberdeen, where he was re-elected on succeeding occasions. His intellectual distinction and political industry made him a valuable member of the Liberal party. In 1886 he was made under secretary for foreign affairs; in 1892 he joined the cabinet as chancellor of the duchy of Lancaster; in 1894 he was president of the Board of Trade, and acted as chairman of the royal commission on secondary education; and in Sir Henry Campbell-Bannerman's cabinet (1905) he was made chief secretary for Ireland; but in February 1907 he was appointed British ambassador at Washington, and took leave of party politics, his last political act being a speech outlining what was then the

government scheme for university reform in Dublin—a scheme which was promptly discarded by his successor Mr Birrell. As a man of letters Mr Bryce was already well known in America. His great work *The American Commonwealth* (1888; revised edition, 1910) was the first in which the institutions of the United States had been thoroughly discussed from the point of view of a historian and a constitutional lawyer, and it at once became a classic. His *Studies in History and Jurisprudence* (1901) and *Studies in Contemporary Biography* (1903) were republications of essays, and in 1897, after a visit to South Africa, he published a volume of *Impressions* of that country, which had considerable weight in Liberal circles when the Boer War was being discussed. Meanwhile his academic honours from home and foreign universities multiplied, and he became a fellow of the Royal Society in 1894. In earlier life he was a notable mountain-climber, ascending Mount Ararat in 1876, and publishing a volume on *Transcaucasia and Ararat* in 1877; in 1899-1901 he was president of the Alpine Club.

BRYDGES, SIR SAMUEL EGERTON (1762-1837), English genealogist and miscellaneous writer, was born on the 30th of November 1762. He studied at Queens' College, Cambridge, and was entered at the Middle Temple in 1782, being called to the bar in 1787. In 1789 he persuaded his elder brother that their family were the heirs to the barony of Chandos, being descended from a younger branch of the Brydges who first held the title. The case was tried and lost, but Brydges never gave up his claim, and used to sign himself *Per legem terrae* B.C. of S. (*i.e.* Baron Chandos of Sudeley). He re-edited Collins's *Peerage*, inserting a statement about his supposed right. In 1814 he was made a baronet, and in 1818 he left England. He died at Geneva on the 8th of September 1837. Sir Egerton was a most prolific author; he is said to have written 2000 sonnets in one year. His numerous works include *Poems* (1785); *Centura Literaria* (1805-1809); *The British Bibliographer* (4 vols., 1810-1814), with J. Haslewood; *Restituta* (4 vols., 1814-1816), containing accounts of old books; and *Autobiography, Times, Opinions and Contemporaries of Sir S.E. Brydges* (1834). In 1813 Brydges began to supply material to a private printing press established at Lee Priory, Kent, by a compositor and a pressman, who were to receive any profits which might arise from the sale of the works published. In this way Brydges published various Elizabethan texts, at considerable expense to himself, which increased the services he had already rendered to the study of Elizabethan literature by his bibliographical works.

For a full list of his works see W.T. Lowndes, *Bibliographer's Manual* (ed. H.G. Bohn, 1857-1864).

BRYENNIUS, NICEPHORUS (1062-1137), Byzantine soldier, statesman and historian, was born at Orestias (Adrianople). His father, of the same name, had revolted against the feeble Michael VII., but had been defeated and deprived of his eyesight. The son, who was distinguished for his learning, personal beauty and engaging qualities, gained the favour of Alexius I. (Comnenus) and the hand of his daughter Anna, with the titles of Caesar (then ranking third) and Panhypersebastos (one of the new dignities introduced by Alexius). Bryennius successfully defended the walls of Constantinople against the attacks of Godfrey of Bouillon (1097); conducted the peace negotiations between Alexius and Bohemund, prince of Antioch (1108); and played an important part in the defeat of Malik-Shah, the Seljuk sultan of Iconium (1116). After the death of Alexius, he refused to enter into the conspiracy set on foot by his mother-in-law and wife to depose John, the son of Alexius, and raise himself to the throne. His wife attributed his refusal to cowardice, but it seems from certain passages in his own work that he really regarded it as a crime to revolt against the rightful heir; the only reproach that can be brought against him is that he did not nip the conspiracy in the bud. He was on very friendly terms with the new emperor John, whom he accompanied on his Syrian campaign (1137), but was forced by illness to return to Byzantium, where he died in the same year. At the suggestion of his mother-in-law he wrote a history (called by him Ὕλη Ἱστορίας, materials for a history) of the period from 1057 to 1081, from the victory of Isaac I. (Comnenus) over Michael VI. to the dethronement of Nicephorus Botaneiates by Alexius. The work has been described as rather a family chronicle than a history, the object of which was the glorification of the house of Comnenus. Part of the introduction is probably a later addition. In addition to information derived from older contemporaries (such as his father and father-in-law) Bryennius made use of the works of Michael Psellus, John Scylitza and Michael Attaliota. As might be expected, his views are biased by personal considerations and his intimacy with the royal family, which at the same time, however, afforded him unusual facilities for obtaining material. His model was Xenophon, whom he has imitated with a tolerable measure of success; he abstains from an excessive use of simile and metaphor, and his style is concise and simple.

[v.04 p.0700]

Editio princeps, P. Possinus, 1661; in Bonn *Corpus Scriptorum Hist. Byz.*, by E. Meincke (1836), with du Cange's valuable commentary; Migne, *Patrologia Graeca*, cxxvii.; see also J. Seger, *Byzantinische Historiker des 10. und 11. Jahrhunderts* (1888), and C. Krumbacher, *Geschichte der byzantinischen Litteratur* (1897). The estimate of his work in R. Nicolai, *Griechische Literaturgeschichte*, iii. p. 76 (1878), is too unfavourable.

BRYNMAWR, a market town of Brecknockshire, Wales, 14½ m. S.E. of Brecknock and 156 m. from London by rail. Pop. of urban district (1901) 6833. It is on the London & North-Western and Rhymney joint railway connecting Rhymney and Abergavenny, being also a junction for a branch line to Pontypool via Blaenavon, and the terminus of the Great Western line from Newport via Nantyglo. The town owes its origin to the development during the first half of the 19th century of ironworks at the upper ends of the valleys that converge in its neighbourhood, its site being previously known as Waun Helygen (Willow-tree Common). The Nantyglo ironworks afford occupation to large numbers of the inhabitants of Brynmawr. Both coal and iron ore were formerly worked, but the coal is exhausted and the ore unsuitable for modern processes.

Brynmawr was formed into an ecclesiastical parish in 1875 out of portions of the civil parishes of Llanelly and Llangattock. In 1894 this was formed into an urban district, which was enlarged in 1900 by the addition of a portion of the parish of Aberystruth in Monmouthshire, the whole being at the same time consolidated into a civil parish.

BRYN MAWR COLLEGE, an institution of advanced learning for women, at Bryn Mawr, Pennsylvania, U.S.A., 5 m. W. of Philadelphia. The site occupies 52 acres and overlooks a broad expanse of rolling country. The buildings are of grey stone in the Jacobean Gothic style, and consist of an administration and lecture hall, a science hall, a library containing in 1908 about 55,000 volumes mostly for special study, a gymnasium, a hospital and six halls of residence. The requirements for matriculation are high; students are required to choose their studies according to the "group system," which permits them to specialize in two or more subjects; and instruction is given largely by means of lectures. The college is open to "hearers" who are not required to matriculate, to undergraduate matriculated students who are not studying for a degree, to undergraduate matriculated students who are candidates for the degree of B.A., and to graduate students who are candidates for the degree of M.A. or Ph.D. The government rests in a board of thirteen trustees and sixteen directors, all the trustees being members of the board of directors. The president of the college is a trustee and director. The institution was founded by Dr Joseph W. Taylor (1810-1880), a member of the Society of Orthodox Friends, and he provided that the trustees also should be members, but otherwise Bryn Mawr College is non-sectarian. It was incorporated in 1880, and was opened for instruction in 1885. In 1908 it had 419 students.

BRYOPHYTA, the botanical name of the second great subdivision of the vegetable kingdom, which includes the mosses and liverworts. They are all plants of small, often minute, size, and, as the absence of popular names indicates, the different kinds are not commonly recognized. Even the distinction between liverworts and mosses is not clearly made, not only the former but other small plants of higher groups being popularly called mosses. A little careful observation soon shows, however, that the Bryophytes form a well-defined class, including several subordinate groups. Though their study necessarily involves minute observation they possess many features of interest. The adaptations they show to their conditions of life are often very perfect and present interesting analogies with the adaptive characters of the higher plants. They are of great scientific interest not only as representing a special type of life-history and organization, but because in several of the subordinate groups series of forms can be traced, which enable the general course of their evolution to be inferred even in the practical absence of fossil remains of any antiquity.

Bryophytes are very generally distributed over the earth, and those of a single country, such as Britain, afford examples of all the chief natural groups. Sometimes, as is the case with the bog-mosses and some arctic mosses, they may cover considerable tracts. As a rule, however, they occupy a subordinate place in the vegetation, and the different kinds require to be carefully looked for. Covering, as they often do, what would otherwise be bare ground, they are of value in assisting to retain moisture in the soil and in preparing the way for its colonization by higher plants. Although many forms are capable of withstanding periods of drought they succeed best in relatively moist climates and localities. This is shown both by their unequal abundance in different localities of one country and in their scarcity in certain geographical regions as compared with their luxuriance in others.

The external appearance and general organization show great variety. In all mosses and many liverworts (figs. 8, 11) the plant consists of a stem bearing small leaves. In a number of liverworts (figs. 2, 7), on the other hand, it presents no distinction of stem and leaf, but is a flat, dorsiventral body usually closely applied to the substratum on which it grows. This, in contradistinction to the leafy shoot, is termed a *thallus*. True roots are never present, the plants being attached to the soil by *rhizoids*, which resemble the root-hairs of higher plants.

The reproductive organs borne by the thallus or plant are called antheridia and archegonia, and serve for sexual reproduction. The *antheridium* (figs. 5, 15) has a longer or shorter stalk and consists of a wall formed of a single layer of flat cells enclosing a mass of minute cells from which the spermatozoids are developed. In the cases which have been most carefully investigated two spermatozoids have been found to arise from each of the small cubical cells of the central tissue. When mature the antheridium opens on being moistened and the spermatozoids become free in the water by the dissolution of the mucilaginous cell-walls enclosing them. Each has the form (fig. 5, D) of a more or less spirally twisted, club-shaped body, bearing at the pointed anterior end two long cilia by means of which it moves through the water. The *archegonium* (fig. 1) has the form of a narrow flask with a long neck. It usually has a short stalk and consists of a central row of cells enclosed by a layer of cells forming the wall. The egg-cell or ovum lies within the wider basal region or venter, and above it come the ventral canal-cell and canal-cells within the neck of the archegonium. When

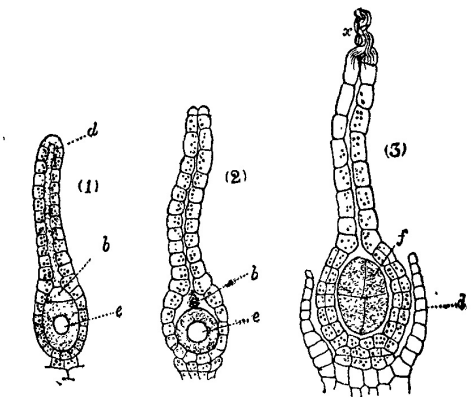

FIG. 1.—Archegonia of *Marchantia polymorpha*. (After Sachs.)

1. Mature but unopened archegonium. *e*, Ovum; *b*, ventral-canal cell; *d*, lid-cells of neck.

2. Archegonium ready for fertilization; a passage leads down to the rounded ovum *e*.

3. Archegonium after fertilization; the fertilized ovum is developing into a sporogonium *f*; *d*, perianth.

the archegonium opens by the separation of the cells at the tip, the disorganized canal-cells escape, leaving a narrow tubular passage leading down to the ovum. Each antheridium or archegonium arises from a single cell, and while the mature structure is similar in the two groups, the development presents differences in liverworts and mosses. Without entering into details it may be mentioned that in the mosses it proceeds both in the archegonium and antheridium by the segmentation of an apical cell, while this is not the case in the liverworts. Fertilization is effected by the passage of a spermatozoid, attracted probably by means of a chemical stimulus, down the passage of the archegonial neck and its fusion with the ovum. It thus, as in other cases of sexual reproduction, involves the union of two cells, and the vegetative plant, since it bears the sexual organs, is called the sexual generation or *gametophyte*.

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From the fertilized ovum another and very different stage arises, which remains attached to the sexual plant and has thus the appearance of a fruit borne on it. It consists of a capsule usually borne on a longer or shorter stalk or seta, the base of which is inserted into the tissues of the gametophyte. This basal region, which serves to absorb nourishment, is called the foot. Within the capsule numerous reproductive cells, the spores, are developed. In contrast to the sexual generation this stage is called the spore-bearing generation (*sporogonium*, *sporophyte*). The examination of any moss "in fruit" (fig. 11, B) will show the readily detachable sporogonium borne on the leafy sexual plant, and the relation existing between the two generations will be evident from figs. 2, 3, 9, and 16. In liverworts (with one or two exceptions) the mature capsule is filled with spores mingled with sterile cells or elaters and opens by splitting into valves. In mosses (fig. 11, C) the sporogonium is more highly organized; a central column of sterile tissue (the columella) is found in the capsule, which opens by the removal of a lid or operculum, and there are no elaters among the spores. By the opening of the capsule the spores are set free, and under suitable conditions germinate and give rise to the sexual generation. In mosses (fig. 12) a filamentous growth, the protonema, is first formed, and the leafy plants arise upon this. In liverworts this preliminary phase of the sexual generation is as a rule ill-marked or absent, and the plant may be said to develop directly from the spore.

It will be evident that the two generations exhibit a regular succession or alternation in the life-history of all Bryophytes. The gametophyte is developed from the spore and bears the sexual organs; the sporogonium is developed from the fertilized egg and produces spores. An important cytological difference between the two generations can only be mentioned here. By the union of the nuclei of the spermatozoid and ovum in fertilization the number of chromosomes in the resulting nucleus is doubled, and this double number is maintained throughout all the cell-divisions of the sporogonium. On the development of the spores, which takes place by the division of each spore-mother-cell into four, the number of chromosomes becomes one half of what it has been in all the nuclei of the sporogonium. This reduced number is maintained throughout the development of the sexual generation. Thus in *Pellia* the nuclei of the gametophyte have eight chromosomes and those of the sporophyte sixteen. The relation in which the two generations stand to one another is the most important common characteristic of the Bryophyta. The gametophyte is always the independently living individual upon which the spore-bearing generation is throughout its life dependent. In all plants higher than the Bryophyta the sporophyte becomes an independently rooted plant and is the conspicuous stage in the life-history. Thus in the fern the sexual generation is the small prothallus developed from the spore, while the familiar fern-plant is the spore-bearing generation (see PTERIDOPHYTA). On the other hand a corresponding alternation of generations is only indicated in the lower plants (Thallophyta).

The Bryophyta are divided into the Hepaticae (liverworts) and Musci (mosses). In the Hepaticae we can recognize three subordinate groups—the Marchantiales, Jungermanniales and Anthocerotales; and in the Musci also three groups—the Sphagnales, Andreaeales and Bryales. Since these series of forms differ considerably among themselves, it is difficult to express in a definition the distinction between a liverwort and a moss which is readily made in practice. We may therefore leave it to the description of the several groups of Hepaticae and Musci to supplement the differences mentioned above and to bring out the exceptions which exist.

Hepaticae **(Liverworts).**

The range of form and structure of both generations in the liverworts is so great that no one form can be taken as a satisfactory type. It will, however, be of use to preface the more general description by a brief account of a particular example, and we may take for this purpose a very common and easily recognized thalloid liverwort belonging to the Jungermanniales.

Pellia epiphylla (fig. 2) can be found at any season growing in large patches on the damp soil of woods, banks, &c. The broad flat thallus is green and may be a couple of inches long. It is sparingly branched, the branching being apparently dichotomous; the growing point is situated in a depression at the anterior end of each branch. The wing-like lateral portions of the thallus

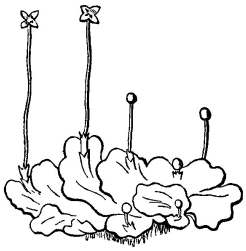

FIG. 2.—*Pellia epiphylla*. Group of plants bearing mature sporogonia.

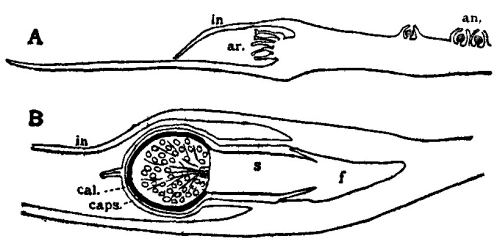

FIG. 3.—*Pellia epiphylla*.
A, Longitudinal section of thallus at the time of fertilization. *an*, Antheridia; *ar*, archegonia; *in*, involucre.

gradually thin out from the midrib; from the projecting lower surface of this numerous rhizoids spring. These are elongated superficial cells, and serve to fix the thallus to the soil and obtain water and salts from it. No leaf-like appendages are borne on the thallus, but short glandular hairs occur behind the apex. The plant is composed throughout of very similar living cells, the more superficial ones containing numerous chlorophyll grains, while starch is stored in the internal cells of the midrib. The cells contain a number of oil-bodies the function of which is imperfectly understood. The growth of the thallus proceeds by the regular segmentation of a single apical cell. The sexual organs are borne on the upper surface, and both antheridia and archegonia occur on the same branch (fig. 3, A). The antheridia (*an*) are scattered over the middle region of the thallus, and each is surrounded by a tubular upgrowth from the surface. The archegonia (*ar*) are developed in a group behind the apex, and the latter continues to grow for a time after their formation, so that they come to be seated in a depression of the upper surface. They are further protected by the growth of the hinder margin of the depression to form a scale-like involucre (*in*). Fertilization takes place about June, and the sporogonium is fully developed by the winter. The embryo developed from the fertilized ovum consists at first of a number of tiers of cells. Its terminal tier gives rise to the capsule, the first divisions in the four cells of the tier marking off the wall of the capsule from the cells destined to produce the spores. In fig. 4, C, which represents a longitudinal section of a young embryo of *Pellia*, these archesporial cells are shaded. The tiers below give rise to the seta and foot. The mature sporogonium (fig. 3, B) consists of the foot embedded in the tissue of the thallus, the seta, which remains short until just before the shedding of the spores, and the spherical capsule. It remains for long enclosed within the calyptra formed by the further development of the archegonial wall and surmounted by the neck of the archegonium. The calyptra is ultimately burst through, and in early spring the seta elongates rapidly, raising the dark-coloured capsule (fig. 2). In the young condition the wall of the capsule, which consists of two layers of cells, encloses a mass of similar cells developed from the archesporium. Some of these become spore-mother-cells and give rise by cell division to four spores, while others remain undivided and become the elaters. The latter are elongated spindle-shaped cells with thick brown spiral bands on the inside of their thin walls. They radiate out from a small plug of sterile cells projecting into the base of the capsule, and some are attached to this, while others lie free among the spores. The latter are large, and at first are unicellular; but in *Pellia*, which in this respect is exceptional, they commence their further development within the capsule, and thus consist of several cells when shed. The cells of the capsule wall have incomplete, brown, thickened rings on their walls, and the capsule opens by splitting into four valves, which bend away from one another, allowing the loose spores to be readily dispersed by the wind, assisted by the hygroscopic movements of the elaters. On falling upon damp soil the spores germinate, growing into a thallus, which gradually attains its full size and bears sexual organs.

From Cooke, *Handbook of British Hepaticae*.

B, Longitudinal section of almost mature sporogonium attached to the thallus. *in*, Involucre; *cal*, calyptra; *f*, foot; *s*, seta; *caps*, capsule (semi-diagrammatic).

[v.04 p.0702]

While the general course of the life-history of all liverworts resembles that of *Pellia*, the three great groups into which they are divided differ from one another in the characters of both generations. Each group exhibits a series leading from more simple to more highly organized forms, and the differentiation has proceeded on distinct and to some extent divergent lines in the three groups. The Marchantiales are a series of thalloid forms, in which the structure of the thallus is specialized to enable them to live in more exposed situations. The lowest members of the series (*Riccia*) possess the simplest sporogonia known, consisting of a wall of one layer of cells enclosing the spores. In the higher forms a sterile foot and seta is present, and sterile cells or elaters occur with the spores. The lower members of the Jungermanniales are also thalloid, but the thallus never has the complicated structure characteristic of the Marchantiales, and progress is in the direction of the differentiation of the plant into stem and leaf. Indications of how this may have come about are afforded by the lower group of the Anacrogynous Jungermanniaceae, and throughout the Acrogynous Jungermanniacae the plant has well-marked stem and leaves. The sporogonium even in the simplest forms has a sterile foot, but in this series also the origin of elaters from sterile cells can be traced. The Anthocerotales are a small and very distinct group, in which the gametophyte is a thallus, while the sporogonium possesses a sterile columella and is capable of long-continued growth and spore production. The mode of development of the sporogonium presents important differences in the three series that may be briefly referred to here. In fig. 4 young sporogonia of a number of liverworts are shown in longitudinal section, and the archesporial cells from which the spores and elaters will arise are shaded. In *Riccia* (fig. 4, A) the whole mass of cells derived from the ovum forms a spherical capsule, the only sterile tissue being the single layer of peripheral cells forming the wall. In other Marchantiales (fig. 4, B) the lower half of the embryo separated by the first transverse wall (1, I) forms the sterile foot and seta, while in the upper half (*ka*) the

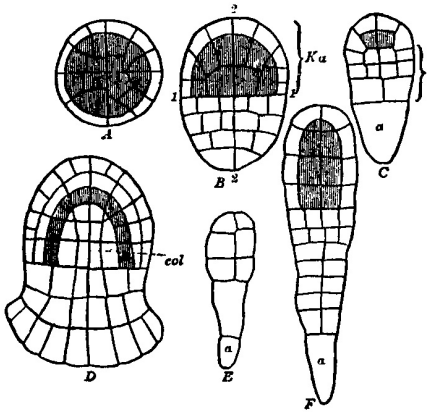

FIG. 4.—Semi-diagrammatic figures of young embryos of Liverworts in longitudinal section. The cells which will produce the sporogenous tissue are shaded. (After Kienitz-Gerloff and Leitgeb.)

A, *Riccia*.
B, *Marchantia polymorpha*.
C, *Pellia epiphylla*.
D, *Anthoceros laevis*.
E, *Cephalozia bicuspidata*.
F, *Radula complanata*.

peripheral layer forms the wall of the capsule, enclosing the archesporial cells from which spores and elaters arise. In the Jungermanniales (fig. 4, C, E, F) the embryo is formed of a number of tiers of cells, and the archesporium is defined by the first divisions parallel to the surface in the cells of one or more of the upper tiers; a number of tiers go to form the seta and foot, while the lowest segment (*a*) usually forms a small appendage of the latter. In the Anthocerotales (fig. 4, D) the lowest tiers form the foot, and the terminal tier the capsule. The first periclinal divisions in the cells of the terminal tier separate a central group of cells which form the sterile columella (*col*). The archesporium arises by the next divisions in the outer layer of cells, and thus extends over the summit of the columella. In none of the liverworts does the sporogonium develop by means of an apical cell, as is the rule in mosses.

Leaving details of form and structure to be considered under the several groups, some general features of the Hepaticae may be looked at here in relation to the conditions under which the plants live. The organization of the gametophyte stands in the closest relation to the factors of light and moisture in the environment. With hardly an exception the liverworts are dorsiventral, and usually one side is turned to the substratum and the other exposed to the light. In thalloid forms a thinner marginal expansion or a definite wing increasing the surface exposed to the light can be distinguished from a thicker midrib serving for storage and conduction. The leaves and stem of the foliose forms effect the same division of labour in another way. The relation of the plant to its water supply varies within the group. In the Marchantiales the chief supply is obtained from the soil by the rhizoids, and its loss in transpiration is regulated and controlled. In most liverworts, on the other hand, water is absorbed directly by the whole general surface, and the rhizoids are of subordinate importance. Many forms only succeed in a constantly humid atmosphere, while others sustain drying for a period, though their powers of assimilation and growth are suspended in the dry state. The cell-walls are capable of imbibing water rapidly, and their thickness stands in relation to this rather than to the prevention of loss of water from the plant. The large surface presented by the leafy forms facilitates the retention and absorption of water. The importance of prolonging the moistened condition as long as possible is further shown by special adaptations to retain water either between the appressed lobes of the leaves or in special pitcher-like sacs. In thalloid forms fimbriate or lobed margins or outgrowths from the surface lead to the same result. Sometimes adaptations to protect the plant during seasons of drought, such as the rolling up of the thallus in many xerophytic Marchantiales, can be recognized, but more often a prolonged dry season is survived in some resting state. The formation of subterranean tubers, which persist when the rest of the plant is killed by drought, is an interesting adaptation to this end, and is found in all three groups (*e.g.* in species of *Riccia*, *Fossombronia* and *Anthoceros*). No examples of total saprophytism or of parasitism are known, but two interesting cases of a symbiosis with other organisms which is probably a mutually beneficial one, though the nature of the physiological relation between the organisms is not clearly established, may be mentioned. Fungal hyphae occur in the rhizoids and in the cells of the lower region of the thallus of many liverworts, as in the endotrophic mycorhiza of higher plants. Colonies of *Nostoc* are constantly found in the Anthocerotaceae and in *Blasia*. In the latter they are protected by special concave scales, while in the Anthocerotaceae they occupy some of the mucilage slits between the cells of the lower surface of the thallus.

Other adaptations concern the protection of the sexual organs and sporogonia, and the retention of water in the neighbourhood of the archegonia to enable the spermatozoid to reach the ovum. In thalloid forms the sexual organs are often sunk in depressions, while in the foliose forms protection is afforded by the surrounding leaves. In addition special involucres around the archegonia have arisen independently in several series. The characters of the sporogonium have as their object the nutrition and effective distribution of the spores, and only exceptionally, as in the Anthocerotaceae, are concerned with independent assimilation. In most forms the capsule is raised above the general surface at the time of opening, usually by the rapid growth of the seta, but in the Marchantiaceae by the sporogonia being raised on a special archegoniophore. The elaters serve as lines of conduction of plastic material to the developing spores, and later usually assist in their dispersal. The spores, with few exceptions, are unicellular when shed, and may develop at once or after a resting period. In their germination a short filament of a few cells is usually developed, and the apical cell of the plant is established in the terminal cell. In other cases a small plate or mass of cells is formed. With one or two exceptions, however, this
[v.04 p.0703] preliminary phase, which may be compared with the protonema of mosses, is of short duration.

The power of vegetative propagation is widely spread. When artificially divided small fragments of the gametophyte are found to be capable of growing into new individuals. Apart from the separation of branches by the decay of older portions, special gemmae are found in many species. In *Aneura* the contents of superficial cells, after becoming surrounded by a new wall and dividing, escape as bi-cellular gemmae. Usually the gemmae arise by the outgrowth of superficial cells, and become free by breaking away from their stalk. When separated they may be single cells or consist of two or numerous cells. In *Blasia* and *Marchantia* the gemmae are formed within tubular or cup-shaped receptacles, out of which they are forced by the swelling of mucilage secreted by special hairs.

Marchantiales.—The plants of this group are most abundant in warm sunny localities, and grow for the most part on soil or rocks often in exposed situations. Nine genera are represented in Britain. *Targionia* is found on exposed rocks, but the other forms are less strikingly xerophytic; *Marchantia polymorpha* and *Lunularia* spread largely by the gemmae formed in the special gemma-cups on the thallus, and occur commonly in greenhouses. The large thallus of *Conocephalus* covers stones by the waterside, while *Dumortiera* is a hygrophyte confined to

damp and shady situations. Among the Ricciaceae, most of which grow on soil, *Ricciocarpus* and *Riccia natans* occur floating on still water. The dorsiventral thallus is constructed on the same plan throughout the group, and shows a lower region composed of cells containing little chlorophyll and an upper stratum specialized for assimilation and transpiration. The lower region usually forms a more or less clearly marked midrib, and consists of parenchymatous cells, some of which may contain oil-bodies or be differentiated as mucilage cells or sclerenchyma fibres. Behind the apex, which has a number of initial cells, a series of amphigastria or ventral scales is formed. These consist of a single layer of cells, and their terminal appendages often fold over the apex and protect it. Usually they stand in two rows, but sometimes accessory rows occur, and in *Riccia* only a single median row is present. The thallus bears two sorts of rhizoids, wider ones with smooth walls which grow directly down into the soil, and longer, narrower ones, with peg-like thickenings of the wall projecting into the cell-cavity. The peg-rhizoids, which are peculiar to the group, converge under shelter of the amphigastria to the midrib, beneath which they form a wick-like strand. Through this water is conducted by capillarity as well as in the cell cavities. The upper stratum of the thallus is constructed to regulate the giving off of the water thus absorbed. It consists of a series of air-chambers (fig. 6, B) formed by certain lines of the superficial cells growing up from the surface, and as the thallus increases in area continuing to divide so as to roof in the chamber. The layer forming the roof is called the "epidermis," and the small opening left leading into the chamber is bounded by a special ring of cells and forms the "stoma" or air-pore. In most species of *Riccia* the air-chambers are only narrow passages, but in the other Marchantiales they are more extended. In the simplest cases the sides and base of the chambers perform the work of assimilation (*e.g. Corsinia*). Usually the surface is extended by the development of partitions in the chambers (*Reboulia*), or by the growth from the floor of the chamber of short filaments of chlorophyllous cells (*Targionia*. *Marchantia*, fig. 6). The stomata may be simply surrounded by one or more series of narrower cells, or, as in the thallus of *Marchantia* and on the archegoniophores of other forms, may become barrel-shaped structures by the division of the ring of cells bounding the pore. In some cases the lowermost circle of cells can be approximated so as to close the pore. In *Dumortiera* the air-chambers are absent, their formation being only indicated at the apex.

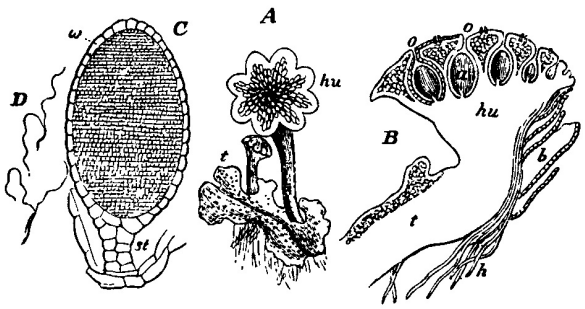

FIG. 5.—*Marchantia polymorpha*. (After Sachs.)
A. Portion of thallus (*t*) bearing two stalked antheridiophores (*hu*).
B. Longitudinal section through a young antheridiophore. The antheridia (*a*) are seated in depressions of the upper surface (*o*); *b*, scales; *h*, rhizoids.
C. Longitudinal section of antheridium; *st*, stalk; *w*, wall.
D. Two spermatozoids.

The sexual organs are always situated on the morphologically upper surface of the thallus. In *Riccia* they are scattered singly and protected by the air-chamber layer. The scattered position of the antheridia is also found in some of the higher forms, but usually they are grouped on special antheridiophores which in *Marchantia* are stalked, disk-shaped branch-systems (fig. 5). The individual antheridia are sunk in depressions from which the spermatozoids are in some cases forcibly ejected. The archegonial groups in *Corsinia* are sunk in a depression of the upper surface, while in *Targionia* they are displaced to the lower side of the anterior end of a branch. In all the other forms they are borne on special archegoniophores which have the form of a disk-shaped head borne on a stalk. The archegoniophore may be an upgrowth from the dorsal surface of the thallus (*e.g. Plagiochasma*), or the apex of the branch may take part in its formation. When the disk, around which archegonia are developed at intervals, is simply raised on a stalk-like continuation of the branch, a single groove protecting a strand of peg-rhizoids is found on the ventral face of the stalk (*Reboulia*). In the highest forms (*e.g. Marchantia*) the archegoniophore corresponds to the repeatedly branched continuation of the thallus, and the archegonia arise in relation to the growing points which are displaced to the lower surface of the disk. In this case two grooves are found in the stalk. The archegonia are protected by being sunk in depressions of the disk or by a special two-lipped involucre. In *Marchantia* and *Fimbriaria* an additional investment termed in descriptive works the perianth, grows up around each fertilized archegonium (fig. 1, 3, *d*). The simple sporogonium found in the Ricciaceae (fig. 4, A) has been described above; as the spores develop, the wall of the spherical capsule is absorbed and the spores lie free in the calyptra, by the decay of which they are set free. In *Corsinia* the capsule has a well-developed foot, but the sterile cells found among the spore-mother-cells do not become elaters, but remain thin-walled and simply contribute to the nutrition of the spores. In all other forms elaters with spirally thickened walls are found. The seta is short, the capsule being usually raised upon the archegoniophore.

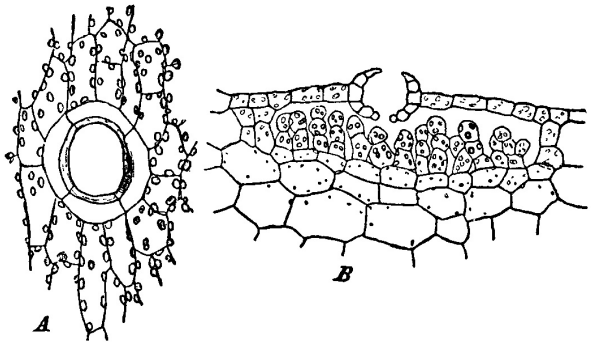

FIG. 6.—*Marchantia polymorpha.* A, Stoma in surface view. B, Air-chamber with the filaments of assimilating cells and stoma in vertical section.
From Strasburger's *Text-book of Botany*.

Dehiscence takes place either by the upper portion of the capsule splitting into short teeth or falling away as a whole or in fragments as a sort of operculum. The spores on germination form a short germ-tube, in the terminal cell of which the apical cell is established, but the direction of growth of the young thallus is usually not in the same straight line as the germ-tube. The Marchantiales are divided into a number of groups which represent distinct lines of advance from forms like the Ricciaceae, but the details of their classification cannot be entered upon here. The general nature of the progression exhibited by the group as a whole will, however, be evident from the above account.

Jungermanniales.—This large series of liverworts, which presents great variety in the organization of the sexual generation, is divided into two main groups according to whether the formation of archegonia terminates the growth of the branch or does not utilize the apex. The latter condition is characteristic of the more primitive group of the Anacrogynous Jungermanniaceae, in which the branch continues its growth after the formation of archegonia so that they (and later the sporogonia) stand on the dorsal surface of the thallus or leafy plant. In the Acrogynous Jungermanniaceae the plant is throughout foliose, and the archegonia occupy the ends of the main shoot or of its branches. The antheridia are usually globular and long-stalked. The capsule opens by splitting into four halves.

[v.04 p.0704]

Jungermanniaceae Anacrogynae.—The great range of form in the sexual plant is well illustrated by the nine genera of this group which occur in Britain. One thalloid form has already been described in *Pellia* (fig. 2). *Sphaerocarpus*, which occurs rarely in stubble fields, is in many respects one of the simplest of the liverworts. The small thallus bears the antheridia and archegonia, each of which is surrounded by a tubular involucre, on the upper surface of distinct individuals. The sporogonium has a small foot, but the sterile cells among the spores do not develop into elaters. The same is true of the capsule of *Riella*. The plants of this genus, none of the species of which are British, grow in shallow water rooted in the mud, and are unlike all other liverworts in appearance. The usually erect thallus has a broad wing-like outgrowth from the dorsal surface and two rows of rather large scales below. No provision for the opening of the capsule exists in either of these genera. In *Aneura* the form of the plant may be complicated by a division of labour between root-like, stem-like and assimilating branches of the thallus. The sexual organs are borne on short lateral branches, while in the related genus *Metzgeria*, which occurs on rocks and tree trunks, the small sexual branches spring from the lower surface of the midrib of the narrow thallus. In these two genera the elaters are attached to a sterile group of cells projecting into the upper end of the capsule, and on dehiscence remain connected with the tips of the valves. *Pallavicinia* and some related genera have a definite midrib and broad wings formed of one layer of cells, and are of interest owing to the presence of a special water-conducting strand in the midrib. This consists of elongated lignified cells with pitted walls. *Blasia pusilla*, which occurs commonly by ditches and streams, affords a transition to the foliose types. Its thallus (fig. 7) has thin marginal lobes of limited growth, which are comparable to the more definite leaves of other anacrogynous forms. The ventral surface bears flat scales in addition to the concave scales which, as mentioned above, are inhabited by *Nostoc*. This interesting liverwort produces two kinds of gemmae, and in the localities in which it grows is largely reproduced by their means. In *Fossombronia*, of which there are a number of British species, the plant consists of a flattened stem creeping on muddy soil and bearing two rows of large obliquely-placed leaves. The sexual organs are borne on the upper surface of the midrib, and the sporogonium is surrounded by a bell-shaped involucre which grows up after fertilization. *Treubia*, which grows on rotting wood in the mountain forests of Java, is similarly differentiated into stem and leaf, and is the largest liverwort known, reaching a length of thirty centimetres. Lastly *Haplomitrium*, a rare British genus, forms with the exotic *Calobryum*, an isolated group which is most naturally placed among the anacrogynous forms although the archegonia are in terminal groups. The erect branches bear three rows of leaves, and spring from a creeping axis from which root-like branches destitute of rhizoids extend into the substratum.

FIG. 7.—*Blasia pusilla.* The margin of the thallus bears leaf-life lobes. *r*, Rhizoids; *s*, sporogonium.
From Strasburger's *Text-book of Botany*.

Jungermanniaceae Acrogynae.—The plant consists of leafy shoots, the origin of which can be understood in the light of the foliose forms described above. The great majority of existing liverworts belong to this group, the general plan of construction of which is throughout very similar. In Britain thirty-nine genera with numerous species are found. With few exceptions the stem grows by means of a pyramidal apical cell cutting off three rows of segments. Each segment gives rise to a leaf, but usually the leaves of the ventral row (amphigastria) are smaller and differently shaped from those of the two lateral rows; in a number of genera they are wanting altogether. Sometimes the leaves retain their transverse insertion on the stem, and the two lobes of which they consist are developed equally. More often they come to be obliquely inserted, the anterior edge of each leaf lying under or over the edge of the leaf in front. The two lobes are often unequally developed. In *Scapania* the upper lobe is the smaller, while in *Radula*, *Poretta* and the *Lejeuneae* this is the case with the lower lobe. The folding of one lobe against another assists in the retention of water. Pitcher-like structures have arisen in different ways in a number of genera, and are especially common in epiphytic forms (*Frullania*, *Lepidolaena*, *Pleurozia*). In some forms the leaves are finely divided, and along with the hair-like paraphyllia form a loose weft around the stem (*Trichocolea*). The rhizoids spring from the lower surface of the stem, and sometimes from the bases of the leaves. The branches arise below and by the side of the leaves.

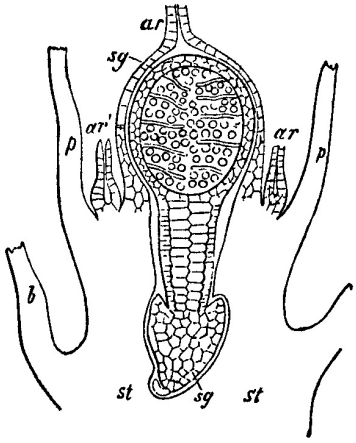

FIG. 9.—*Cephalozia bicuspidata.* Longitudinal section of the summit of a shoot bearing a nearly mature sporogonium, *sg*, still enclosed in the calyptra; *ar'*, archegonia which have remained unfertilized; *st*, stem; *b*, leaf; *p*, perianth. (After Hofmeister.)

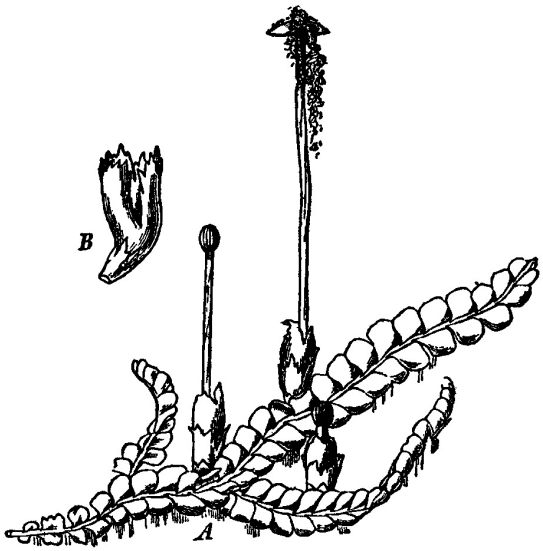

FIG. 8.—*Chiloscyphus polyanthos.* The plant bears three mature sporogonia which show the elongation of the seta. One of the sporogonia has opened. B, The "perianth" with the small perichaetial leaves below it. (After Goebel.)

The sexual organs may occur on the same or on distinct individuals. The antheridia are protected by leaves which are often modified in shape. The archegonia are borne at the apex of the main stem or of a lateral branch. A single archegonium may arise from the apical cell (*Lejeunea*); more commonly a number of others are formed from the surrounding segments. The leaves below the archegonial group are frequently modified in size and shape, but the chief protection is afforded by a tubular perianth, which corresponds to a coherent whorl of leaves and grows up independently of fertilization. The perianth serves also to enclose and protect the sporogonium during its development. In a number of forms belonging to different groups the end of the stem on which the sporogonium is borne grows downwards so as to form a hollow tubular sac enclosing the sporogonium; in other cases this marsupial sac is formed by the base of the sporogonium boring into the thickened end of the stem. The sac usually penetrates into the soil and bears rhizoids on its outer surface. *Kantia*, *Calypogeia* and *Saccogyna* are British forms, which have their sporogonia protected in this way. The sporogonium is very similar throughout the group (figs. 8, 9). At maturity the seta elongates rapidly, and the wall of the capsule splits more or less completely into four valves, allowing the elaters and spores to escape. In the Jubuloideae, which in other respects form a well-marked group, the seta is short and the elaters extend from the upper part of the capsule to the base; at dehiscence they remain fixed to the valves into which the capsule splits. The germinating spore usually forms a short filament, but in other cases a flat plate of cells growing by a two-sided apical cell is first formed (*Radula*, *Lejeunea*). In one or two tropical forms the pro-embryonic stage is prolonged, and leafy shoots only arise in connexion with the sexual organs. In *Protocephalozia*, which grows on bare earth in South America, this pro-embryo is filamentous, while in *Lejeunea Metzgeriopsis*, which grows on the leaves of living plants, it is a flat branched thallus closely applied to the substratum. Other cases of the plant being, with the exception of the sexual branches, apparently thalloid, are on the other hand to be explained as due to the reduction of the leaves and flattening of the stem of a shoot (*Pteropsiella*, *Zoopsis*).

The Acrogynous Jungermanniaceae fall into a number of natural groups, which cannot, however, be followed out here. They occur in very various situations, on the ground, on rocks and stones, on tree trunks, and, in the damp tropics, on leaves. Usually they form larger or smaller tufts of a green colour, but some forms have a reddish tint.

[v.04 p.0705]

Anthocerotales.—This small and very natural group includes the three genera *Anthoceros*, *Dendroceros* and *Notothylas*, and stands in many respects in an isolated position among the Bryophyta. Three species of *Anthoceros* occur in Britain, growing on the damp soil of fields, ditches, &c. The dark green thallus has an ill-defined midrib, and is composed of parenchymatous cells. In each assimilating cell there is usually a single large chloroplast. The apical region, which has a single initial cell, is protected by mucilage secreted by the mucilage slits, which are small pit-like depressions between superficial cells of the lower surface. Mucilage is also often formed in intercellular spaces within the thallus. Colonies of *Nostoc* are constantly found living in some of the mucilage slits which then become enlarged. The sexual organs are scattered over the upper surface. The stalked globular antheridia are exceptional in being formed endogenously, and are situated in groups in special intercellular spaces. The superficial layer of cells bounding the cavity does not break down until the antheridia are nearly mature. Occasionally antheridia develop on the surface of shaded portions of the thallus. The necks of the archegonia hardly project above the general surface of the thallus. In structure and development they agree with other Hepaticae, though differences of detail exist. The young sporogonium is protected by a thick calyptra derived from the tissue of the thallus around the archegonium. The sporogonium consists of a large bulbous foot, the superficial cells of which grow out into processes, and a long capsule, which continues to grow for months by the activity of a zone of cells between it and the

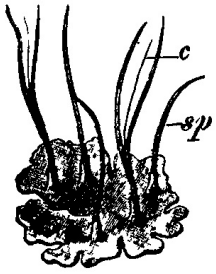

FIG. 10.—*Anthoceros laevis. sp*, Sporogonium; *c*, columella. From Strasburger's *Text-book of Botany.*

foot, and may attain the length of an inch and a half. The wall of the capsule is several layers of cells thick, and since the epidermis contains functional stomata and the underlying cells possess chlorophyll it is capable of assimilation. In the centre of the capsule is a strand of narrow elongated cells forming the columella, and between this and the wall spores mixed with elaters are formed from the dome-shaped archesporium, the origin of which has already been described (fig. 4, D). The capsule opens by splitting into two valves from the apex downwards, and the mature spores escape while others are developing in succession below. In *Dendroceros*, which grows as an epiphyte in the tropics, the thallus has a well-defined midrib and broad wings composed of a single layer of cells. The capsule is similar to that of *Anthoceros*, but has no stomata, and the elaters have spirally thickened walls. Some species of *Anthoceros* agree with it in these respects. *Notothylas* resembles *Anthoceros* in its thallus, but the sporogonium is much smaller. In some species, although the columella and archesporium arise in the usual way, both give rise to mingled spores and elaters, and no sterile columella is developed.

Musci **(Mosses).**

Though the number of species of mosses is far greater than of liverworts, the group offers much less diversity of form. The sexual generation is always a leafy plant, which is not developed directly from the spore but is borne on a well-marked and usually filamentous protonema. The general course of the life-history and the main features of form and structure will be best understood by a brief account of a particular example.

Funaria hygrometrica is a moss of very common occurrence even in towns on the soil of paths, at the foot of walls and in similar places. The small plants grow closely crowded in tufts, and consist of short leafy shoots attached to the soil by numerous fine rhizoids. The latter, in contrast to the rhizoids of liverworts, are composed of rows of elongated cells and are branched. The leaves are simple, and except for the midrib are only one layer of cells thick. The structure of the stem though simple is more complicated than in any liverwort. The superficial cells are thick-walled, and there is a central strand of narrow cells forming a water-conducting tissue. The small strand of elongated cells in the midrib of the leaf runs down into the stem, but is not usually connected with the central strand. The sexual organs are developed in groups at the apices, the antheridial group usually terminating the main axis while the archegonia are borne on a lateral branch. The brown tint of the hair-like paraphyses mixed with antheridia (fig. 15) makes the male branch conspicuous, while the archegonia have to be carefully looked for enclosed by the surrounding leaves (fig. 16, B). The sporogonium developed from the fertilized ovum grows by means of a two-sided apical cell (fig. 16 A), and is at first of uniform thickness. After a time the upper region increases in diameter and forms the capsule, while the lower portion forms the long seta and the foot which is embedded in the end of the stem. With the growth of the sporogonium the archegonial wall, which for a time kept pace with it, is broken through, the larger upper part terminated by the neck being carried up on the capsule as the calyptra, while the basal portion remains as a tubular sheath round the lower end of the seta (cf. figs. 16, C, and fig. 11, A, B). The seta widens out at the base of the capsule into a region known as the apophysis. The peripheral cells of the seta are thick-walled, and it has a central strand of elongated conducting cells. In the epidermis of the apophysis functional stomata, similar to those of the higher plants, are present and, since cells containing chlorophyll are present below the superficial layers of the apophysis and capsule, the sporogonium is capable of independent assimilation. The construction of the capsule will be best understood from the median longitudinal section (fig. 11, C). The central region extending between the apophysis and the operculum is composed of sterile tissue and forms the columella (*c*). Immediately around this is the layer of cells from which the spores will be developed (*s*), and the layers of cells on either side of this form the walls of the spore-sac, which will contain the spores. Between the wall of the capsule, which is composed of several layers of cells, and the spore-sac is a wide intercellular space (*h*) bridged across by trabeculae consisting of rows of chlorophyll-containing cells. At the junction of the operculum (*d*) with the rest of the capsule is a circle of cells forming the annulus (*a*), by help of which the operculum is detached at maturity as a small lid. Its removal does not, however, leave the mouth of the capsule wide open, for around the margin are two circles of pointed teeth forming the peristome. These are the thickened cell-walls of a definite layer of cells (*p*), and appear as separate teeth owing to the breaking down of the unthickened cell-walls. The numerous spores which have been developed in the spore sac can thus only escape from the pendulous capsule through narrow slits between the teeth, and these are closed in damp air. The unicellular spores when supplied with moisture germinate (fig. 12) and give rise to the sexual generation. A filamentous protonema is first developed, some of the branches of which are exposed to the light and contain abundant chlorophyll, while others penetrate the substratum as brown or colourless rhizoids. The moss-plants arise from single

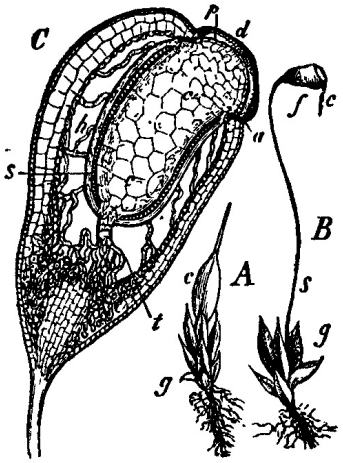

FIG. 11.—*Funaria hygrometrica.*
A, Leafy shoot (*g*) bearing a young sporogonium enclosed in the calyptra (*c*).
B, Similar plant with an almost mature sporogonium; *s*, seta; *f*, capsule; *c*, calyptra.
C, Median longitudinal section of a capsule, with the seta gradually widening into the apophysis at its base; *d*, operculum; *p*, peristome; *a*, annulus; *c*, columella; *s*, archesporium; *h*, air-space between the spore-sac and the wall of the capsule.
(From Goebel's *Pflanzenmorphologie*, by permission of W Engelmann)

projecting cells, and numerous plants may spring from the protonema developed from a single spore.

The majority of the mosses belong to the same great group as *Funaria*, the Bryales. The other two subdivisions of the Musci are each represented by a single genus. In the Andreaeales the columella does not extend to the upper end of the capsule, and the latter opens by a number of lateral slits. The Sphagnales also have a dome-shaped spore-sac continued over the columella, and, though their capsule opens by an operculum, they differ widely from other mosses in the development of the sporogonium as well as in the characters of the sexual generation. The three groups are described separately below, but some more general features of the mosses may be considered here.

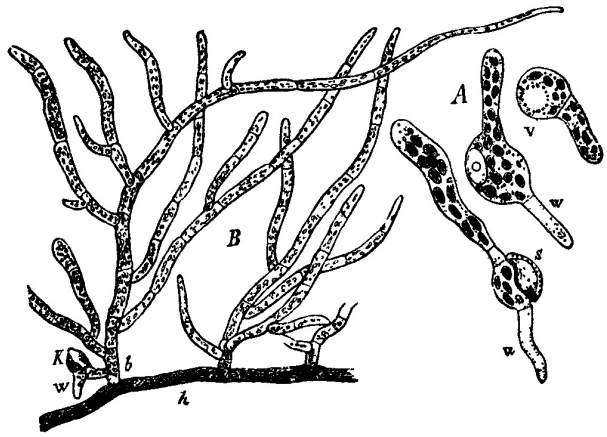

FIG. 12.—*Funaria hygrometrica.* (After Goebel.)
A, Germinating spores. *s*, Wall of spore; *v*, vacuole; *w*, rhizoid.
B, Part of a developed protonema. *h*, Creeping filament with brown walls from which the filaments of chlorophyll-containing cells (*b*) arise; *k*, young moss-plant; *w*, its first rhizoid.

On the whole mosses grow in drier situations than the liverworts, and the arrangements they present for the conduction of water in the plant are also more complete and suggest in some cases comparisons with the higher plants. In spite of this, however, they are in great part dependent on the absorption of water through the general surface of the shoot, and the power of rapid imbibition possessed by their cell-walls, the crowded position of the small leaves on the stem, and special adaptations for the retention of water on the surface, have the same significance as in the foliose liverworts. The different appearance of exposed mosses in dry weather and after a shower illustrates this relation to the water supply. The protonema is always a well-marked stage in the life-history. Not only does a moss-plant never arise directly from the spore, but in all cases of vegetative reproduction, apart from the separation of branches by decay of older regions of the plant, a protonema is found. Usually the protonema is filamentous and ceases to be evident after the plants have developed. But in some small mosses (e.g. *Ephemerum*) it plays the chief part in assimilation and lives on from year to year. In *Sphagnum*, *Andreaea* and some genera of the Bryales the protonema or some of its branches have the form of flat plates or masses of cells. The formation of the moss-plant on the protonema is always from a single cell and is similar in all mosses. The first three walls in this cell intersect one another, and define the three-sided pyramidal apical cell by means of which the shoot continues to grow. In *Fissidens* and a few other mosses the apical cell is two-sided. The leaves formed by the successive segments gradually attain their normal size and structure. Each segment of the initial cell gives rise to a leaf and a portion of the stem; the branches arise from the lower portion of a segment and stand immediately below a leaf. The leaves may form three vertical rows, but usually their arrangement, owing to the direction of the segment walls at the apex, becomes more complicated. Their growth proceeds by means of a two-sided apical cell, and the midrib does not become more than one cell thick until later. In addition to the leaves the stem often bears hair-like structures of different kinds, some of which correspond to modified branches of protonema. The branched filamentous rhizoids which spring from the lower region of the stem also correspond to protonemal branches. The structure of both stem and leaf reaches a high grade of organization in some mosses. Not only are thick-walled sclerenchymatous cells developed to give rigidity to the periphery of the stem and the midrib of the leaf, but in many cases a special water-conducting tissue, consisting of elongated cells, the end walls of which are thin and oblique, forms a definite central strand in the stem. In the forms in which it is most highly developed (Polytrichaceae) this tissue, which is comparable with the xylem of higher plants, is surrounded by a zone of tissue physiologically comparable to phloem, and in the rhizome may be limited by an endodermis. The conducting strands in the leaves show the same tissues as in the central strand of the stem, and in the Polytrichaceae and some other mosses are in continuity with it. The independent origin of this conducting system is of great interest for comparison with the vascular system of the sporophyte of the higher plants.

The sexual organs, with the exception of the antheridia of *Sphagnum*, are borne at the apices of the main shoot or of branches. Their general similarity to the mature antheridia and archegonia of liverworts and the main difference in their development have been referred to. The antheridia open by means of a cap cell or groups of cells with mucilaginous contents. The details of construction of the sporogonium are referred to below. In all cases (except *Archidium*) a columella is present, and all the cells derived from the archesporium produce spores, no elaters being formed. In a few cases the germination of the spore commences within the capsule. The development of the sporogonium proceeds in all cases (except in *Sphagnum*) by means of an apical cell cutting off two rows of segments. The first periclinal division in the region forming the capsule separates an inner group of cells (the endothecium) form the peripheral layer (amphithecium). In *Sphagnum*, as in *Anthoceros*, the archesporium is derived from the amphithecium; in all other mosses it is the outermost layer of the endothecium.

Vegetative propagation is widely spread in the mosses, and, as mentioned above, a protonema is always formed in the development of the new plant. The social growth of the plants characteristic

of many mosses is a result of the formation of numerous plants on the original protonema and on developments from the rhizoids. Besides this, gemmae may be formed on the protonema, on the leaves or at the apex, and some mosses have specialized shoots for their better protection or distribution. Thus in *Georgia* the stalked, multicellular gemmae are borne at the ends of shoots surrounded by a rosette of larger leaves, and in *Aulacomnium androgynum* they are raised on an elongated leafless region of the shoot. In other cases detached leaves or shoots may give rise to new plants, and when a moss is artificially divided almost any fragment may serve for reproduction.

Even in those rare cases in which the sexual generation can be developed without the intervention of spore production from the tissues of the sporogonium, a protonema is formed from cut pieces of the seta or in some cases from intact sporogonia still attached to the plant. This phenomenon of *apospory* was first discovered in mosses, but is now also known in a number of ferns (see PTERIDOPHYTA).

Sphagnales.—The single genus *Sphagnum* occupies a very distinct and isolated position among mosses. The numerous species, which are familiar as the bog-mosses, are so similar that minute structural characters have to be relied on in their identification. The plants occur in large patches of a pale green or reddish colour on moors, and, when filling up small lakes or pools, may attain a length of some feet. Their growth has played a large part in the formation of peat. The species are distributed in temperate and arctic climates, but in the tropics only occur at high levels. The protonema forms a flat, lobed, thalloid structure attached to the soil by rhizoids, and the plants arise from marginal cells. The main shoot bears numerous branches which appear to stand in whorls; some of them bend down and become applied to the surface of the main axis. The structure of the stem and leaves is peculiar. The former shows on cross-section a thin-walled central tissue surrounded by a zone of thick-walled cells. Outside this come one to five layers of large clear cells, which when mature are dead and empty; their walls are strengthened with a spiral thickening and perforated with round pores. They serve to absorb and conduct water by capillarity. The leaves have no midrib and similar empty cells occur regularly among the narrow chlorophyll-containing cells, which thus appear as a green network. The antheridia are globular and have long stalks. They stand by the side of leaves of special club-shaped branches. The archegonial groups occupy the apices of short branches (fig. 13, A.). The mature sporogonium consists of a wide foot separated by a constriction from the globular capsule (B). There is no distinct seta, but the capsule is raised on a leafless outgrowth of the end of the branch called a pseudopodium (C, *qs*). The capsule, the wall of which bears rudimentary stomata, has a small operculum but no peristome. There is a short, wide columella, over which the dome-shaped spore-sac extends, and no air-space is present between the spore-sac and the wall. In the embryo a number of tiers of cells are first formed. The lower tiers form the foot, while in the upper part the first divisions mark off the columella, around which the archesporium, derived from the amphithecium, extends. The sporogonium when nearly mature bursts the calyptra irregularly. The capsule opens explosively in dry weather, the operculum and spores being thrown to a distance. The spore on germination forms a short filament which soon broadens out into the thalloid protonema. Some twelve species of *Sphagnum* are found in Britain.

[v.04 p.0707]

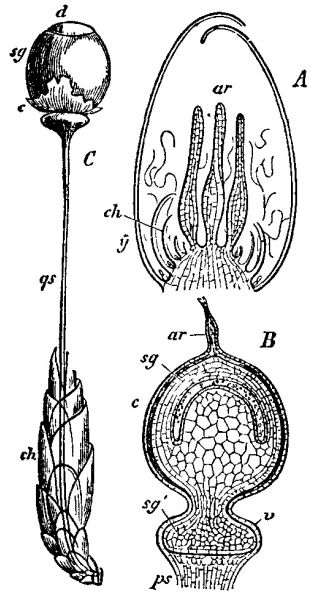

FIG. 13.—*Sphagnum acutifolium.* (After Schimper.)

A. Longitudinal section of apex of a bud bearing archegonia (*ar*), enclosed by the large leaves (*y*); *ch*, small perichaetial leaves.

B. Longitudinal section of the sporogonium borne on the pseudopodium (*ps*); *c*, calyptra; *ar*, neck of archegonium; *sg'*, foot; *sg*, capsule.

C. *S. squarrosum.* Ripe sporogonium raised on the pseudopodium (*qs*) above the enclosing leaves (*ch*); *c*, the ruptured calyptra; *sg*, capsule; *d*, operculum.

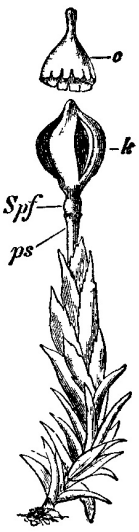

FIG. 14.—*Andreaea*

Andreaeales.—The species of the single genus *Andreaea* (fig. 14) are small, dark-coloured mosses growing for the most part in tufts on bare rocks in alpine and arctic regions. Four species occur on alpine rocks in Britain. The spore on germination gives rise to a small mass of cells from which one or more short filaments grow. The filament soon broadens into a ribbon-shaped thallus, several cells thick, which is closely applied to the rock. Erect branches may arise from the protonema, and gemmae may be developed on it. The stem of the plant, which arises in the usual way, has no conducting strand and the leaves may or may not have midribs. The leaf grows by a dome-shaped instead of by the usual two-sided initial cell. The antheridia are long-stalked. The upper portion of the archegonial wall is carried up as a calyptra on the sporogonium, which, as in *Sphagnum*, has no seta and is raised on a pseudopodium. The development of the sporogonium proceeds as in the Bryales, but the dome-shaped archesporium extends over the summit of the columella and an air-space is wanting. The capsule does not open by an operculum but by four or six longitudinal slits, which do not reach either the base or apex. In one exotic species the splits occur only at the upper part of the capsule, and the terminal cap breaks away. This isolated example

petrophila. Plant bearing opened capsule.
(*k*) *ps*, Pseudopodium.
c, Calyptra.
spf, Foot of sporogonium.
From Strasburger's *Textbook of Botany*

thus appears to approach the Bryales in its mode of dehiscence.

Bryales.—In contrast to the preceding two this group includes a very large number of genera and species. Thus even in Britain between five and six hundred species belonging to more than one hundred genera are found. They occur in the most varied situations, on soil, on rocks and trees, and, in a few instances (*Fontinalis*), in water. Although exhibiting a wide range in size and in the structural complexity of both generations, they all conform to a general type, so that *Funaria*, described above, will serve as a fair example of the group. The protonema is usually filamentous, and in some of the simplest forms is long-lived, while the small plants borne on it serve mainly to protect the sexual organs and sporogonia. This is the case in *Ephemerum*, which grows on the damp soil of clayey fields, and the plants are even more simply constructed in *Buxbaumia*, which occurs on soil rich in humus and is possibly partially saprophytic. In this moss the filamentous protonema is capable of assimilation, but the leaves of the small plants are destitute of chlorophyll, so that they are dependent on the protonema. The male plant has no definite stem, and consists of a single concave leaf protecting the antheridium. The female plant is rather more highly organized, consisting of a short stem bearing a few leaves around the group of archegonia. The sporogonium is of large size and highly organized, though it presents peculiar features in the peristome. *Buxbaumia* has been regarded by Goebel as representing a stage which other mosses have passed, and has been described by him as the simplest type of moss. In *Ephemerum* also we may probably regard the relation of the small plants to the protonema as a primitive one. On the other hand, in the case of *Ephemeropsis*, which grows on the leaves of living plants in Java, the high organization of the sporogonium makes it probable that the persistent protonema is an adaptation to the peculiar conditions of life. A highly developed protonema provided with leaf-like assimilating organs is found in *Georgia*, *Diphyscium* and *Oedipodium*, all of which show peculiarities in the sporogonium as well. The cells of the protonema of *Schistostega*, which lives in the shade of caves, are so constructed as to concentrate the feeble available light on the chloroplasts.

We may perhaps regard the persistent protonema bearing small leafy plants as a primitive condition, and look upon those larger plants which remain unbranched and bear the sexual organs at the apex (e.g. *Schistostega*) as representing the next stage. From this condition different lines of specialization in the form and structure of the plant can be recognized. A large number of mosses stand at about the same grade as *Funaria*, in that the plants are small, sparingly branched, usually radial, and do not show a very highly differentiated internal structure. In others the form of the plant becomes more complex by copious branching and the differentiation of shoots of different orders. In these cases the shoot system is often more or less dorsiventral, and the sexual organs are borne on short lateral branches (e.g. *Thuidium tamariscinum*). The Polytrichaceae, on the other hand, show a specialization in structure rather than in form. The high organization of their conducting system has been referred to above, but though many species are able to exist in relatively dry situations, the plants are still dependent on the absorption of water by the general surface. The parallel lamellae of assimilating cells which grow from the upper surface of the leaf in these and some other mosses probably serve to retain water in the neighbourhood of the assimilating cells and so prolong their activity. As common adaptive features in the leaves the occurrence of papillae or outgrowths of the cell-walls to retain water, and the white hairlike leaf tips, which assist in protecting the young parts at the apex of many xerophytic mosses, may be mentioned. The leaves of *Leucobryum*, which occurs in pale green tufts in shaded woods, show a parallel adaptation to that found in *Sphagnum*. They are several cells thick, and the small assimilating cells lie between two layers of empty water-storage cells, the walls of which are perforated by pores.

With the possible exception of *Archidium*, the sporogonium is throughout the Bryales constructed on one plan. *Archidium* is a small moss occurring occasionally on the soil of wet fields. The protonema is not persistent, and the plants are well developed, resembling those of *Pleuridium*. The sporogonium has a small foot and practically no seta, and differs in the development and structure of its capsule from all other mosses. The spores are derived from the endothecium, but no distinction of a sterile columella and an archesporium is established in this, a variable number of its cells becoming spore-mother-cells while the rest serve to nourish the spores. The layer of cells immediately around the endothecium becomes the spore-sac, and an air-space forms between this and the wall of the capsule. The very large, thin-walled spores escape on the decay of the capsule, which ruptures the archegonial wall irregularly. On account of the absence of a columella *Archidium* is sometimes placed in a distinct group, but since its peculiarities have possibly arisen by reduction it seems at present best retained among the Bryales. In all other Bryales there is a definite columella extending from the base to the apex of the capsule, the archesporium is derived from the outermost layer of cells of the endothecium, and an air space is formed between the spore-sac and the wall. In the Polytrichaceae another air space separates the spore-sac from the columella. There is great variety in the length of the seta, which is sometimes practically absent. The apophysis, which may be a more or less distinct region, usually bears stomata and is the main organ of assimilation. In the Splachnaceae it is expanded for this purpose, while in *Oedipodium* it constitutes most of the long pale stalk which supports the capsule. A distinct operculum is usually detached by the help of the annulus, and its removal may leave the mouth of the capsule widely open. More usually there is a peristome, consisting of one or two series of teeth, which serves to narrow the opening and in various ways to ensure the gradual shedding of the spores in dry weather. In most mosses the teeth are portions of thickened cell-walls but in the Polytrichaceae they are formed of a number of sclerenchymatous

cells. In *Polytrichum* a membranous epiphragm stretches across the wide mouth of the capsule between the tips of the short peristome teeth, and closes the opening except for the interspaces of the peristome.

In a number of forms, which were formerly grouped together, the capsule does not open to liberate the spores. These cleistocarpous forms are now recognized as related to various natural groups, in which the majority of the species possess an operculum. In such forms as *Phascum* the columella persists, and the only peculiarity is in the absence of arrangements for dehiscence. In [v.04 p.0708] *Ephemerum* (and the closely related *Nanomitrium* which has a small operculum) the columella becomes absorbed during the development of the spores. Stomata are present on the wall of the small capsule. Such facts as these suggest that in many cases the cleistocarpous condition is the result of reduction rather than primitive, and that possibly the same holds for *Archidium*.

The former subdivision of the Bryales into Musci Cleistocarpi and Musci Stegocarpi according to the absence or presence of an operculum is thus clearly artificial. The same holds even more obviously for the grouping of the stegocarpous forms into those in which the archegonial group terminates a main axis (acrocarpi) and those in which it is borne on a more or less developed lateral branch (pleurocarpi). Modern classifications of the Bryales depend mainly on the construction of the peristome.

It remains to be considered to what extent the several natural groups of plants classed together in the Bryophyta can be placed in a phylogenetic relation to one another. Practically no help is afforded by palaeobotany, and only the comparison of existing forms can be depended on. The indications of probable lines of evolution are clearest in the Hepaticae. The Marchantiales form an obviously natural evolutionary group, and the same is probably true of the Jungermanniales, although in neither case can the partial lines of progression within the main groups be said to be quite clear. Such a form as *Sphaerocarpus*, which has features in common with the lower Marchantiales, enables us to form an idea of the divergence of the two groups from a common ancestry. The Anthocerotales, on the other hand, stand in an isolated position, and recent researches have served to emphasize this rather than to confirm the relationship with the Jungermanniales suggested by Leitgeb. The indications of a serial progression are not so clear in the mosses, but the majority of the forms may be regarded as forming a great phylogenetic group in the evolution of which the elaboration of the moss-plant has proceeded until the protonema appears as a mere preliminary stage to the formation of the plants. Parallel with the evolution of the gametophyte in form and structure, a progression can be traced in the sporogonium, although the simplest sporogonia available for study may owe much of their simplicity to reduction. The Andreaeales may perhaps be looked on as a divergent primitive branch of the same stock. On the other hand, the Sphagnales show such considerable and important differences from the rest of the mosses, that like the Anthocerotales among the liverworts, they may be regarded as a group, the relationship of which to the main stem is at least problematical. Between the Hepaticae, Anthocerotales, Sphagnales and Musci, there are no connecting forms known, and it must be left as an open question whether the Bryophyta are a monophyletic or polyphyletic group.

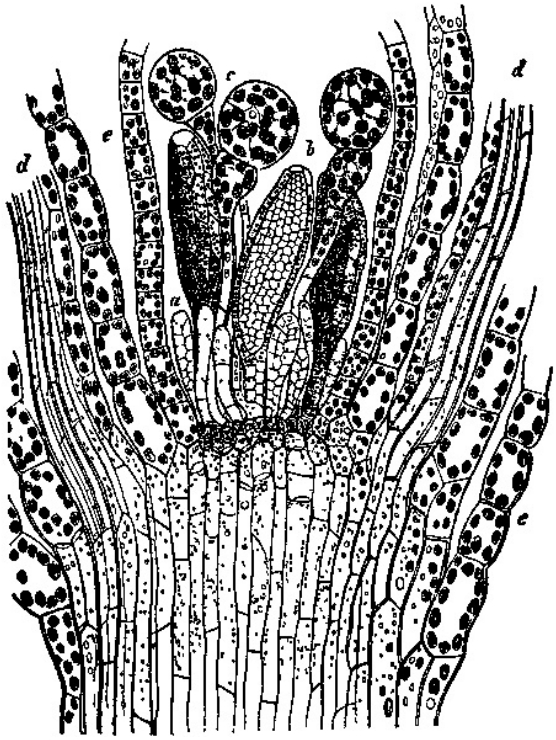

FIG. 15.—*Funaria hygrometrica.* Longitudinal section through the summit of a male branch. (After Sachs.)
e, Leaves.
d, Leaves cut through the mid-ribs.
c, Paraphyses.
b, Antheridia.

The question of the relationship of the Bryophyta on the one hand to the Thallophyta and on the other to the Pteridophyta lies even more in the region of speculation, on slender grounds without much hope of decisive evidence. In a general sense we may regard the Bryophyta as derived from an algal ancestry, without being able to suggest the nature of the ancestral forms or the geological period at which they arose. Recent researches on those Algae such as *Coleochaete* which appeared to afford a close comparison in their alternation of generations with *Riccia*, have shown that the body resulting from the segmentation of the fertilized ovum is not so strictly comparable in the two cases as had been supposed. The series of increasingly complex sporogonia among Bryophytes appears to be most naturally explained on an hypothesis of progressive sterilization of sporogenous tissue, such as has been advanced by Bower. On the other hand there are not wanting indications of reduction in the Bryophyte sporogonium which make an alternative view of its origin at least possible. With regard to the relationship of the Bryophyta and Pteridophyta the article on the latter group should be consulted. It will be sufficient to say in conclusion that while the alternating generations in the two groups are strictly comparable, no evidence of actual relationship is yet forthcoming.

For further information consult: Campbell, *Mosses and Ferns* (London, 1906); Engler and Prantl, *Die naturlichen Pflanzenfamilien*, Teil i. Abt. 3 (Leipzig, 1893-1907); Goebel, *Organography of Plants* (Oxford, 1905). Full references to the literature of the subject will be found in these works. For the identification of the British species of liverworts and mosses the following recent works will be of use: Pearson, *The Hepaticae of the British Isles* (London, 1902); Dixon and Jameson, *The Student's Handbook of British Mosses* (London, 1896); Braithwaite, *British Moss Flora* (London, 1887-1905).

(W. H. L.)

BRZOZOWSKI, THADDEUS (d. 1820), nineteenth general of the Jesuits, was appointed in succession to Gabriel Gruber on the 2nd of September 1805. In 1801 Pius VII. had given the Jesuits liberty to reconstitute themselves in north Russia (see JESUITS: *History*), and in 1812 Brzozowski secured the recognition of the Jesuit college of Polotsk as a university, though he could not obtain permission to go to Spain to agitate for the recognition of the Spanish Jesuits. In 1814 Pius VII., in accordance with the bull *Sollicitudo omnium ecclesiarum*, gave to Brzozowski among others full authority to receive those who desired to enter the society. The Russian government, however, soon began to be alarmed at the growth of the Jesuits, and on the 20th of December 1815 published an edict expelling them from St Petersburg. Brzozowski, having vainly requested to be allowed to retire to Rome, died on the 5th of February 1820. He is interesting mainly from the fact that he was general of the Society at the time of its restoration throughout Europe.

[v.04 p.0709]

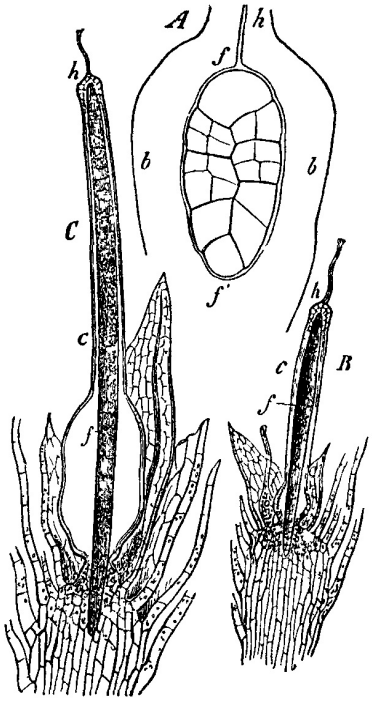

FIG. 16.—*Funaria hygrometrica.* (After Goebel.)

A. Longitudinal section of the very young sporogonium (*f*, *f*) enclosed in the archegonial wall (*b*, *h*).

B, C. Further stages of the development of the sporogonium (*f*) enclosed in the calyptra formed from the archegonial wall (*c*) and still bearing the neck (*h*). The foot of the sporogonium has penetrated into the underlying tissue of the stem of the moss-plant.

BUBASTIS, the Graecized name of the Egyptian goddess Ubasti, meaning "she of [the city] Bast" (B;s-t), a city better known by its later name, P-ubasti, "place of Ubasti"; thus the goddess derived her name Ubasti from her city (Bast), and in turn the city derived its name P-ubasti from that of the goddess; the Greeks, confusing the name of the city with that of the goddess, called the latter Bubastis, and the former also Bubastis (later Bubastos). Bubastis, capital of the 19th nome of Lower Egypt, is now represented by a great mound of ruins called Tell Basta, near Zagazig, including the site of a large temple (described by Herodotus) strewn with blocks of granite. The monuments discovered there, although only those in hard stone have survived, are more important than at any other site in the Delta except Tanis and cover a wider range, commencing with Khufu (Cheops) and continuing to the thirtieth dynasty.

Ubasti was one of many feline goddesses, figured with the head of a lioness. In the great development of reverence for sacred animals which took place after the New Kingdom, the domestic cat was especially the animal of Bubastis, although it had also to serve for all the other feline goddesses, owing no doubt to the scarcity and intractability of its congeners. Her hieratic and most general form was still lioness-headed, but a popular form, especially in bronze, was a cat-headed women, often holding in her right hand a lion aegis, i.e. a broad semicircular pectoral surmounted by the head of a lioness, and on the left arm a basket. The cat cemetery on the west side of the town consisted of numbers of large brick chambers, crammed with burnt and decayed mummies, many of which had been enclosed in cat-shaped cases of wood and bronze. Herodotus describes the festival of Bubastis, which was attended by thousands from all parts of Egypt and was a very riotous affair; it has its modern equivalent in the Moslem festival of the sheikh Said el Badawi at Tanta. The tablet of Canopus shows that there were two festivals of Bubastis, the great and the lesser: perhaps the lesser festival was held at Memphis, where the quarter called Ankhto contained a temple to this goddess. Her name is found on monuments from the third dynasty onwards, but a great stimulus was given to her worship by the twenty-second (Bubastite) dynasty and generally by the increased importance of Lower Egypt in later times. Her character seems to have been essentially mild and playful, in contrast to Sokhmi and other feline goddesses. The Greeks equated Ubasti with their Artemis, confusing her with the leonine Tafne, sister of Shöou (Apollo). The Egyptians themselves delighted in identifying together goddesses of the most diverse forms and attributes; but Ubasti was almost indistinguishable in form from Tafne. The name of her son Iphthimis (Nfr-tm), pronounced Eftem, may mean "All-good," and, in the absence of other information about him, suggests a reason why he was identified with Prometheus.

See K. Sethe in Pauly-Wissowa's *Realencyclopädie*; E. Naville, *Bubastis*, and *Festival Hall of Osorkon II.*; Herodotus ii. 67, 137-156; Grenfell and Hunt, *Hibeh Papyri*, i.

(F. LL. G.)

BUCARAMANGA, a city of Colombia, capital of the department of Santandér, about 185 m. N.N.E. of Bogotá. Pop. (estimate, 1902) 25,000. It is situated on the Lebrija river, 3248 ft. above sea-level, in a mountainous country rich in gold, silver and iron mines, and having superior

coffee-producing lands in the valleys and on the lower slopes. The city is laid out with wide, straight streets, is well built, and has many public buildings of a substantial character.

BUCCANEERS, the name given to piratical adventurers of different nationalities united in their opposition to Spain, who maintained themselves chiefly in the Caribbean Sea during the 17th century.

The island of Santo Domingo was one of several in the West Indies which had early in the 16th century been almost depopulated by the oppressive colonial policy of Spain. Along its coast there were several isolated establishments presided over by Spaniards, who were deprived of a convenient market for the produce of the soil by the monopolies imposed by the mother country. Accordingly English, Dutch and French vessels were welcomed and their cargoes readily bought. The island, thinned of its former inhabitants, had become the home of immense herds of wild cattle; and it became the habit of smugglers to provision at Santo Domingo. The natives still left were skilled in preserving flesh at their little establishments called *boucans*. The adventurers learned "boucanning" from the natives; and gradually Hispaniola became the scene of an extensive and illicit butcher trade. Spanish monopolies filled the seamen who sailed the Caribbean with a natural hate of everything Spanish. The pleasures of a roving life, enlivened by occasional skirmishes with forces organized and led by Spanish officials, gained upon them. Out of such conditions arose the buccaneer, alternately sailor and hunter, even occasionally a planter —roving, bold, unscrupulous, often savage, with an intense detestation of Spain. As the Spaniards would not recognize the right of other races to make settlements, or even to trade in the West Indies, the governments of France, England and Holland would do nothing to control their subjects who invaded the islands. They left them free to make settlements at their own risk. Each nation contributed a band of colonists, who selected the island of St Kitts or St Christopher, in the West Indies, where the settlers of both nations were simultaneously planted. The English and French were, however, not very friendly; and in 1629, after the retirement of several of the former to an adjoining island, the remaining colonists were surprised and partly dispersed by the arrival of a Spanish fleet of thirty-nine sail. But on the departure of the fleet the scattered bands returned, and encouragement was given to their countrymen in Santo Domingo. For buccaneering had now become a most profitable employment, operations were extended, and a storehouse secure from the attacks of the Spaniards was required. The small island of Tortuga (north-west of Hispaniola) was seized for this purpose in 1630, converted into a magazine for the goods of the rivals, and made their headquarters, Santo Domingo itself still continuing their hunting ground. A purely English settlement directed by a company in London was made at Old Providence, an island in the Caribbean Sea, now belonging to Colombia. It began a little before 1630, and was suppressed by the Spaniards in 1641.

Spain was unable to take immediate action. Eight years later, however, watching their opportunity when many buccaneers were absent in the larger island, the Spaniards attacked Tortuga, and massacred every settler they could seize. But the others returned; and the buccaneers, now in open hostility to the Spanish arms, began to receive recruits from every European trading nation, and for three-quarters of a century became the scourge of the Spanish-American trade and dominions.

France, throughout all this, had not been idle. She had named the governor of St Kitts "Governor-General for the French West India Islands," and in 1641 he took possession of Tortuga, expelled all English from the island, and attempted the same with less success in Santo Domingo. England was absorbed in the Civil War, and the buccaneers had to maintain themselves as best they could,—now mainly on the sea.

In 1654 the Spaniards regained Tortuga from the French, into whose hands it again, however, fell after six years. But this state of affairs was too insecure even for these rovers, and they would speedily have succumbed had not a refuge been found for them by the fortunate conquest of Jamaica in 1655 by the navy of the English Commonwealth. These conquests were not made without the aid of the buccaneers themselves. The taking and re-taking of Tortuga by the French was always with the assistance of the roving community; and at the conquest of Jamaica the
[v.04 p.0710] English navy had the same influence in its favour. The buccaneers, in fact, constituted a mercenary navy, ready for employment against the power of Spain by any other nation, on condition of sharing the plunder; and they were noted for their daring, their cruelty and their extraordinary skill in seamanship.

Their history now divides itself into three epochs. The first of these extends from the period of their rise to the capture of Panama by Morgan in 1671, during which time they were hampered neither by government aid nor, till near its close, by government restriction. The second, from 1671 to the time of their greatest power, 1685, when the scene of their operations was no longer merely the Caribbean, but principally the whole range of the Pacific from California to Chile. The third and last period extends from that year onwards; it was a time of disunion and disintegration, when the independence and rude honour of the previous periods had degenerated into unmitigated vice and brutality.

It is chiefly during the first period that those leaders flourished whose names and doings have been associated with all that was really influential in the exploits of the buccaneers—the most prominent being Mansfield and Morgan. The floating commerce of Spain had by the middle of the 17th century become utterly insignificant. But Spanish settlements remained; and in 1654 the first great expedition on land made by the buccaneers, though attended by considerable difficulties, was completed by the capture and sack of New Segovia, on the mainland of America.

The Gulf of Venezuela, with its towns of Maracaibo and Gibraltar, were attacked and plundered under the command of a Frenchman named L'Ollonois, who performed, it is said, the office of executioner upon the whole crew of a Spanish vessel manned with ninety seamen. Such successes removed the buccaneers further and further from the pale of civilized society, fed their revenge, and inspired them with an avarice almost equal to that of the original settlers from Spain. Mansfield indeed, in 1664, conceived the idea of a permanent settlement upon a small island of the Bahamas, named New Providence, and Henry Morgan, a Welshman, intrepid and unscrupulous, joined him. But the untimely death of Mansfield nipped in the bud the only rational scheme of settlement which seems at any time to have animated this wild community; and Morgan, now elected commander, swept the whole Caribbean, and from his headquarters in Jamaica led triumphant expeditions to Cuba and the mainland. He was leader of the expedition wherein Porto Bello, one of the best-fortified ports in the West Indies, was surprised and plundered.

This was too much for even the adverse European powers; and in 1670 a treaty was concluded between England and Spain, proclaiming peace and friendship among the subjects of the two sovereigns in the New World, formally renouncing hostilities of every kind. Great Britain was to hold all her possessions in the New World as her own property (a remarkable concession on the part of Spain), and consented, on behalf of her subjects, to forbear trading with any Spanish port without licence obtained.

The treaty was very ill observed in Jamaica, where the governor, Thomas Modyford (1620-1679), was in close alliance with the "privateers," which was the official title of the buccaneers. He had already granted commissions to Morgan and others for a great attack on the Isthmus of Panama, the route by which the bullion of the South American mines was carried to Porto Bello, to be shipped to Spain. The buccaneers to the number of 2000 began by seizing Chagres, and then marched to Panama in 1671. After a difficult journey on foot and in canoes, they found themselves nearing the shores of the South Sea and in view of the city. On the morning of the tenth day they commenced an engagement which ended in the rout of the defenders of the town. It was taken, and, accidentally or not, it was burnt. The sack of Panama was accompanied by great barbarities. The Spaniards had, however, removed the treasure before the city was taken. When the booty was divided, Morgan is accused of having defrauded his followers. It is certain that the share per man was small, and that many of the buccaneers died of starvation while trying to return to Jamaica. Modyford was recalled, and in 1672 Morgan was called home and imprisoned in the Tower. In 1674 he was allowed to come back to the island as lieutenant-governor with Lord Vaughan. He had become so unpopular after the expedition of 1671 that he was followed in the streets and threatened by the relations of those who had perished. During his later years he was active in suppressing the buccaneers who had now inconvenient claims on him.

From 1671 to 1685 is the time of the greatest daring, prosperity and power of the buccaneers. The expedition against Panama had not been without its influence. Notwithstanding their many successes in the Caribbean and on land, including a second plunder of Porto Bello, their thoughts ran frequently on the great expedition across the isthmus, and they pictured the South Sea as a far wider and more lucrative field for the display of their united power.

In 1680 a body of marauders over 300 strong, well armed and provisioned, landed on the shore of Darien and struck across the country; and the cruelty and mismanagement displayed in the policy of the Spaniards towards the Indians were now revenged by the assistance which the natives eagerly rendered to the adventurers. They acted as guides during a difficult journey of nine days, kept the invaders well supplied with food, provided them with canoes, and only left them after the taking of the fort of Santa Maria, when the buccaneers were fairly embarked on a broad and safe river which emptied itself into the South Sea. With John Coxon as commander they entered the Bay of Panama, where rumour had been before them, and where the Spaniards had hastily prepared a small fleet to meet them. But the valour of the buccaneers won for them another victory; within a week they took possession of four Spanish ships, and now successes flowed upon them. The Pacific, hitherto free from their intrusion, showed many sail of merchant vessels, while on land opposition south of the Bay of Panama was of little avail, since few were acquainted with the use of fire-arms. Coxon and seventy men returned as they had gone, but the others, under Sawkins, Sharp and Watling, roamed north and south on islands and mainland, and remained for long ravaging the coast of Peru. Never short of silver and gold, but often in want of the necessaries of life, they continued their practices for a little longer; then, evading the risk of recrossing the isthmus, they boldly cleared Cape Horn, and arrived in the Indies. Again, in 1683, numbers of them under John Cook departed for the South Sea by way of Cape Horn. On Cook's death his successor, Edward Davis, undoubtedly the greatest and most prudent commander who ever led the forces of the buccaneers at sea, met with a certain Captain Swan from England, and the two captains began a cruise which was disastrous to the Spanish trade in the Pacific.

In 1685 they were joined in the Bay of Panama by large numbers of buccaneers who had crossed the isthmus under Townley and others. This increased body of men required an enlarged measure of adventure, and this in a few months was supplied by the viceroy of Peru. That officer, seeing the trade of the colony cut off, supplies stopped, towns burned and raided, and property harassed by continual raids, resolved by vigorous means to put an end to it. But his aim was not easily accomplished. In this same year a Spanish fleet of fourteen sail met, but did not engage, ten buccaneer vessels which were found in the Bay of Panama.

At this period the power of the buccaneers was at its height. But the combination was too

extensive for its work, and the different nationality of those who composed it was a source of growing discord. Nor was the dream of equality ever realized for any length of time. The immense spoil obtained on the capture of wealthy cities was indeed divided equally. But in the gambling and debauchery which followed, nothing was more common than that one-half of the conquerors should find themselves on the morrow in most pressing want; and while those who had retained or increased their share would willingly have gone home, the others clamoured for renewed attacks. The separation of the English and French buccaneers, who together presented a united front to the Spanish fleet in 1685, marks the beginning of the third and last epoch in their history.

[v.04 p.0711] The brilliant exploits begun by the sack of Leon and Realejo by the English under Davis have, even in their variety and daring, a sameness which deprives them of interest, and the wonderful confederacy is now seen to be falling gradually to pieces. The skill of Davis at sea was on one occasion displayed in a seven days' engagement with two large Spanish vessels, and the interest undoubtedly centres in him. Townley and Swan had, however, by this time left him, and after cruising together for some time, they, too, parted. In 1688 Davis cleared Cape Horn and arrived in the West Indies, while Swan's ship, the "Cygnet," was abandoned as unseaworthy, after sailing as far as Madagascar. Townley had hardly joined the French buccaneers remaining in the South Sea ere he died, and the Frenchmen with their companions crossed New Spain to the West Indies. And thus the Pacific, ravaged so long by this powerful and mysterious band of corsairs, was at length at peace.

The West Indies had by this time become hot enough even for the banded pirates. They hung doggedly along the coasts of Jamaica and Santo Domingo, but their day was nearly over. Only once again—at the siege of Carthagena—did they appear great; but even then the expedition was not of their making, and they were mere auxiliaries of the French regular forces. After the treachery of the French commander of this expedition a spirit of unity and despairing energy seemed reawakened in them; but this could not avert and scarcely delayed the rapidly approaching extinction of the community.

The French and English buccaneers could not but take sides in the war which had arisen between their respective countries in 1689. Thus was broken the bond of unity which had for three-quarters of a century kept the subjects of the two nations together in schemes of aggression upon a common foe. In the short peace of 1697-1700 England and France were using all their influence, both in the Old World and in the New, to ingratiate themselves into the favour of the king of Spain. With the resumption of hostilities in 1700 and the rise of Spain consequent upon the accession of the French claimant to the throne the career of the buccaneers was effectually closed.

But the fall of the buccaneers is no more accounted for fully by these circumstances than is their rise by the massacre of the islanders of Santo Domingo. There was that in the very nature of the community which, from its birth, marked it as liable to speedy decline.

The principles which bound the buccaneers together were, first the desire for adventure and gain, and, in the second place, hatred of the Spaniard. The first was hardly a sufficient bond of union, among men of different nationalities, when booty could be had nearly always by private venture under the colours of the separate European powers. Of greater validity was their second and great principle of union, namely, that they warred not with one another, nor with every one, but with a single and a common foe. For while the buccaneer forces included English, French and Dutch sailors, and were complemented occasionally by bands of native Indians, there are few instances during the time of their prosperity and growth of their falling upon one another, and treating their fellows with the savagery which they exulted in displaying against the subjects of Spain. The exigencies, moreover, of their perilous career readily wasted their suddenly acquired gains.

Settled labour, the warrant of real wealth, was unacceptable to those who lived by promoting its insecurity. Regular trade—though rendered attractive by smuggling—and pearl gathering and similar operations which were spiced with risk, were open in vain to them, and in the absence of any domestic life, a hand-to-mouth system of supply and demand rooted out gradually the prudence which accompanies any mode of settled existence. In everything the policy of the buccaneers, from the beginning to the end of their career, was one of pure destruction, and was, therefore, ultimately suicidal.

Their great importance in history lies in the fact that they opened the eyes of the world, and specially of the nations from whom these buccaneers had sprung, to the whole system of Spanish-American government and commerce—the former in its rottenness, and the latter in its possibilities in other hands. From this, then, along with other causes, dating primarily from the helplessness and presumption of Spain, there arose the West Indian possessions of Holland, England and France.

A work published at Amsterdam in 1678, entitled *De Americaensche Zee Roovers*, from the pen of a buccaneer named Exquemelin, was translated into several European languages, receiving additions at the hands of the different translators. The French translation by Frontignières is named *Histoire des avanturiers qui se sont signalez dans les Indes*; the English edition is entitled *The Bucaniers of America.* Other works are Raynal's *History of the Settlements and Trade of the Europeans in the East and West Indies*, book x., English translation 1782; Dampier's *Voyages*; Geo. W. Thornbury's *Monarchs of the Main, &c.* (1855); Lionel Wafer's *Voyage and Description of the Isthmus of America* (1699); and the *Histoire de l'isle Espagnole, &c.*, and *Histoire et*

description générale de la Nouvelle France of Père Charlevoix. The statements in these works are to be received with caution. A really authentic narrative, however, is Captain James Burney's *History of the Buccaneers of America* (London, 1816). The *Calendar of State Papers*, Colonial Series (London, 1860 et seq.), contains much evidence for the history of the buccaneers in the West Indies.

(D. H.)

BUCCARI (Serbo-Croatian *Bakar*), a royal free town of Croatia-Slavonia, Hungary; situated in the county of Modruš-Fiume, 7 m. S.E. of Fiume, on a small bay of the Adriatic Sea. Pop. (1900) 1870. The Hungarian state railway from Zákány and Agram terminates 2½ m. from Buccari. The harbour, though sometimes dangerous to approach, affords good anchorage to small vessels. Owing to competition from Fiume, Buccari lost the greater part of its trade during the 19th century. The staple industry is boatbuilding, and there is an active coasting trade in fish, wine, wood and coal. The tunny-fishery is of some importance. In the neighbourhood of the town is the old castle of Buccarica, and farther south the flourishing little port of Porto Ré or Kraljevica.

BUCCINA (more correctly *Būcĭna*, Gr. Βυκάνη, connected with *bucca*, cheek, and Gr. Βύζω, a brass wind instrument extensively used in the ancient Roman army. The Roman instrument consisted of a brass tube measuring some 11 to 12 ft. in length, of narrow cylindrical bore, and played by means of a cup-shaped mouthpiece. The tube is bent round upon itself from the mouthpiece to the bell in the shape of a broad C and is strengthened by means of a bar across the curve, which the performer grasps while playing, in order to steady the instrument; the bell curves over his head or shoulder as in the modern helicon. Three Roman buccinas were found among the ruins of Pompeii and are now deposited in the museum at Naples. V. C. Mahillon, of Brussels[1] has made a facsimile of one of these instruments; it is in G and has almost the same harmonic series as the French horn and the trumpet. The buccina, the cornu (see Horn), and the tuba were used as signal instruments in the Roman army and camp to sound the four night watches (hence known as *buccina prima, secunda, &c.*), to summon them by means of the special signal known as *classicum*, and to give orders.[2] Frontinus relates[3] that a Roman general, who had been surrounded by the enemy, escaped during the night by means of the stratagem of leaving behind him a *buccinator* (trumpeter), who sounded the watches throughout the night.[4] Vegetius gives brief descriptions of the three instruments, which suffice to establish their identity; the tuba, he says, is straight; the buccina is of bronze bent in the form of a circle.[5]

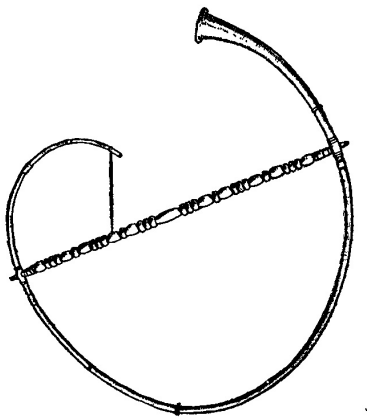

Fig. 1.—Buccina in the National Museum, Naples. From a photo by Brogi.

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The buccina, in respect of its technical construction and acoustic properties, was the ancestor of both trumpet and trombone; the connexion is further established by the derivation of the words Sackbut and *Posaune* (the German for trombone) from buccina. The relation was fully recognized in Germany during the 15th and 16th centuries, as two translations of Vegetius, published at Ulm in 1470, and at Augsburg in 1534, clearly demonstrate: "Bucina das ist die trumet oder pusan"[6] ("the bucina is the trumpet or trombone") and ("Bucina ist die trummet die wirt ausz und eingezogen"[7] ("the bucina is the trumpet which is drawn out and in"). A French translation by Jean de Meung (Paris, 1488),[8] renders the passage (chap. iii. 5) thus: "Trompe est longue et droite; buisine est courte et reflechist en li meisme si comme partie de cercle." On Trajan's column[9] the tuba, the cornu and the buccina are distinguishable. Other illustrations of the buccina may be seen in François Mazois' *Les Ruines de Pompéi* (Paris, 1824-1838), pt. iv, pl. xlviii. fig. 1, and in J.N. von Wilmowsky's *Eine römische Villa zu Nennig* (Bonn, 1865), pl. xii. (mosaics), where the buccinator is accompanied on the hydraulus. The military buccina described is a much more advanced instrument than its prototype the *buccina marina*, a primitive trumpet in the shape of a conical shell, often having a spiral twist, which in poetry is often called *concha*. The buccina marina is frequently depicted in the hands of Tritons (Macrobius i. 8), or of sailors, as for instance on terra-cotta lamp shown by G.P. Bellori (*Lucernae veterum sepulcrales iconicae*, 1702, iii. 12). The highly imaginative writer of the apocryphal letter of St Jerome to Dardanus also has a word to say concerning the buccina among the Semitic races: "Bucca vocatur tuba apud Hebreos: deinde per diminutionem buccina dicitur." After the fall of the Roman empire the art of bending metal tubes was gradually lost, and although the buccina survived in Europe both in name and in principle of construction during the middle ages, it lost for ever the characteristic curve like a "C" which it possessed in common with the cornu, an instrument having a conical bore of wider calibre.

Fig. 2.—Busine, 14th century. (From MS. R. 10 E. IV. Brit. Mus.)

Fig. 3.—Busine, 14th century. (From MS. R. 10 E. IV. Brit. Mus.)

Although we regard the buccina as essentially Roman, an instrument of the same type, but probably straight and of kindred name, was widely known and used in the East, in Persia, Arabia and among the Semitic races. After a lapse of years during which records are almost wanting, the buccina reappeared all over Europe as the busine, buisine, pusin, busaun, pusun, posaun, busna (Slav), &c.; whether it was a Roman survival or a re-introduction through the Moors of Spain in the West and the Byzantine empire in the East, we have no records to show. An 11th-century mural painting representing the Last Judgment in the cathedral of S. Angelo in Formis (near Capua), shows the angels blowing the last trump on busines.[10]

There are two distinct forms of the busine which may be traced during the middle ages:—(i) a long straight tube (fig. 2) consisting of 3 to 5 joints of narrow cylindrical bore, the last joint alone being conical and ending in a pommel-shaped bell, precisely as in the curved buccina (fig. 1); (2) a long straight cylindrical tube of somewhat wider bore than the busine, ending in a wide bell curving out abruptly from the cylindrical tube (fig. 3).

The history of the development of the trumpet, the sackbut and the trombone from the buccina will be found more fully treated under those headings; for the part played by the buccina in the evolution of the French horn see Horn.

(K. S.)

[1] See *Catalogue descriptif* (Ghent, 1880), p. 330, and illustration, vol. ii. (1896), p. 30.

[2] Livy vii. 35, xxvi. 15; Prop. v. 4, 63; Tac. *Ann.* xv. 30; Vegetius, *De re militari*, ii. 22, iii. 5; Polyb. vi. 365, xiv. 3, 7.

[3] *Stratagematicon*, i. 5, § 17.

[4] For another instance see Caesar, *Comm. Bell. Civ.* ii. 35.

[5] Vegetius, op. cit. iii. 5.

[6] Idem, ii. 7.

[7] Idem, iii. 5.

[8] A reprint edited by Ulysse Robert has been published by the Soc. des Anciens Textes Français (Paris, 1897).

[9] See Conrad Cichorius, *Die Reliefs der Traiansaule*, 3 vols. of text and 2 portfolios of heliogravures (Berlin, 1896, &c.), Bd. i. pl. x. buccina and tubae; pl. viii. buccina; pl. lxxvi. buccina and two cornua; pl. xx. cornu, &c.; or W. Froehner, *La Colonne de Trajan* (Paris, 1872), vol. i. pl. xxxii., xxxvi., li., tome ii. pl. lxvi., tome iii. pl. cxxxiv., &c.

[10] See F.X. Kraus, "Die Wandgemälde von San Angelo in Formis," in *Jahrbuch der kgl. preuss. Kunstsamml.* (1893), pl. i.

BUCCLEUCH, DUKES OF. The substantial origin of the ducal house of the Scotts of Buccleuch dates back to the large grants of lands in Scotland to Sir Walter Scott of Kirkurd and Buccleuch, a border chief, by James II., in consequence of the fall of the 8th earl of Douglas (1452); but the family traced their descent back to a Sir Richard le Scott (1240-1285). The estate of Buccleuch is in Selkirkshire. Sir Walter Scott of Branxholm and Buccleuch (d. 1552) distinguished himself at the battle of Pinkie (1547), and furnished material for his later namesake's famous poem, *The Lay of the Last Minstrel*; and his great-grandson Sir Walter (1565-1611) was created Lord Scott of Buccleuch in 1606. An earldom followed in 1619. The second earl's daughter Anne (1651-1732), who succeeded him as a countess in her own right, married in 1663 the famous duke of Monmouth (*q.v.*), who was then created 1st duke of Buccleuch; and her grandson Francis became 2nd duke. The latter's son Henry (1746-1812) became 3rd duke, and in 1810 succeeded also, on the death of William Douglas, 4th duke of Queensberry, to that dukedom as well as its estates and other honours, according to the entail executed by his own great-grandfather, the 2nd duke of Queensberry, in 1706; he married the duke of Montagu's daughter, and was famous for his generosity and benefactions. His son Charles William Henry (d. 1819), grandson Walter Francis Scott (1806-1884), and great-grandson William Henry Walter Montagu Douglas Scott (b. 1831), succeeded in turn as 4th, 5th and 6th dukes of Buccleuch and 6th, 7th, and 8th dukes of Queensberry. The 5th duke was lord privy seal 1842-1846, and president of the council 1846. It was he who at a cost of over £500,000 made the harbour at Granton, near Edinburgh. He was president of the Highland and Agricultural Society, the Society of Antiquaries and of the British Association. The 6th duke sat in the House of Commons as Conservative M.P. for Midlothian, 1853-1868 and 1874-1880; his wife, a daughter of the 1st duke of Abercorn, held the office of mistress of the robes.

See Sir W. Fraser, *The Scotts of Buccleuch* (1878).

BUCENTAUR (Ital. *bucintoro*), the state gallery of the doges of Venice, on which, every year on Ascension day up to 1789, they put into the Adriatic in order to perform the ceremony of "wedding the sea." The name *bucintoro* is derived from the Ital. *buzino d' oro*, "golden bark," latinized in the middle ages as *bucentaurus* on the analogy of a supposed Gr. βουκένταυρος, ox-centaur (from βοῦς and Κένταυρος). This led to the explanation of the name as derived from the head of an ox having served as the galley's figurehead. This derivation is, however, fanciful; the name *bucentaurus* is unknown in ancient mythology, and the figurehead of the bucentaurs, of

which representations have come down to us, is the lion of St Mark. The name bucentaur seems, indeed, to have been given to any great and sumptuous Venetian galley. Du Cange (*Gloss.*, *s.v.* "Bucentaurus") quotes from the chronicle of the doge Andrea Dandolo (d. 1354): *cum uno artificioso et solemni Bucentauro, super quo venit usque ad S. Clementem, quo jam pervenerat principalior et solemnior Bucentaurus cum consiliariis*, &c. The last and most magnificent of the bucentaurs, built in 1729, was destroyed by the French in 1798 for the sake of its golden decorations. Remains of it are preserved at Venice in the Museo Civico Correr and in the Arsenal; in the latter there is also a fine model of it.

The "Marriage of the Adriatic," or more correctly "of the sea" (*Sposalizio del Mar*) was a ceremony symbolizing the maritime dominion of Venice. The ceremony, established about A.D. 1000 to commemorate the doge Orseolo II.'s conquest of Dalmatia, was originally one of supplication and placation, Ascension day being chosen as that on which the doge had set out on his expedition. The form it took was a solemn procession of boats, headed by the doge's *maesta nave*, afterwards the Bucentaur (from 1311) out to sea by the Lido port. A prayer was offered that "for us and all who sail thereon the sea may be calm and quiet," whereupon the doge and the others were solemnly aspersed with holy water, the rest of which was thrown into the sea while the priests chanted "Purge me with hyssop and I shall be clean." To this ancient ceremony a sacramental character was given by Pope Alexander III in 1177, in return for the services rendered by Venice in the struggle against the emperor Frederick I. The pope drew a ring from his finger and, giving it to the doge, bade him cast such a one into the sea each year on Ascension day, and so wed the sea. Henceforth the ceremonial, instead of placatory and expiatory, became nuptial. Every year the doge dropped a consecrated ring into the sea, and with the words *Desponsamus te, mare* (We wed thee, sea) declared Venice and the sea to be indissolubly one (see H. F. Brown, *Venice*, London, 1893, pp. 69, 110).

BUCEPHALUS (Gr. βουκεφαλος), the favourite Thracian horse of Alexander the Great, which died in 326 B.C., either of wounds received in the battle on the Hydaspes, or of old age. In commemoration Alexander built the city of Bucephala (Boukephala), the site of which is almost certainly to be identified with a mound on the bank of the river opposite the modern Jhelum.

See especially Arrian v. 20; other stories in Plutarch, *Alex.* 6; Curtius vi. 8. For the identification of Bucephala, Vincent A. Smith, *Early Hist. of India* (2nd ed., 1908), pp. 65, 66 note.

BUCER (or BUTZER), **MARTIN** (1491-1551), German Protestant reformer, was born in 1491 at Schlettstadt in Alsace. In 1506 he entered the Dominican order, and was sent to study at Heidelberg. There he became acquainted with the works of Erasmus and Luther, and was present at a disputation of the latter with some of the Romanist doctors. He became a convert to the reformed opinions, abandoned his order by papal dispensation in 1521, and soon afterwards married a nun. In 1522 he was pastor at Landstuhl in the palatinate, and travelled hither and thither propagating the reformed doctrine. After his excommunication in 1523 he made his headquarters at Strassburg, where he succeeded Matthew Zell. Henry VIII of England asked his advice in connexion with the divorce from Catherine of Aragon. On the question of the sacrament of the Lord's Supper, Bucer's opinions were decidedly Zwinglian, but he was anxious to maintain church unity with the Lutheran party, and constantly endeavoured, especially after Zwingli's death, to formulate a statement of belief that would unite Lutheran, south German and Swiss reformers. Hence the charge of ambiguity and obscurity which has been laid against him. In 1548 he was sent for to Augsburg to sign the agreement, called the *Interim*, between the Catholics and Protestants. His stout opposition to this project exposed him to many difficulties, and he was glad to accept Cranmer's invitation to make his home in England. On his arrival in 1549 he was appointed regius professor of divinity at Cambridge. Edward VI. and the protector Somerset showed him much favour and he was consulted as to the revision of the Book of Common Prayer. But on the 27th of February 1551 he died, and was buried in the university church, with great state. In 1557, by Mary's commissioners, his body was dug up and burnt, and his tomb demolished; it was subsequently reconstructed by order of Elizabeth. Bucer is said to have written ninety-six treatises, among them a translation and exposition of the Psalms and a work *Deregno Christi*. His name is familiar in English literature from the use made of his doctrines by Milton in his divorce treatises.

A collected edition of his writings has never been published. A volume known as the *Tomus Anglicanus* (Basel, 1577) contains those written in England. See J.W. Baum, *Capito and Butzer* (Strassburg, 1860); A. Erichson, *Martin Butzer* (1891); and the articles in the *Dict. Nat. Biog.* (by A.W. Ward), and in Herzog-Hauck's *Realencyklopädie* (by Paul Grünberg).

BUCH, CHRISTIAN LEOPOLD VON, BARON (1774-1853), German geologist and geographer, a member of an ancient and noble Prussian family, was born at Stolpe in Pomerania on the 26th of April 1774. In 1790-1793 he studied at the mining school of Freiberg under Werner, one of his fellow-students there being Alexander von Humboldt. He afterwards completed his education at the universities of Halle and Göttingen. His *Versuch einer mineralogischen Beschreibung von Landeck* (Breslau, 1797) was translated into French (Paris, 1805), and into English as *Attempt at a Mineralogical Description of Landeck* (Edinburgh, 1810); he also published in 1802 *Entwurf einer geognostischen Beschreibung von Schlesien (Geognostische Beobachtungen auf Reisen durch Deutschland und Italien*, Band i.). He was at this time a zealous upholder of the Neptunian theory of his illustrious master. In 1797 he met Humboldt at Salzburg, and with him explored the geological formations of Styria, and the adjoining Alps. In the spring of the following year, von Buch extended his excursions into Italy, where his faith in the Neptunian theory was shaken. In his previous works he had advocated the aqueous origin of basaltic and other formations. In 1799

he paid his first visit to Vesuvius, and again in 1805 he returned to study the volcano, accompanied by Humboldt and Gay Lussac. They had the good fortune to witness a remarkable eruption, which supplied von Buch with data for refuting many erroneous ideas then entertained regarding volcanoes. In 1802 he had explored the extinct volcanoes of Auvergne. The aspect of the Puy de Dôme, with its cone of trachyte and its strata of basaltic lava, induced him to abandon as untenable the doctrines of Werner on the formation of these rocks. The scientific results of his investigations he embodied in his *Geognostische Beobachtungen auf Reisen durch Deutschland und Italien* (Berlin, 1802-1809). From the south of Europe von Buch repaired to the north, and spent two years among the Scandinavian islands, making many important observations on the geography of plants, on climatology and on geology. He showed that many of the erratic blocks on the North German plains must have come from Scandinavia. He also established the fact that the whole of Sweden is slowly but continuously rising above the level of the sea from Frederikshald to Abo. The details of these discoveries are given in his *Reise durch Norwegen und Lappland* (Berlin, 1810). In 1815 he visited the Canary Islands in company with Christian Smith, the Norwegian botanist. His observations here convinced him that these and other islands of the Atlantic owed their existence to volcanic action of the most intense kind, and that the groups of islands in the South Sea are the remains of a pre-existing continent. The physical description of the Canary Islands was published at Berlin in 1825, and this work alone is regarded as an enduring monument of his labours. After leaving the Canaries von Buch proceeded to the Hebrides and the coasts of Scotland and Ireland. Palaeontology also claimed his attention, and he described in 1831 and later years a number of Cephalopods, Brachiopods and Cystidea, and pointed out their stratigraphical importance. In addition to the works already mentioned von Buch published in 1832 the magnificent *Geological Map of Germany* (42 sheets, Berlin). His geological excursions were continued without interruption till his 78th year. Eight months before
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his death he visited the mountains of Auvergne; and on returning home he read a paper on the Jurassic formation before the Academy of Berlin. He died at Berlin on the 4th of March 1853. Von Buch had inherited from his father a fortune more than sufficient for his wants. He was never married, and was unembarrassed by family ties. His excursions were always taken on foot, with a staff in his hand, and the large pockets of his overcoat filled with papers and geological instruments. Under this guise, the passer-by would not easily have recognized the man whom Humboldt pronounced the greatest geologist of his time.

A complete edition of his works was published at Berlin (1867-1885).

BUCHAN, EARLS OF. The earldom of Mar and Buchan was one of the seven original Scottish earldoms; later, Buchan was separated from Mar, and among the early earls of Buchan were Alexander Comyn (d. 1289), John Comyn (d. *c.* 1313), both constables of Scotland, and Henry Beaumont (d. 1340), who had married a Comyn. John Comyn's wife, Isabel, was the countess of Buchan who crowned Robert the Bruce king at Scone in 1306, and was afterwards imprisoned at Berwick; not, however, in a cage hung on the wall of the castle. About 1382 Sir Alexander Stewart (d. *c.* 1404), the "wolf of Badenoch," a son of King Robert II., became earl of Buchan, and the Stewarts appear to have held the earldom for about a century and a half, although not in a direct line from Sir Alexander.[1] Among the most celebrated of the Stewart earls were the Scottish regent, Robert, duke of Albany, and his son John, who was made constable of France and was killed at the battle of Verneuil in 1424. In 1617 the earldom came to James Erskine (d. 1640), a son of John Erskine, 2nd (or 7th) earl of Mar, whose wife Mary had inherited it from her father, James Douglas (d. 1601), and from that time it has been retained by the Erskines.

Perhaps the most celebrated of the later earls of Buchan was the eccentric David Steuart Erskine, 11th earl (1742-1829), a son of Henry David, 10th earl (d. 1767), and brother of Henry Erskine (*q.v.*), and of Thomas, Lord Erskine (*q.v.*). His pertinacity was instrumental in effecting a change in the method of electing Scottish representative peers, and in 1780 he succeeded in founding the Scottish Society of Antiquaries. Among his correspondents was Horace Walpole, and he wrote an *Essay on the Lives of Fletcher of Saltoun and the Poet Thomson* (1792), and other writings. He died at his residence at Dryburgh in April 1829, leaving no legitimate children, and was followed as 12th earl by his nephew Henry David (1783-1857), the ancestor of the present peer. The 11th earl's natural son, Sir David Erskine (1772-1837), who inherited his father's unentailed estates, was an antiquary and a dramatist.

[1] In August 1908, during some excavations at Dunkeld, remains were found which are supposed to be those of Alexander Stewart, the "wolf of Badenoch."

BUCHAN, ELSPETH (1738-1791), founder of a Scottish religious sect known as the Buchanites, was the daughter of John Simpson, proprietor of an inn near Banff. Having quarrelled with her husband, Robert Buchan, a potter of Greenock, she settled with her children in Glasgow, where she was deeply impressed by a sermon preached by Hugh White, minister of the Relief church at Irvine. She persuaded White and others that she was a saint with a special mission, that in fact she was the woman, and White the man-child, described in Revelation xii. White was condemned by the presbytery, and the sect, which ultimately numbered forty-six adherents, was expelled by the magistrates in 1784 and settled in a farm, consisting of one room and a loft, known as New Cample in Dumfriesshire. Mrs Buchan claimed prophetic inspiration and pretended to confer the Holy Ghost upon her followers by breathing upon them; they believed that the millennium was near, and that they would not die, but be translated. It appears that they had community of wives and lived on funds provided by the richer members. Robert Burns, the poet, in a letter dated August 1784, describes the sect as idle and immoral. In 1785 White and Mrs Buchan published a *Divine Dictionary*, but the sect broke up on the death of its founder in spite of White's attempts to

prove that she was only in a trance. Even White was eventually undeceived. Andrew Innes, the last survivor, died in 1848. See J. Train, *The Buchanites from First to Last* (Edinburgh, 1846).

BUCHAN, PETER (1790-1854), Scottish editor, was born at Peterhead, Aberdeenshire, in 1790. In 1816 he started in business as a printer at Peterhead, and was successful enough to be able eventually to retire and devote himself to the collection and editing of Scottish ballads. His *Ancient Ballads and Songs of the North of Scotland* (1828) contained a large number of hitherto unpublished ballads, and newly discovered versions of existing ones. Another collection made by him was published by the Percy Society, under the title *Scottish Traditional Versions of Ancient Ballads* (1845). Two unpublished volumes of Buchan's ballad collections are in the British Museum. He died on the 19th of September 1854.

BUCHANAN, CLAUDIUS (1766-1815), English divine, was born at Cambuslang, near Glasgow, and educated at the universities of Glasgow and Cambridge. He was ordained in 1795, and after holding a chaplaincy in India at Barrackpur (1797-1799) was appointed Calcutta chaplain and vice-principal of the college of Fort William. In this capacity he did much to advance Christianity and native education in India, especially by organizing systematic translations of the Scriptures. An account of his travels in the south and west of India, which added considerably to our knowledge of nature life, is given in his *Christian Researches in Asia* (Cambridge, 1811). After his return to England in 1808, he still took an active part in matters connected with India, and by his book entitled *Colonial Ecclesiastical Establishment* (London, 1813), he assisted in settling the controversy of 1813, which ended in the establishment of the Indian episcopate.

BUCHANAN, GEORGE (1506-1582), Scottish humanist, was born in February 1506. His father, a younger son of an old family, was the possessor of the farm of Moss, in the parish of Killearn, Stirlingshire, but he died at an early age, leaving his widow and children in poverty. His mother, Agnes Heriot, was of the family of the Heriots of Trabroun, Haddingtonshire, of which George Heriot, founder of Heriot's hospital, was also a member. Buchanan is said to have attended Killearn school, but not much is known of his early education. In 1520 he was sent by his uncle, James Heriot, to the university of Paris, where, as he tells us in an autobiographical sketch, he devoted himself to the writing of verses "partly by liking, partly by compulsion (that being then the one task prescribed to youth)." In 1522 his uncle died, and Buchanan being thus unable to continue longer in Paris, returned to Scotland. After recovering from a severe illness, he joined the French auxiliaries who had been brought over by John Stewart, duke of Albany, and took part in an unsuccessful inroad into England (see the account in his *Hist. of Scotland*). In the following year he entered the university of St Andrews, where he graduated B.A. in 1525. He had gone there chiefly for the purpose of attending the celebrated John Major's lectures on logic; and when that teacher removed to Paris, Buchanan followed him in 1526. In 1527 he graduated B.A., and in 1528 M.A. at Paris. Next year he was appointed regent, or professor, in the college of Sainte-Barbe, and taught there for upwards of three years. In 1529 he was elected Procurator of the "German Nation" in the university of Paris, and was re-elected four times in four successive months. He resigned his regentship in 1531, and in 1532 became tutor to Gilbert Kennedy, 3rd earl of Cassilis, with whom he returned to Scotland about the beginning of 1537.

At this period Buchanan was content to assume the same attitude towards the Church of Rome that Erasmus maintained. He did not repudiate its doctrines, but considered himself free to criticize its practice. Though he listened with interest to the arguments of the Reformers, he did not join their ranks before 1553. His first production in Scotland, when he was in Lord Cassilis's household in the west country, was the poem *Somnium*, a satirical attack upon the Franciscan friars and monastic life generally. This assault on the monks was not displeasing to James V., who
[v.04 p.0715] engaged Buchanan as tutor to one of his natural sons, Lord James Stewart (not the son who was afterwards the regent Murray), and encouraged him to a still more daring effort. In these circumstances the poems *Palinodia* and *Franciscanus & Fratres* were written, and, although they remained unpublished for many years, it is not surprising that the author became an object of bitterest hatred to the order and their friends. Nor was it yet a safe matter to assail the church. In 1539 there was a bitter persecution of the Lutherans, and Buchanan among others was arrested. He managed to effect his escape and with considerable difficulty made his way to London and thence to Paris. In Paris, however, he found his enemy, Cardinal David Beaton, who was there as an ambassador, and on the invitation of André de Gouvéa, proceeded to Bordeaux. Gouvéa was then principal of the newly founded college of Guienne at Bordeaux, and by his exertions Buchanan was appointed professor of Latin. During his residence here several of his best works, the translations of *Medea* and *Alcestis*, and the two dramas, *Jephthes (sive Votum)* and *Baptistes (sive Calumnia)*, were completed. Montaigne was Buchanan's pupil at Bordeaux and acted in his tragedies. In the essay *Of Presumption* he classes Buchanan with Aurat, Béza, de L'Hopital, Montdore and Turnebus, as one of the foremost Latin poets of his time. Here also Buchanan formed a lasting friendship with Julius Caesar Scaliger; in later life he won the admiration of Joseph Scaliger, who wrote an epigram on Buchanan which contains the couplet, famous in its day:—

> "Imperii fuerat Romani Scotia limes;
> Romani eloquii Scotia limes erit?"

In 1542 or 1543 he returned to Paris, and in 1544 was appointed regent in the college of Cardinal le Moine. Among his colleagues were the renowned Muretus and Turnebus.

In 1547 Buchanan joined the band of French and Portuguese humanists who had been invited by André de Gouvéa to lecture in the Portuguese university of Coimbra. The French mathematician

Élie Vinet, and the Portuguese historian, Jeronimo de Osorio, were among his colleagues; Gouvéa, called by Montaigne *le plus grand principal de France*, was rector of the university, which had reached the summit of its prosperity under the patronage of King John III. But the rectorship had been coveted by Diogo de Gouvéa, uncle of André and formerly head of Sainte-Barbe. It is probable that before André's death at the end of 1547 Diogo had urged the Inquisition to attack him and his staff; up to 1906, when the records of the trial were first published in full, Buchanan's biographers generally attributed the attack to the influence of Cardinal Beaton, the Franciscans, or the Jesuits, and the whole history of Buchanan's residence in Portugal was extremely obscure.

A commission of inquiry was appointed in October 1549 and reported in June 1550. Buchanan and two Portuguese, Diogo de Teive and João da Costa (who had succeeded to the rectorship), were committed for trial. Teive and Costa were found guilty of various offences against public order, and the evidence shows that there was ample reason for a judicial inquiry. Buchanan was accused of Lutheran and Judaistic practices. He defended himself with conspicuous ability, courage and frankness, admitting that some of the charges were true. About June 1551 he was sentenced to abjure his errors, and to be imprisoned in the monastery of São Bento in Lisbon. Here he was compelled to listen to edifying discourses from the monks, whom he found "not unkind but ignorant." In his leisure he began to translate the Psalms into Latin verse. After seven months he was released, on condition that he remained in Lisbon; and on the 28th of February 1552 this restriction was annulled. Buchanan at once sailed for England, but soon made his way to Paris, where in 1553 he was appointed regent in the college of Boncourt. He remained in that post for two years, and then accepted the office of tutor to the son of the Maréchal de Brissac. It was almost certainly during this last stay in France, where Protestantism was being repressed with great severity by Francis I., that Buchanan ranged himself on the side of the Calvinists.

In 1560 or 1561 he returned to Scotland, and in April 1562 we find him installed as tutor to the young queen Mary, who was accustomed to read Livy with him daily. Buchanan now openly joined the Protestant, or Reformed Church, and in 1566 was appointed by the earl of Murray principal of St Leonard's College, St Andrews. Two years before he had received from the queen the valuable gift of the revenues of Crossraguel Abbey. He was thus in good circumstances, and his fame was steadily increasing. So great, indeed, was his reputation for learning and administrative capacity that, though a layman, he was made moderator of the general assembly in 1567. He had sat in the assemblies from 1563.

Buchanan accompanied the regent Murray into England, and his *Detectio* (published in 1572) was produced to the commissioners at Westminster. In 1570, after the assassination of Murray, he was appointed one of the preceptors of the young king, and it was through his tuition that James VI. acquired his scholarship. While discharging the functions of royal tutor he also held other important offices. He was for a short time director of chancery, and then became lord privy seal, a post which entitled him to a seat in the parliament. He appears to have continued in this office for some years, at least till 1579. He died on the 28th of September 1582.

His last years had been occupied with two of his most important works. The first was the treatise *De Jure Regni apud Scotos*, published in 1579. In this famous work, composed in the form of a dialogue, and evidently intended to instil sound political principles into the mind of his pupil, Buchanan lays down the doctrine that the source of all political power is the people, that the king is bound by those conditions under which the supreme power was first committed to his hands, and that it is lawful to resist, even to punish, tyrants. The importance of the work is proved by the persistent efforts of the legislature to suppress it during the century following its publication. It was condemned by act of parliament in 1584, and again in 1664; and in 1683 it was burned by the university of Oxford. The second of his larger works is the history of Scotland, *Rerum Scoticarum Historia*, completed shortly before his death (1579), and published in 1582. It is of great value for the period personally known to the author, which occupies the greater portion of the book. The earlier part is based, to a considerable extent, on the legendary history of Boece. Buchanan's purpose was to "purge" the national history "of sum Inglis lyis and Scottis vanite" (*Letter to Randolph*), but he exaggerated his freedom from partisanship and unconsciously criticized his work when he said that it would "content few and displease many."

Buchanan is one of Scotland's greatest scholars. For mastery over the Latin language he has seldom been surpassed by any modern writer. His style is not rigidly modelled upon that of any classical author, but has a certain freshness and elasticity of its own. He wrote Latin as if it had been his mother tongue. But in addition to this perfect command over the language, Buchanan had a rich vein of poetical feeling, and much originality of thought. His translations of the Psalms and of the Greek plays are more than mere versions; the smaller satirical poems abound in wit and in happy phrase; his two tragedies, *Baptistes* and *Jephthes*, have enjoyed from the first an undiminished European reputation for academic excellence. In addition to the works already named, Buchanan wrote in prose *Chamaeleon*, a satire in the vernacular against Maitland of Lethington, first printed in 1711; a Latin translation of Linacre's Grammar (Paris, 1533); *Libettus de Prosodia* (Edinburgh, 1640); and *Vita ab ipso scripta biennio ante mortem* (1608), edited by R. Sibbald (1702). His other poems are *Fratres Fraterrimi*, *Elegiae*, *Silvae*, two sets of verses entitled *Hendecasyllabon Liber* and *Iambon Liber*; three books of *Epigrammata*; a book of miscellaneous verse; *De Sphaera* (in five books), suggested by the poem of Joannes de Sacrobosco, and intended as a defence of the Ptolemaic theory against the new Copernican view.

There are two editions of Buchanan's works:—(*a*) *Georgii Buchanani Scoti, Poetarum sui seculi facile principis, Opera Omnia*, in two vols. fol., edited by Ruddiman (Edinburgh, Freebairn, 1715);

(b) edited by Burman, 4to, 1725. The *Vernacular Writings*, consisting of the *Chamaeleon* (*u.s.*), a tract on the Reformation of St Andrews University, *Ane Admonitioun to the Trew Lordis*, and two letters, were edited for the Scottish Text Society by P. Hume Brown. The principal biographies are:—David Irving, *Memoirs of the Life and Writings of George Buchanan* (Edinburgh,1807 and 1817); P. Hume Brown, *George Buchanan, Humanist and Reformer* (Edinburgh, 1890), *George Buchanan and his Times* (Edinburgh, 1906); Rev. D. Macmillan, *George Buchanan, a Biography* (Edinburgh, 1906). Buchanan's quatercentenary was celebrated at different centres in Scotland in 1906, and was the occasion of several encomia and studies. The most important of these are: *George Buchanan: Glasgow Quatercentenary Studies* (Glasgow, 1906), and *George Buchanan, a Memoir*, edited by D.A. Millar (St Andrews, 1907). A verse translation of the *Baptistes*, entitled *Tyrannicall-Government Anatomized* (1642), has been attributed to Milton; its authorship is discussed in the *Glasgow Quatercentenary Studies*. The records of Buchanan's trial, discovered by the Portuguese historian, G.J.C. Henriques, were published by him under the title *George Buchanan in the Lisbon Inquisition. The Records of his Trial, with a Translation thereof into English, Facsimiles of some of the Papers, and an Introduction* (Lisbon, 1906).

BUCHANAN, JAMES (1791-1868), fifteenth president of the United States, was born near Foltz, Franklin county, Pennsylvania, on the 23rd of April 1791. Both parents were of Scottish-Irish Presbyterian descent. He graduated at Dickinson College, Carlisle, Pennsylvania, in 1809, studied law at Lancaster in 1809-1812, and was admitted to the bar in 1812. He served in the lower house of the state legislature in 1814-1816, and as a representative in Congress from 1821 to 1831. As chairman of the judiciary committee he conducted the impeachment trial (1830) of Judge James H. Peck, led an unsuccessful movement to increase the number of Supreme Court judges and to relieve them of their circuit duties, and succeeded in defeating an attempt to repeal the twenty-fifth section of the Judiciary Act of 1789, which gave the Supreme Court appellate jurisdiction by writ of error to the state courts in cases where federal laws and treaties are in question. After the dissolution of the Federalist party, of which he had been a member, he supported the Jackson-Van Buren faction, and soon came to be definitely associated with the Democrats. He represented the United States at the court of St Petersburg in 1832-1833, and there negotiated an important commercial treaty. He was a Democratic member of the United States Senate from December 1834 until March 1845, ardently supporting President Jackson, and was secretary of state in the cabinet of President Polk from 1845 to 1849—a period marked by the annexation of Texas, the Mexican War, and negotiations with Great Britain relative to the Oregon question. After four years of retirement spent in the practice of his profession, he was appointed by President Pierce minister to Great Britain in 1853.

Up to this time Buchanan's attitude on the slavery question had been that held by the conservative element among Northern Democrats. He felt that the institution was morally wrong, but held that Congress could not interfere with it in the states in which it existed, and ought not to hinder the natural tendency toward territorial expansion through a fear that the evil would spread. He voted for the bill to exclude anti-slavery literature from the mails, approved of the annexation of Texas, the war with Mexico, and the Compromise of 1850, and disapproved of the Wilmot Proviso. Fortunately for his career he was abroad during the Kansas-Nebraska debates, and hence did not share in the unpopularity which attached to Stephen A. Douglas as the author of the bill, and to President Pierce as the executive who was called upon to enforce it. At the same time, by joining with J.Y. Mason and Pierre Soule in issuing the Ostend Manifesto in 1854, he retained the good-will of the South.[1] Accordingly on his return from England in 1856 he was nominated by the Democrats as a compromise candidate for president, and was elected, receiving 174 electoral votes to 114 for John C. Frémont, Republican, and 8 for Millard Fillmore, American or "Know-Nothing."

His high moral character, the breadth of his legal knowledge, and his experience as congressman, cabinet member and diplomat, would have made Buchanan an excellent president in ordinary times; but he lacked the soundness of judgment, the self-reliance and the moral courage needed to face a crisis. At the beginning of his administration he appointed Robert J. Walker of Mississippi, territorial governor of Kansas, and Frederick P. Stanton of Tennessee, secretary, and assured them of his determination to adhere to the popular sovereignty principle. He soon began to use his influence, however, to force the admission of Kansas into the Union under the pro-slavery Lecompton Constitution, contrary to the wishes of the majority of the settlers. Stanton was removed from office for opposing the scheme, and Walker resigned in disgust. This change of policy was doubtless the result of timidity rather than of a desire to secure re-election by gaining the favour of the Southern Democracy. Under the influence of Howell Cobb of Georgia, secretary of the treasury, and Jacob Thompson of Mississippi, secretary of the interior, the president was convinced that it was the only way to avoid civil war. Federal patronage was freely used to advance the Lecompton measure and the compromise English Bill, and to prevent Douglas's election to the Senate in 1858. Some of these facts were brought out in the famous Covode Investigation conducted by a committee of the House of Representatives in 1860. The investigations, however, were very partisan in character, and there is reason to doubt the constitutional power of the House to make it, except as the basis for an impeachment trial.

The call issued by the South Carolina legislature just after the election of Lincoln for a state convention to decide upon the advisability of secession brought forward the most serious question of Buchanan's administration. The part of his annual message of the 4th of December 1860 dealing with it is based upon a report prepared by Attorney-General Jeremiah S. Black of Pennsylvania. He argued that a state had no legal right to secede, but denied that the federal government had any power forcibly to prevent it. At the same time it was the duty of the

president to call out the army and navy of the United States to protect federal property or to enforce federal laws. Soon after the secession movement began the Southern members of the cabinet resigned, and the president gradually came under the influence of Black, Stanton, Dix, and other Northern leaders. He continued, however, to work for a peaceful settlement, supporting the Crittenden Compromise and the work of the Peace Congress. He disapproved of Major Anderson's removal of his troops from Fort Moultrie to Fort Sumter in December 1860; but there is probably no basis for the charge made by Southern writers that the removal itself was in violation of a pledge given by the president to preserve the *status quo* in Charleston harbour until the arrival of the South Carolina commissioners in Washington. Equally unfounded is the assertion first made by Thurlow Weed in the London *Observer* (9th of February 1862) that the president was prevented from ordering Anderson back to Fort Moultrie only by the threat of four members of the cabinet to resign.

[v.04 p.0717] On the expiration of his term of office (March 4, 1861) Buchanan retired to his home at Wheatland, near Lancaster, Pennsylvania, where he died on the 1st of June 1868. His mistakes as president have been so emphasized as to obscure the fact that he was a man of unimpeachable honesty, of the highest patriotism, and of considerable ability. He never married.

See George Ticknor Curtis, *The Life of James Buchanan* (2 vols., New York, 1883), the standard biography; Curtis, however, was a close personal and political friend, and his work is too eulogistic. More trustworthy, but at times unduly severe, is the account given by James Ford Rhodes in the first two volumes of his *History of the United States since the Compromise of 1850* (New York, new edition, 1902-1907). John Bassett Moore has edited *The Works of James Buchanan, comprising his Speeches, State Papers, and Private Correspondence* (Philadelphia, 1908-1910).

[1] This "manifesto," which was bitterly attacked in the North, was agreed upon (October 18, 1854) by the three ministers after several meetings at Ostend and at Aix-la-Chapelle, arranged in pursuance of instructions to them from President Pierce to "compare opinions, and to adopt measures for perfect concert of action in aid of the negotiations at Madrid" on the subject of reparations demanded from Spain by the United States for alleged injuries to American commerce with Cuba. In the manifesto the three ministers asserted that "from the peculiarity of its geographical position, and the considerations attendant upon it, Cuba is as necessary to the North American republic as any of its present members"; spoke of the danger to the United States of an insurrection in Cuba; asserted that "we should be recreant to our duty, be unworthy of our gallant forefathers, and commit base treason against our posterity, should we permit Cuba to be Africanized and become a second Santo Domingo, with all its attendant horrors to the white race, and suffer the flames to extend to our own neighboring shores, seriously to endanger or actually destroy the fair fabric of our Union"; and recommended that "the United States ought, if practicable, to purchase Cuba as soon as possible." To Spain, they argued, the sale of the island would be a great advantage. The most startling declaration of the manifesto was that if Spain should refuse to sell "after we shall have offered a price for Cuba far beyond its present value," and if Cuba, in the possession of Spain, should seriously endanger "our internal peace and the existence of our cherished Union," then "by every law, human and divine, we shall be justified in wresting it from Spain if we have the power."

BUCHANAN, ROBERT WILLIAMS (1841-1901), British poet, novelist and dramatist, son of Robert Buchanan (1813-1866), Owenite lecturer and journalist, was born at Caverswall, Staffordshire, on the 18th of August 1841. His father, a native of Ayr, after living for some years in Manchester, removed to Glasgow, where Buchanan was educated, at the high school and the university, one of his fellow-students being the poet David Gray. His essay on Gray, originally contributed to the *Cornhill Magazine*, tells the story of their close friendship, and of their journey to London in 1860 in search of fame. After a period of struggle and disappointment Buchanan published *Undertones* in 1863. This "tentative" volume was followed by *Idyls and Legends of Inverburn* (1865), *London Poems* (1866), and *North Coast and other Poems* (1868), wherein he displayed a faculty for poetic narrative, and a sympathetic insight into the humbler conditions of life. On the whole, Buchanan is at his best in these narrative poems, though he essayed a more ambitious flight in *The Book of Orm: A Prelude to the Epic*, a study in mysticism, which appeared in 1870. He was a frequent contributor to periodical literature, and obtained notoriety by an article which, under the *nom de plume* of Thomas Maitland, he contributed to the *Contemporary Review* for October 1871, entitled "The Fleshly School of Poetry." This article was expanded into a pamphlet (1872), but he subsequently withdrew from the criticisms it contained, and it is chiefly remembered by the replies it evoked from D.G. Rossetti in a letter to the *Athenaeum* (16th December 1871), entitled "The Stealthy School of Criticism," and from Mr Swinburne in *Under the Microscope* (1872). Buchanan himself afterwards regretted the violence of his attack, and the "old enemy" to whom *God and the Man* is dedicated was Rossetti. In 1876 appeared *The Shadow of the Sword*, the first and one of the best of a long series of novels. Buchanan was also the author of many successful plays, among which may be mentioned *Lady Clare*, produced in 1883; *Sophia* (1886), an adaptation of *Tom Jones; A Man's Shadow* (1890); and *The Charlatan* (1894). He also wrote, in collaboration with Harriett Jay, the melodrama *Alone in London*. In 1896 he became, so far as some of his work was concerned, his own publisher. In the autumn of 1900 he had a paralytic seizure, from which he never recovered. He died at Streatham on the 10th of June 1901.

Buchanan's poems were collected into three volumes in 1874, into one volume in 1884; and as *Complete Poetical Works* (2 vols., 1901). Among his poems should also be mentioned: "The Drama of Kings" (1871); "St Abe and his Seven Wives," a lively tale of Salt Lake City, published anonymously in 1872; and "Balder the Beautiful" (1877); "The City of Dream" (1888); "The Outcast: a Rhyme for the Time" (1891); and "The Wandering Jew" (1893). His earlier novels, *The Shadow of the Sword*, and *God and the Man* (1881), a striking tale of a family feud, are distinguished by a certain breadth and simplicity of treatment which is not so noticeable in their successors, among which may be mentioned *The Martyrdom of Madeline* (1882); *Foxglove Manor* (1885); *Effie Hetherington* (1896); and *Father Anthony* (1898). *David Gray and other Essays, chiefly on Poetry* (1868); *Master Spirits* (1873); *A Poet's Sketch Book* (1883), in which the interesting essay on Gray is reprinted; and *A Look round Literature* (1887), contain Buchanan's chief contributions to periodical literature. More valuable is *The Land of Lorne* (2 vols., 1871), a vivid record of yachting experiences on the west coast of Scotland.

See also Harriett Jay, *Robert Buchanan; some Account of his Life* (1903).

BUCHAREST (*Bucuresci*), also written Bucarest, Bukarest, Bukharest, Bukorest and Bukhorest, the capital of Rumania, and chief town of the department of Ilfov. Although *Bucharest* is the conventional English spelling, the forms *Bucarest* and *Bukarest* more nearly represent the correct pronunciation. The population in 1900 was 282,071, including 43,274 Jews, and 53,056 aliens, mostly Austro-Hungarian subjects. With its outlying parts, Bucharest covers more than 20 sq. m. It lies in a hollow, traversed from north-west to south-east by the river Dimbovitza (*Dâmbovita* or *Dîmbovita*), and is built mainly on the left bank. A range of low hills affords shelter on the west and south-west; but on every other side there are drained, though still unhealthy, marshes, stretching away to meet the central Walachian plains. From a distance, the multitude of its gardens, and the turrets and metal-plated or gilded cupolas of its many churches give Bucharest a certain picturesqueness. In a few of the older districts, too, where land is least valuable, there are antique one-storeyed houses, surrounded by poplars and acacias; while the gipsies and Rumans, wearing their brightly coloured native costumes, the Russian coachmen, or sleigh-drivers, of the banished Lipovan sect, and the pedlars, with their doleful street cries, render Bucharest unlike any western capital. Nevertheless, the city is modern. Until about 1860, indeed, the dimly lit lanes were paved with rough stone blocks, imbedded in the clay soil, which often subsided, so as to leave the surface undulating like a sea. Drains were rare, epidemics common. Owing to the frequency of earthquakes, many houses were built of wood, and in 1847 fully a quarter of the city was laid waste by fire. The plague visited Bucharest in 1718, 1738, 1793, when an earthquake destroyed a number of old buildings, and in 1813, when 70,000 of the inhabitants died in six weeks. From the accession of Prince Charles, in 1866, a gradual reform began. The river was enclosed between stone embankments; sewerage and pure water were supplied, gas and electric light installed; and horse or electric tramways laid down in the principal thoroughfares, which were paved with granite or wood. The older houses are of brick, overlaid with white or tinted plaster, and ornamented with figures or foliage in terra-cotta; but owing to the great changes of temperature in Rumania, the plaster soon cracks and peels off, giving a dilapidated appearance to many streets. The chief modern buildings, such as the Athenaeum, with its Ionic façade and Byzantine dome, are principally on the quays and boulevards, and are constructed of stone.

Bucharest is often called "The Paris of the East," partly from a supposed social resemblance, partly from the number of its boulevards and avenues. Three main thoroughfares, the Plevna, Lipscani, and Vacaresci, skirt the left bank of the river; the Elizabeth Boulevard, and the Calea Victoriei, or "Avenue of Victory," which commemorates the Rumanian success at Plevna, in 1877, radiate east and north, respectively, from the Lipscani, and meet a broad road which surrounds all sides of Bucharest, except the north-west. The Lipscani was originally the street of merchants who obtained their wares from the annual fair at Leipzig; for almost all crafts or gilds, other than the bakers and tavern-keepers, were long confined to separate quarters; and the old names have survived, as in the musicians', furriers', and money-changers' quarters. Continuous with the Calea Victoriei, on the north, is the Kisilev Park, traversed by the Chausée, a favourite drive, leading to the pretty Baneasa race-course, where spring and autumn meetings are held. The Cismegiu or Cismigiu Park, which has a circumference of about 1 m., is laid out between the Plevna road and the Calea Victoriei; and there are botanical and zoological gardens.

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The Orthodox Greek churches are generally small, with very narrow windows, and are built of brick in a modified Byzantine style. They are usually surmounted by two or three towers, but the bells are hung in a kind of wooden porch, resembling a lych-gate, and standing about twenty paces from the church. The cathedral, or metropolitan church, where the metropolitan primate of Rumania officiates, was built between 1656 and 1665. It has the shape of a Greek cross, surrounded by a broad cloister, with four main entrances, each surmounted by a turret. The whole culminates in three brick towers. Standing on high ground, the cathedral overlooks all Bucharest, and commands a view of the Carpathians. Other interesting churches are St Spiridion the New (1768), the loftiest and most beautiful of all; the Doamna Balasa (1751), noteworthy for its rich carved work without, and frescoes within; and the ancient Biserica Bucur, said, in local traditions, to derive its name from Bucur, a shepherd whom legend makes the founder of Bucharest. The real founder and date of this church, and of many others, are unknown, thanks to the frequent obliteration of Slavonic inscriptions by the Greek clergy. The Protestants, Armenians and Lipovans worship in their own churches, and the Jews have several synagogues. Bucharest is also the seat of a Roman Catholic archbishop; but the Roman Catholics, though numbering nearly 37,000 in 1899, possess only three churches, including the cathedral of St Joseph.

Bucharest is a great educational centre. Besides the ordinary ecclesiastical seminaries, lyceums, gymnasia and elementary schools, it possesses schools of commerce, science and art institutes, and training colleges, for engineers and veterinary surgeons; while the university, founded in 1864, has faculties of theology, philosophy, literature, law, science, medicine and pharmacy. Students pay no fees except for board. The national library, containing many precious Oriental documents, and the meeting-hall of the Rumanian senate, are both included in the university buildings, which, with the Athenaeum (used for literary conferences and for music), and the central girls' school, are regarded as the best example of modern Rumanian architecture. Other libraries are those of the Nifon seminary, of the Charles University Foundation (*Fundatiunea universitara Carol*), which endows research, and rewards literary or scientific merit; the central library, and the library of the Academy, which also contains a museum of natural history and antiquities. Among philanthropic institutions may be mentioned the Coltei, Brancovan, Maternitate, Philantropia and Pantelimon hospitals; the Marcutza lunatic asylum; and the Princess Elena refuge (*Asilul Elena Doamna*), founded by Princess Elena Couza in 1862, to provide for 230 orphan girls. The summer home of these girls is a convent in the Transylvanian Alps. Hotels and restaurants are numerous. There are two theatres, the National and the Lyric, which is mainly patronized by foreign players; but minor places of amusement abound; as also do clubs—political, social and sporting. Socially, indeed, the progress of Bucharest is remarkable, its political, literary and scientific circles being on a level with those of most European capitals.

Bucharest is the winter residence of the royal family, the meeting-place of parliament, and the seat of an appeal court (*Curtea de Apel*), of the supreme court (*Curtea de Casatie*), of the ministries, the national bank, the bank of Rumania, many lesser credit establishments, and a chamber of commerce. The railway lines which meet on the western limit of the city give access to all parts, and the telephone system, besides being internally complete, communicates with Braila, Galatz, Jassy and Sinaia. Bucharest has a very large transit trade in petroleum, timber and agricultural produce; above all, in wheat and maize. Its industries include petroleum-refining, extraction of vegetable oils, cabinet-making, brandy-distilling, tanning, and the manufacture of machinery, wire, nails, metal-ware, cement, soap, candles, paste, starch, paper, cardboard, pearl buttons, textiles, leather goods, ropes, glucose, army supplies, preserved meat and vegetables, and confectionery. An important fair is held for seven days in each year. The mercantile community is largely composed of Austrians, Frenchmen, Germans, Greeks and Swiss, who form exclusive colonies. Bucharest is the headquarters of the II. army corps, and a fortress of the first rank. The fortifications were constructed in 1885-1896 on a project drafted by the Belgian engineer, General Brialmont, in 1883. The mean distance of the forts from the city is 4 m., and the perimeter of the defences (which are technically of special importance as embodying the system of Brialmont) is about 48 m., this perimeter being defended by 36 armoured forts and batteries. There are barracks for over 30,000 cavalry and infantry, an arsenal, a military hospital and three military academies.

The legend of Bucur is plainly unhistorical, and the meaning of *Bucharest* has been much disputed. One account derives it from an Albanian word *Bukur*, meaning joy, in memory of a victory won by Prince Mircea of Walachia (c. 1383-1419) over the Turks. For this reason Bucharest is often called "The City of Joy". Like most ancient cities of Rumania, its foundation has also been ascribed to the first Walachian prince, the half-mythical Radu Negru (c. 1290-1314). More modern historians declare that it was originally a fortress, erected on the site of the Daco-Roman Thyanus, to command the approaches to Tîrgovishtea, formerly the capital of Walachia. It soon became the summer residence of the court. In 1595 it was burned by the Turks; but, after its restoration, continued to grow in size and prosperity, until, in 1698, Prince Constantine Brancovan chose it for his capital. During the 18th century the possession of Bucharest was frequently disputed by the Turks, Austrians and Russians. In 1812 it gave its name to the treaty by which Bessarabia and a third of Moldavia were ceded to Russia. In the war of 1828 it was occupied by the Russians, who made it over to the prince of Walachia in the following year. A rebellion against Prince Bibescu in 1848 brought both Turkish and Russian interference, and the city was again held by Russian troops in 1853-1854. On their departure an Austrian garrison took possession and remained till March 1857. In 1858 the international congress for the organization of the Danubian principalities was held in the city; and when, in 1861, the union of Walachia and Moldavia was proclaimed, Bucharest became the Rumanian capital. Prince Cuza, the first ruler of the united provinces, was driven from his throne by an insurrection in Bucharest in 1866. For the subsequent history of the city see RUMANIA: *History*.

BÜCHELER, FRANZ (1837-1908), German classical scholar, was born in Rheinberg on the 3rd of June 1837, and educated at Bonn. He held professorships successively at Freiburg (1858), Greifswald (1866), and Bonn (1870), and in 1878 became joint-editor of the *Rheinisches Museum für Philologie*. Both as a teacher and as a commentator he was extremely successful. Among his editions are: *Frontini de aquis urbis Romae* (Leipzig, 1858); *Pervigilium Veneris* (Leipzig, 1859); *Petronii satirarum reliquiae* (Berlin, 1862; 3rd ed., 1882); *Hymnus Cereris Homericus* (Leipzig, 1869); *Q. Ciceronis reliquiae* (1869); *Herondae mimiambi* (Bonn, 1892). He wrote also *Grundriss der lateinischen Deklination* (1866); *Das Recht von Gortyn* (Frankfort, 1885, with Zitelmann); and supervised the third edition (1893) of O. Jahn's *Persii, Juvenalis, Sulpiciae saturae*.

BUCHER, LOTHAR (1817-1892), German publicist, was born on the 25th of October 1817 at Neu Stettin, in Pomerania, his father being master at a gymnasium. After studying at the university of Berlin he adopted the legal profession. Elected a member of the National Assembly in Berlin in 1848, he was an active leader of the extreme democratic party. With others of his colleagues he was in 1850 brought to trial for having taken part in organizing a movement for

refusal to pay taxes; he was condemned to fifteen months' imprisonment in a fortress, but left the country before the sentence was executed. For ten years he lived in exile, chiefly in London; he acted as special correspondent of the *National Zeitung*, and gained a great knowledge of English life; and he published a work, *Der Parliamentarismus wie er ist*, a criticism of parliamentary government, which shows a marked change in his political opinions. In 1860 he returned to Germany, and became intimate with Lassalle, who made him his literary executor. In 1864 he was offered by Bismarck, and accepted, a high position in the Prussian foreign office. The reasons that led him to a step which involved so complete a break with his earlier friends and associations are not clearly known. From this time till his death he acted as Bismarck's secretary, [v.04 p.0719] and was the man who probably enjoyed the greatest amount of his confidence. It was he who drew up the text of the constitution of the North German Confederation; in 1870 he was sent on a very confidential mission to Spain in connexion with the Hohenzollern candidature for the Spanish crown; he assisted Bismarck at the final negotiations for the treaty of Frankfort, and was one of the secretaries to the congress of Berlin; he also assisted Bismarck in the composition of his memoirs. Bucher, who was a man of great ability, had considerable influence, which was especially directed against the economic doctrines of the Liberals; in 1881 he published a pamphlet criticizing the influence and principles of the Cobden Club. He identified himself completely with Bismarck's later commercial and colonial policy, and probably had much to do with introducing it, and he did much to encourage anti-British feeling in Germany. He died at Glion, in Switzerland, on the 12th of October 1892.

See Heinrich v. Poschinger, *Ein 48er: Lothar Buchers Leben und Werke* (3 vols., Berlin, 1890); Busch, *Bismarck: Some Secret Pages of his History* (London, 1898).

(J. W. He.)

BUCHEZ, PHILIPPE JOSEPH BENJAMIN (1796-1865), French author and politician, was born on the 31st of March 1796 at Matagne-la-Petite, now in Belgium, then in the French department of the Ardennes. He finished his general education in Paris, and afterwards applied himself to the study of natural science and medicine. In 1821 he co-operated with Saint-Amand Bazard and others in founding a secret association, modelled on that of the Italian Carbonari, with the object of organizing a general armed rising against the government. The organization spread rapidly and widely, and displayed itself in repeated attempts at revolution. In one of these attempts, the affair at Belfort, Buchez was gravely compromised, although the jury which tried him did not find the evidence sufficient to warrant his condemnation. In 1825 he graduated in medicine, and soon after he published with Ulisse Trélat a *Précis élémentaire d'hygiène*. About the same time he became a member of the Saint-Simonian Society, presided over by Bazard, Barthélemy Prosper Enfantin, and Olinde Rodrigues, and contributed to its organ, the *Producteur*. He left it in consequence of aversion to the strange religious ideas developed by its "Supreme Father," Enfantin, and began to elaborate what he regarded as a Christian socialism. For the exposition and advocacy of his principles he founded a periodical called *L'Européen*. In 1833 he published an *Introduction à la science de l'histoire*, which was received with considerable favour (2nd ed., improved and enlarged, 2 vols., 1842). Notwithstanding its prolixity, this is an interesting work. The part which treats of the aim, foundation and methods of the science of history is valuable; but what is most distinctive in Buchez's theory—the division of historical development into four great epochs originated by four universal revelations, of each epoch into three periods corresponding to desire, reasoning and performance, and of each of these periods into a theoretical and practical age—is merely ingenious (see Flint's *Philosophy of History in Europe*, i. 242-252). Buchez next edited, along with M. Roux-Lavergne (1802-1874), the *Histoire parlementaire de la Révolution française* (1833-1838; 40 vols.). This vast and conscientious publication is a valuable store of material for the early periods of the first French Revolution. There is a review of it by Carlyle (*Miscellanies*), the first two parts of whose own history of the French Revolution are mainly drawn from it. The editors worked under the inspiration of a strong admiration of the principles of Robespierre and the Jacobins, and in the belief that the French Revolution was an attempt to realize Christianity. In the *Essai d'un traité complet de philosophie au point de vue du Catholicisme et du progrès* (1839-1840) Buchez endeavoured to co-ordinate in a single system the political, moral, religious and natural phenomena of existence. Denying the possibility of innate ideas, he asserted that morality comes by revelation, and is therefore not only certain, but the only real certainty.

It was partly owing to the reputation which he had acquired by these publications, but still more owing to his connexion with the *National* newspaper, and with the secret societies hostile to the government of Louis Philippe, that he was raised, by the Revolution of 1848, to the presidency of the Constituent Assembly. He speedily showed that he was not possessed of the qualities needed in a situation so difficult and in days so tempestuous. He retained the position only for a very short time. After the dissolution of the assembly he was not re-elected. Thrown back into private life, he resumed his studies, and added several works to those which have been already mentioned. A *Traité de politique* (published 1866), which may be considered as the completion of his *Traité de philosophie*, was the most important of the productions of the last period of his life. His brochures are very numerous and on a great variety of subjects, medical, historical, political, philosophical, &c. He died on the 12th of August 1865. He found a disciple of considerable ability in M.A. Ott, who advocated and applied his principles in various writings.

See also A. Ott, "P.B.J. Buchez," in *Journal des économistes* for 1865.

BUCHHOLZ, a town of Germany, in the kingdom of Saxony, 1700 ft. above the sea, on the Sehma, 18 m. S. by E. of Chemnitz by rail. Pop. (1905) 9307. It has a Gothic Evangelical church

and monuments of Frederick the Wise of Saxony, and Bismarck. There is a school for instruction in lace-making, an industry dating from 1589, which still forms the chief employment of the inhabitants.

BÜCHNER, FRIEDRICH KARL CHRISTIAN LUDWIG (1824-1899), German philosopher and physician, was born at Darmstadt. He studied at Giessen, Strassburg, Würzburg and Vienna. In 1852 he became lecturer in medicine at the university of Tübingen, where he published his great work *Kraft und Stoff* (1855). In this work, the product, according to Lange, of a fanatical enthusiasm for humanity, he sought to demonstrate the indestructibility of matter and force, and the finality of physical force. The extreme materialism of this work excited so much opposition that he was compelled to give up his post at Tübingen. He retired to Darmstadt, where he practised as a physician and contributed regularly to pathological and physiological magazines. He continued his philosophical work in defence of materialism, and published *Natur und Geist* (1857), *Aus Natur und Wissenschaft* (vol. i., 1862; vol. ii., 1884), *Fremdes und Eigenes aus dem geistigen Leben der Gegenwart* (1890), *Darwinismus und Socialismus* (1894), *Im Dienste der Wahrheit* (1899). He died at Darmstadt on the 1st of May 1899. In estimating Büchner's philosophy it must be remembered that he was primarily a physiologist, not a metaphysician. Matter and force (or energy) are infinite; the conservation of force follows from the imperishability of matter, the ultimate basis of all science. Büchner is not always clear in his theory of the relation between matter and force. At one time he refuses to explain it, but generally he assumes that all natural and spiritual forces are indwelling in matter. "Just as a steam-engine," he says in *Kraft und Stoff* (7th ed., p. 130), "produces motion, so the intricate organic complex of force-bearing substance in an animal organism produces a total sum of certain effects, which, when bound together in a unity, are called by us mind, soul, thought." Here he postulates force and mind as emanating from original matter—a materialistic monism. But in other parts of his works he suggests that mind and matter are two different aspects of that which is the basis of all things—a monism which is not necessarily materialistic, and which, in the absence of further explanation, constitutes a confession of failure. Büchner was much less concerned to establish a scientific metaphysic than to protest against the romantic idealism of his predecessors and the theological interpretations of the universe. Nature according to him is purely physical; it has no purpose, no will, no laws imposed by extraneous authority, no supernatural ethical sanction.

See Frauenstädt, *Der Materialismus* (Leipzig, 1856); Janet, *The Materialism of the Present Day: A Criticism of Dr Büchner's System*, trans. Masson (London, 1867).

BUCHON, JEAN ALEXANDRE (1791-1849), French scholar, was born on the 21st of May 1791 at Menetou-Salon (Cher), and died on the 29th of August 1849. An ardent Liberal, he took an active part in party struggles under the Restoration, while throwing himself with equal vigour into the great work of historical regeneration which was going on at that period. During 1822 and the succeeding years he travelled about Europe on the search for materials for his *Collection des chroniques nationales françaises écrites en langue vulgaire du XIII*^{e} *au XVI*^{e} *siècle* (47 vols., 1824-1829). After the revolution of 1830 he founded the *Panthéon litteraire*, in which he published a *Choix d'ouvrages mystiques* (1843), a *Choix de monuments primitifs de l'église chrétienne* (1837), a *Choix des historiens grecs* (1837), a collection of *Chroniques étrangères relatives aux expéditions françaises pendant le XIII*^{e} *siècle* (1840), and, most important of all, a *Choix de chroniques et mémoires sur l'histoire de France* (1836-1841). His travels in southern Italy and in the East had put him upon the track of the medieval French settlements in those regions, and to this subject he devoted several important works: *Recherches et matériaux pour servir a une histoire de la domination française dans les provinces démembrées de l'empire grec* (1840); *Nouvelles recherches historiques sur la principauté française de Morée et ses hautes baronnies* (2 vols., 1843-1844); *Histoire des conquêtes et de l'établissement des Français dans les états de l'ancienne Grèce sous es Villehardouin* (1846, unfinished). None of the numerous publications which we owe to Buchon can be described as thoroughly scholarly; but they have been of great service to history, and those concerning the East have in especial the value of original research.

[v.04 p.0720]

BUCHU, or Buka Leaves, the produce of several shrubby plants belonging to the genus Barosma (nat. order Rutaceae), natives of the Cape of Good Hope. The principal species, *B. crenulata*, has leaves of a smooth leathery texture, oblong-ovate in shape, from an inch to an inch and a half in length, with serrulate or crenulate margins, on which as well as on the under side are conspicuous oil-glands. The other species which yield buchu are *B. serratifolia*, having linear-lanceolate sharply serrulate leaves, and *B. betulina*, the leaves of which are cuneate-obovate, with denticulate margins. They are all, as found in commerce, of a pale yellow-green colour; they emit a peculiar aromatic odour, and have a slightly astringent bitter taste. Buchu leaves contain a volatile oil, which is of a dark yellow colour, and deposits a form of camphor on exposure to air, a liquid hydro-carbon being the solvent of the camphor within the oil-glands. There is also present a minute quantity of a bitter principle. The leaves of a closely allied plant, *Empleurum serratulum*, are employed as a substitute or adulterant for buchu. As these possess no glands they are a worthless substitute. The British Pharmacopoeia contains an infusion and tincture of buchu. The former may be given in doses of an ounce and the latter in doses of a drachm. The drug has the properties common to all substances that contain a volatile oil. The infusion contains very little of the oil and is of very slight value. Until the advent of the modern synthetic products buchu was valued in diseases of the urinary tract, but its use is now practically obsolete.

BUCK, CARL DARLING (1866-), American philologist, was born on the 2nd of October 1866, at

Bucksport, Maine. He graduated at Yale in 1886, was a graduate student there for three years, and studied at the American School of Classical Studies in Athens (1887-1889) and in Leipzig (1889-1892). In 1892 he became professor of Sanskrit and Indo-European comparative philology in the University of Chicago; but it is in the narrower field of the Italic dialects that his important work lies, including *Der Vocalismus der oskischen Sprache* (1892), *The Oscan-Umbrian Verb-System* (1895), and *Grammar of Oscan and Umbrian* (1904), as well as an excellent *précis* of the Italic languages in *Johnson's Universal Cyclopaedia*. He collaborated with W.G. Hale (*q.v.*) in the preparation of *A Latin Grammar* (1903). Of his contributions to reviews on phonological topics, perhaps the most important is his discussion of "Brugmann's Law."

BUCK, DUDLEY (1839-1909), American musical composer, was born in Hartford, Connecticut, on the 10th of March 1839, the son of a merchant who gave him every opportunity for cultivating his musical talents; and for four years (1858-1862) he studied at Leipzig, Dresden and Paris. On returning to America he held the position of organist at Hartford, Chicago (1869), and Boston (1871). In 1875 he went to New York to assist Theodore Thomas as conductor of the orchestral concerts, and from 1877 to 1903 was organist at Holy Trinity church. Meanwhile he had become well known as a composer of church music, a number of cantatas (*Columbus*, 1876; *Golden Legend*, 1880; *Light of Asia*, 1885, &c), a grand opera, *Serapis*, a comic opera, *Deseret* (1880), a symphonic overture, *Marmion*, a symphony in E flat, and other orchestral and vocal works. He died on the 6th of October 1909.

BUCK, (1) (From the O. Eng. *buc*, a he-goat, and *bucca*, a male deer), the male of several animals, of goats, hares and rabbits, and particularly of the fallow-deer. During the 18th century the word was used of a spirited, reckless young man of fashion, and later, with particular reference to extravagance in dress, of a dandy. (2) (From a root common to Teutonic and Romance languages, cf. the Ger. *Bauch*, Fr. *buée*, and Ital. *bucata*), the bleaching of clothes in lye, also the lye itself, and the clothes to be bleached, so a "buck-basket" means a basket of clothes ready for the wash. (3) Either from an obsolete word meaning "body," or from the sense of bouncing or jumping, derived from (1), a word now only found in compound words, as "buck-board," a light four-wheeled vehicle, the primitive form of which has one or more seats on a springy board, joining the front and rear axles and serving both as springs and body; a "buck-wagon" (Dutch, *bok-wagen*) is a South African cart with a frame projecting over the wheels, used for the transport of heavy loads. (4) (Either from "buck" a he-goat, or from a common Teutonic root, to bend, as seen in the Ger. *bücken*, and Eng. "bow"), a verb meaning "to leap"; seen especially in the compound "buck-jumper," a horse which leaps clear off the ground, with feet tucked together and arched back, descending with fore-feet rigid and head down and drawn inwards.

BUCK-BEAN, or Bog-Bean (*Menyanthes trifoliata*, a member of the Gentian family), a bog-plant with a creeping stem, alternately arranged large leaves each with three leaflets, and spikes of white or pink flowers. The stout stem is bitter and has tonic and febrifuge properties. The plant is widely distributed through the north temperate zone.

BÜCKEBURG, a town of Germany, capital of the principality of Schaumburg-Lippe, pleasantly situated at the foot of the Harrelberg on the river Aue, 6 m. from Minden, on the main railway from Cologne to Berlin. Pop. 6000. It has a palace standing in extensive grounds, a gymnasium, a normal seminary, a library, a synagogue, and three churches, one of which has the appropriate inscription, *Religionis non structurae exemplum*. The first houses of Bückeburg began to gather round the castle about 1365; and it was not till the 17th century that the town was surrounded with walls, which have given place to a ring of pretty promenades. The poet J.G. von Herder was court preacher here from 1771 to 1776.

BUCKERIDGE, JOHN (c. 1562-1631), English divine, was a son of William Buckeridge, and was educated at the Merchant Taylors school and at St John's College, Oxford. He became a fellow of his college, and acted as tutor to William Laud, whose opinions were perhaps shaped by him. Leaving Oxford, Buckeridge held several livings, and was highly esteemed by King James I., whose chaplain he became. In 1605 he was elected president of St John's College, a position which he vacated on being made bishop of Rochester in 1611. He was transferred to the bishopric of Ely in 1628, and died on the 23rd of May 1631. The bishop won some fame as a theologian and a controversialist. Among his intimate friends was Bishop Lancelot Andrewes, whose "Ninety-one Sermons" were published by Laud and Buckeridge in 1629.

BUCKETSHOP, a slang financial term for the office or business of an inferior class of stockbroker, who is not a member of an official exchange and conducts speculative operations for his clients, who deposit a margin or cover. The operations consist, as a rule, of a simple bet or wager between the broker and client, no pretence of an actual purchase or sale being attempted. [v.04 p.0721] The term is sometimes, though loosely and wrongfully, applied to all stockbrokers who are not members of the recognized local exchange. The origin of the word is American. According to the *New English Dictionary* it is supposed to have arisen in Chicago. The Board of Trade there forbade dealings in "options" in grain of less than 5000 bushels. An "Open Board of Trade" or unauthorized exchange was opened, for the purpose of small gamblers, in a neighbouring street below the rooms of the Board of Trade. The lift used by members of the Board of Trade would be sent down to bring up from the open Board what was known as a "bucketful" of the smaller speculators, when business was slack.

BUCKHOLDT [properly Beukelsz, or Bockelszoon], **JOHANN** (*c.* 1508-1535), Dutch Anabaptist fanatic, better known as John of Leiden, from his place of birth, was the illegitimate son of Bockel,

burgomaster of Soevenhagen, who afterwards married his mother. He was born about 1508, apprenticed to a tailor, became infected with the opinions of Thomas Münzer, travelled in pursuit of his trade (being four years in London), married a widow, became bankrupt, and in September 1533 joined the Anabaptist movement under Johann Matthysz (Matthyszoon), baker of Haarlem. He had little education, but some literary faculty, and had written plays. On the 13th of January 1534 he appeared in Münster as an apostle of Matthysz. Good-looking and fluent, he fascinated women, and won the confidence of Bernard Knipperdollinck, a revolutionary cloth merchant, who gave him his daughter in marriage. The Münster Anabaptists took up arms on the 9th of February 1534 (see ANABAPTISTS). On the death of Matthysz (1534), Buckholdt succeeded him as prophet, added his widow to the number of his wives, and organized a new constitution for Münster, with twelve elders (suggested by the tribes of Israel) and other officers of a theocracy, but soon superseded these, making himself king of the new Zion. His arbitrary rule was marked by pomp and severity. Münster was retaken (June 25, 1535) by its prince-bishop, Franz von Waldeck. Buckholdt, after many indignities, was cruelly executed on the 22nd of January 1536; his body, and those of his companions, were hung in cages to the tower of the Lamberti church. His portrait is in *Grouwelen der Hooftketteren* (Leiden, 1607; an English edition is appended to Alexander Ross's *Pansebeia*, 2nd ed., 1655); a better example of the same is given by Arend.

See Arend, *Algemeene Geschiedenis des Vaderlands* (1846), ii., iii., 629; Van der Aa, *Biographisch Woordenboek der Nederlanden* (1853); E. Belfort Bax, *Rise and Fail of the Anabaptists* (1903).

(A. GO.*)

BUCKIE, a fishing town and police burgh of Banffshire, Scotland, on the Moray Firth, at the mouth of Buckie burn, about 17 m. W. of Banff, with a station on the Great North of Scotland railway. Pop. (1891) 5849; (1901) 6549. Its public buildings include a hall and literary institute with library and recreation rooms. It attracts one of the largest Scottish fleets in the herring season, and is also the chief seat of line fishing in Scotland. The harbour, with an outer and an inner basin, covers an area of 9 acres and has half a mile of quayage. Besides the fisheries, there are engineering works, distilleries, and works for the making of ropes, sails and oil. The burn, which divides the town into Nether Buckie and Eastern Buckie, rises near the Hill of Clashmadin, about 5 m. to the south-west. Portgordon, 1½ m. west of Buckie, is a thriving fishing village, and Rathven, some 2 m. east, lies in a fertile district, where there are several interesting Danish cairns and other relics of the remote past.

BUCKINGHAM, EARLS, MARQUESSES AND DUKES OF. The origin of the earldom of Buckingham (to be distinguished from that of Buckinghamshire, *q.v.*) is obscure. According to Mr J.H. Round (in G.E.C.'s *Peerage*, *s.v.*) there is some charter evidence for its existence under William Rufus; but the main evidence for reckoning Walter Giffard, lord of Longueville in Normandy, who held forty-eight lordships in the county, as the first earl, is that of Odericus Vitalis, who twice describes Walter as "Comes Bucchingehamensis," once in 1097, and again at his death in 1102. After the death of Walter Giffard, 2nd earl in 1164, the title was assumed by Richard de Clare, earl of Pembroke ("Strongbow"), in right of his wife, Rohais, sister of Walter Giffard I.; and it died with him in 1176. In 1377 Thomas of "Woodstock" (duke of Gloucester) was created earl of Buckingham at the coronation of Richard II. (15th of July), and the title of Gloucester having after his death been given to Thomas le Despenser, his son Humphrey bore that of earl of Buckingham only. On Humphrey's death, his sister Anne became countess of Buckingham in her own right. She married Edmund Stafford, earl of Stafford, and on her death (1438) the title of Buckingham passed to her son Humphrey Stafford, earl of Stafford, who in 1444 was created duke of Buckingham. This title remained in the Stafford family until the attainder and execution of Edward, 3rd duke, in 1521 (see BUCKINGHAM, HENRY STAFFORD, 2nd duke of).

In 1617 King James I. created George Villiers earl, in 1618 marquess, and in 1623 duke of Buckingham (see BUCKINGHAM, GEORGE VILLIERS, 1st duke of). The marquessate and dukedom became extinct with the death of the 2nd (Villiers) duke (*q.v.*) in 1687; but the earldom was claimed, under the special remainder in the patent of 1617, by a collateral line of doubtful legitimacy claiming descent from John Villiers, 1st Viscount Purbeck. The title was not actually borne after the death of John Villiers, styling himself earl of Buckingham, in 1723. The claim was extinguished by the death of George Villiers, a clergyman, in 1774.

In 1703 John Sheffield, marquess of Normanby, was created "duke of the county of Buckingham and of Normanby" (see below). He was succeeded by his son Edmund who died in October 1735 when the titles became extinct.

The title of marquess and duke of Buckingham in the Grenville family (to the holders of which the remainder of this article applies) was derived, not from the county, but from the town of Buckingham. It originated in 1784, when the 2nd Earl Temple was created marquess of Buckingham "in the county of Buckingham," this title being elevated into the dukedom of Buckingham and Chandos for his son in 1822.

GEORGE NUGENT TEMPLE GRENVILLE, 1st marquess of Buckingham (1753-1813), was the second son of George Grenville, and was born on the 17th of June 1753. Educated at Eton and Christ Church, Oxford, he was appointed a teller of the exchequer in 1764, and ten years later was returned to parliament as one of the members for Buckinghamshire. In the House of Commons he was a sharp critic of the American policy of Lord North. In September 1779 he succeeded his uncle as

2nd Earl Temple; in 1782 was appointed lord-lieutenant of Buckinghamshire; and in July of the same year became a member of the privy council and lord-lieutenant of Ireland in the ministry of the earl of Shelburne. On his advice the Renunciation Act of 1783 was passed, which supplemented the legislative independence granted to Ireland in 1782. By royal warrant he created the order of St Patrick in February 1783, with himself as the first grand master. Temple left Ireland in 1783, and again turned his attention to English politics. He enjoyed the confidence of George III., and having opposed Fox's East India Bill, he was authorized by the king to say that "whoever voted for the India Bill was not only not his friend, but would be considered by him as an enemy," a message which ensured the defeat of the bill. He was appointed a secretary of state when the younger Pitt formed his ministry in December 1783, but resigned two days later. In December 1784 he was created marquess of Buckingham "in the county of Buckingham." In November 1787 he was appointed lord-lieutenant of Ireland under Pitt, but his second tenure of this office was hardly as successful as the first. He was denounced by Grattan for extravagance; was censured by the Irish Houses of parliament for refusing to transmit to England in address calling upon the prince of Wales to assume the regency; and he could only maintain his position by resorting to bribery on a large scale. Having become very unpopular he resigned his office in September 1789, and subsequently took very little part in politics, although he spoke in favour of
[v.04 p.0722] the union with Ireland. He died at his residence, Stowe House, Buckingham, on the 11th of February 1813, and was buried at Wotton. In 1775 he had married Mary Elizabeth (d. 1812), daughter of Robert, Earl Nugent.

His elder son, Richard Grenville, 1st duke of Buckingham and Chandos (1776-1839), was one of the members of parliament for Buckinghamshire from 1797 to 1813, and, as Earl Temple, took an active part in politics. In February 1813 he succeeded his father as marquess of Buckingham; and having married the only child of the 3rd duke of Chandos, he was created duke of Buckingham and Chandos in 1822. He died in 1839. Owing to financial embarrassments, the duke lived out of England for some time, and in 1862 an account of his travels was published, as *The Private Diary of Richard, Duke of Buckingham and Chandos*.

He was succeeded by his only child, Richard Grenville, 2nd duke of Buckingham and Chandos (1797-1861). Educated at Eton and Oriel College, Oxford, he was known as Earl Temple and subsequently as marquess of Chandos. He was member of parliament for Buckinghamshire from 1818 to 1839, and was responsible for the "Chandos clause" in the Reform Bill of 1832. He was lord privy seal from September 1841 to January 1842, and partly owing to his opposition to the repeal of the corn laws was known as the "Farmers' Friend." He found the estates heavily encumbered when he succeeded to the dukedom in 1839, and his own generous and luxurious tastes brought matters to a climax. In 1847 his residences were seized by his creditors, and the duke left England. His personal property and many of his landed estates were sold, and returning to England he devoted himself to literature. He died in London, on the 29th of July 1861. His wife, whom he married in 1819, was Mary (d. 1862), daughter of John, 1st marquess of Breadalbane, and she obtained a divorce from him in 1850. Buckingham's chief publications are, *Memoirs of the Court and Cabinets of George III.* (London, 1853-1855); *Memoirs of the Court of England*, 1811-1820 (London, 1856); *Memoirs of the Court of George IV.* (London, 1859); and *Memoirs of the Court and Cabinets of William IV. and Victoria* (London, 1861).

Richard Grenville, 3rd duke of Buckingham and Chandos (1823-1889), the only son of the 2nd duke, was educated at Eton and Christ Church, Oxford, and, as marquess of Chandos, represented the borough of Buckingham in parliament from 1846 to 1857. He was chairman of the London & North-Western railway from 1853 to 1861. After succeeding to the dukedom he became lord president of the council, and subsequently secretary for the colonies in the Conservative government of 1866-1868. From 1875 to 1880 he was governor of Madras, and in 1886 was chosen chairman of committees in the House of Lords. He was twice married and left three daughters. As he left no son the dukedom became extinct on his death; but the Scottish barony of Kinloss (to which he established his title in 1868) passed to his eldest daughter, Mary, the wife of Captain L. F. H. C. Morgan; the earldom of Temple to his nephew, William Stephen Gore-Langton; and the viscounty of Cobham to his kinsman, Charles George, 5th Baron Lyttelton. His widow married the 1st Earl Egerton of Tatton in 1894.

BUCKINGHAM, GEORGE VILLIERS, 1st Duke of[1] (1592-1628), English statesman, born in August 1592,[2] was a younger son of Sir George Villiers of Brooksby. His mother, Mary, daughter of Anthony Beaumont of Glenfield, Leicestershire, who was left a widow early, educated him for a courtier's life, sending him to France with Sir John Eliot; and the lad, being "by nature contemplative," took kindly to the training. He could dance well, fence well, and talk a little French, when in August 1614 he was brought before the king's notice, in the hope that he would take a fancy to him.

The moment was favourable. Since Salisbury's death James had taken the business of government upon himself. But he wanted some one who would chat with him, and amuse him, and would also fill the office of private secretary, and save him from the trouble of saying no to importunate suitors. It would be an additional satisfaction if he could train the youth whom he might select in those arts of statesmanship of which he believed himself to be a perfect master. His first choice had not proved a happy one. Robert Carr, who had lately become earl of Somerset, had had his head turned by his elevation. He had grown peevish toward his master, and had placed himself at the head of the party which was working for a close alliance with Spain.

The appearance of Villiers, beaming with animal spirits and good humour, was therefore welcomed by all who had an interest in opposing the designs of Spain, and he was appointed cupbearer the same year. For some little time still Somerset's pre-eminence was maintained. But on the 23rd of April 1615, Villiers, in spite of Somerset, was promoted to be gentleman of the bedchamber, and was knighted on the 24th; the charge of murdering Overbury, brought against Somerset in September, completed his downfall, and Villiers at once stepped into the place which he had vacated. On the 3rd of January 1616 he became master of the horse, on the 24th of April he received the order of the Garter, and on the 27th of August 1616 was created Viscount Villiers and Baron Waddon, receiving a grant of land valued at £80,000, while on the 5th of January 1617 he was made earl, and on the 1st of January 1618 marquess of Buckingham. With the exception of the earl of Pembroke he was the richest nobleman in England.

Those who expected him to give his support to the anti-Spanish party were at first doomed to disappointment. As yet he was no politician, and he contented himself with carrying out his master's orders, whatever they were. In his personal relations he was kindly and jovial towards all who did not thwart his wishes. But James had taught him to consider that the patronage of England was in his hands, and he took good care that no man should receive promotion of any kind who did not in one way or another pay court to him. As far as can be ascertained, he cared less for money than for the gratification of his vanity. But he had not merely himself to consider. His numerous kinsfolk were to be enriched by marriage, if in no other way, and Bacon, the great philosopher and statesman, was all but thrust from office because he had opposed a marriage suggested for one of Buckingham's brothers, while Cranfield, the first financier of the day, was kept from the treasury till he would forsake the woman whom he loved, to marry a penniless cousin of the favourite. On the 19th of January 1619 James made him lord high admiral of England, hoping that the ardent, energetic youth would impart something of his own fire to those who were entrusted with the oversight of that fleet which had been almost ruined by the peculation and carelessness of the officials. Something of this, no doubt, was realized under Buckingham's eye. But he himself never pretended to the virtues of an administrator, and he was too ready to fill up appointments with men who flattered him, and too reluctant to dismiss them, if they served their country ill, to effect any permanent change for the better.

It was about this time that he first took an independent part in politics. All England was talking of the revolution in Bohemia in the year before, and men's sympathy with the continental Protestants was increased when it was known that James's son-in-law had accepted the crown of Bohemia, and that in the summer of 1620 a Spanish force was preparing to invade the Palatinate. Buckingham at first had thrown himself into the popular movement. Before the summer of 1620 was at end, incensed by injuries inflicted on English sailors by the Dutch in the East Indies, he had swung round, and was in close agreement with Gondomar, the Spanish ambassador. He had now married Lady Katherine Manners, the daughter of the earl of Rutland, who was at heart a Roman Catholic, though she outwardly conformed to the English Church, and this alliance may have had something to do with the change.

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Buckingham's mistakes were owing mainly to his levity. If he passed briskly from one camp to the other, an impartial observer might usually detect some personal motive at the bottom. But it is hardly probable that he was himself conscious of anything of the sort. When he was in reality acting under the influence of vanity or passion it was easy for him to persuade himself that he was doing his duty to his country.

The parliament which met in 1621, angry at discovering that no help was to be sent to the Palatinate, broke out into a loud outcry against the system of monopolies, from which Buckingham's brothers and dependants had drawn a profit, which was believed to be greater than it really was. At first he pleaded for a dissolution. But he was persuaded by Bishop Williams that it would be a wiser course to put himself at the head of the movement, and at a conference of the Commons with the Lords acknowledged that his two brothers had been implicated, but declared that his father had begotten a third who would aid in punishing them. In the impeachment of Bacon which soon followed, Buckingham, who owed much to his wise counsels, gave him that assistance which was possible without imperilling his own position and influence. He at first demanded the immediate dissolution of parliament, but afterwards, when the cry rose louder against the chancellor, joined in the attack, making however some attempt to mitigate the severity of the charges against him during the hearing of his case before the House of Lords. Notwithstanding, he took advantage of Bacon's need of assistance to wring from him the possession of York House.

In the winter of 1621, and the succeeding year, Buckingham was entirely in Gondomar's hands; and it was only with some difficulty that in May 1622 Laud argued him out of a resolution to declare himself a Roman Catholic. In December 1621 he actively supported the dissolution of parliament, and there can be little doubt that when the Spanish ambassador left England the following May, he had come to an understanding with Buckingham that the prince of Wales should visit Madrid the next year, on which occasion the Spanish court hoped to effect his conversion to the Roman Catholic Church before giving him the hand of the infanta Maria. They set out on their adventurous expedition on the 17th of February 1623, arriving at Madrid, after passing through Paris on the 7th of March. Each party had been the dupe of the other. Charles and Buckingham were sanguine in hoping for the restitution of the Palatinate to James's son-in-law, as a marriage gift to Charles; while the Spaniards counted on the conversion of Charles to Roman Catholicism and other extreme concessions (see CHARLES I.). The political differences were soon accentuated by personal disputes between Buckingham and Olivares and the grandees, and

when the two young men sailed together from Santander in September, it was with the final resolution to break entirely with Spain.

James had gratified his favourite in his absence by raising him to a dukedom. But the splendour which now gathered round Buckingham was owing to another source than James's favour. He had put himself at the head of the popular movement against Spain, and when James, acknowledging sorely against his will that the Palatinate could only be recovered by force, summoned the parliament which met in February 1624, Buckingham, with the help of the heir apparent, took up an independent political position. James was half driven, half persuaded to declare all negotiations with Spain at an end. For the moment Buckingham was the most popular man in England.

It was easier to overthrow one policy than to construct another. The Commons would have been content with sending some assistance to the Dutch, and with entering upon a privateering war with Spain. James, whose object was to regain the Palatinate, believed this could only be accomplished by a continental alliance, in which France took part. As soon as parliament was prorogued, negotiations were opened for a marriage between Charles and the sister of Louis XIII., Henrietta Maria. But a difficulty arose. James and Charles had engaged to the Commons that there should be no concessions to the English Roman Catholics, and Louis would not hear of the marriage unless very large concessions were made. Buckingham, impatient to begin the war as soon as possible, persuaded Charles, and the two together persuaded James to throw over the promises to the Commons, and to accept the French terms. It was no longer possible to summon parliament to vote supplies for the war till the marriage had been completed, when remonstrances to its conditions would be useless.

Buckingham, for Buckingham was now virtually the ruler of England, had thus to commence war without money. He prepared to throw 12,000 Englishmen, under a German adventurer, Count Mansfeld, through France into the Palatinate. The French insisted that he should maroh through Holland. It mattered little which way he took. Without provisions, and without money to buy them, the wretched troops sickened and died in the winter frosts. Buckingham's first military enterprise ended in disastrous failure.

Buckingham had many other schemes in his teeming brain. He had offered to send aid to Christian IV., king of Denmark, who was proposing to make war in Germany, and had also a plan for sending an English fleet to attack Genoa, the ally of Spain, and a plan for sending an English fleet to attack Spain itself.

Before these schemes could be carried into operation James died on the 27th of March 1625. The new king and Buckingham were at one in their aims and objects. Both were anxious to distinguish themselves by the chastisement of Spain, and the recovery of the Palatinate. Both were young and inexperienced. But Charles, obstinate when his mind was made up, was sluggish in action and without fertility in ideas, and he had long submitted his mind to the versatile and brilliant favourite, who was never at a loss what to do next, and who unrolled before his eyes visions of endless possibilities in the future. Buckingham was sent over to Paris to urge upon the French court the importance of converting its alliance into active co-operation.

There was a difficulty in the way. The Huguenots of La Rochelle were in rebellion, and James had promised the aid of English ships to suppress that rebellion. Buckingham, who seems at first to have consented to the scheme, was anxious to mediate peace between the king of France and his subjects, and to save Charles from compromising himself with his parliament by the appearance of English ships in an attack upon Protestants. When he returned his main demands were refused, but hopes were given him that peace would be made with the Huguenots. On his way through France he had the insolence to make love to the queen of France.

Soon after his return parliament was opened. It would have been hard for Charles to pass through the session with credit. Under Buckingham's guidance he had entered into engagements involving an enormous expenditure, and these engagements involved a war on the continent, which had never been popular in the House of Commons. The Commons, too, suspected the marriage treaty contained engagements of which they disapproved. They asked for the full execution of the laws against the Roman Catholics, and voted but little money in return. Before they reassembled at Oxford on the 1st of August, the English ships had found their way into the hands of the French, to be used against La Rochelle. The Commons met in an ill-humour. They had no confidence in Buckingham, and they asked that persons whom they could trust should be admitted to the king's council before they would vote a penny. Charles stood by his minister, and on the 12th of August he dissolved his first parliament.

Buckingham and his master set themselves to work to conquer public opinion. On the one hand, they threw over their engagements to France on behalf of the English Roman Catholics. On the other hand they sent out a large fleet to attack Cadiz, and to seize the Spanish treasure-ships. Buckingham went to the Hague to raise an immediate supply by pawning the crown jewels, to place England at the head of a great Protestant alliance, and to enter into fresh obligations to furnish money to the king of Denmark. It all ended in failure. The fleet returned from Cadiz, having effected nothing. The crown jewels produced but a small sum, and the money for the king of Denmark could only be raised by an appeal to parliament. In the meanwhile the king of France
[v.04 p.0724] was deeply offended by the treatment of the Roman Catholics, and by the seizure of French vessels on the ground that they were engaged in carrying goods for Spain.

When Charles's second parliament met on the 6th of February 1626, it was not long before,

under Eliot's guidance, it asked for Buckingham's punishment. He was impeached before the House of Lords on a long string of charges. Many of these charges were exaggerated, and some were untrue. His real crime was his complete failure as the leader of the administration. But as long as Charles refused to listen to the complaints of his minister's incompetency, the only way in which the Commons could reach him was by bringing criminal charges against him. Charles dissolved his second parliament as he had dissolved his first. Subsequently the Star Chamber declared the duke innocent of the charges, and on the 1st of June Buckingham was elected chancellor of Cambridge University.

To find money was the great difficulty. Recourse was had to a forced loan, and men were thrown into prison for refusing to pay it. Disasters had occurred to Charles's allies in Germany. The fleet sent out under Lord Willoughby (earl of Lindsey) against the Spaniards returned home shattered by a storm, and a French war was impending in addition to the Spanish one. The French were roused to reprisals by Charles's persistence in seizing French vessels. Unwilling to leave La Rochelle open to the entrance of an English fleet, Richelieu laid siege to that stronghold of the French Huguenots. On the 27th of June 1627 Buckingham sailed from Portsmouth at the head of a numerous fleet, and a considerable land force, to relieve the besieged city.

His first enterprise was the siege of the fort of St Martin's, on the Isle of Ré. The ground was hard, and the siege operations were converted into a blockade. On the 27th of September the defenders of the fort announced their readiness to surrender the next morning. In the night a fresh gale brought over a flotilla of French provision boats, which dashed through the English blockading squadron. The fort was provisioned for two months more. Buckingham resolved to struggle on, and sent for reinforcements from England. Charles would gladly have answered to his call. But England had long since ceased to care for the war. There was no money in the exchequer, no enthusiasm in the nation to supply the want. Before the reinforcements could arrive the French had thrown a superior force upon the island, and Buckingham was driven to retreat on the 29th of October with heavy loss, only 2989 troops out of nearly 7000 returning to England.

His spirits were as buoyant as ever. Ill luck, or the misconduct of others, was the cause of his failure. He had new plans for carrying on the war. But the parliament which met on the 17th of March 1628 was resolved to exact from the king an obligation to refrain from encroaching for the future on the liberties of his subjects.

In the parliamentary battle, which ended in the concession of the Petition of Right, Buckingham took an active share as a member of the House of Lords. He resisted as long as it was possible to resist the demand of the Commons, that the king should abandon his claim to imprison without showing cause. When the first unsatisfactory answer to the petition was made by the king on the 2nd of June, the Commons suspected, probably with truth, that it had been dictated by Buckingham. They prepared a remonstrance on the state of the nation, and Coke at last named the duke as the cause of all the misfortunes that had occurred. "The duke of Bucks is the cause of all our miseries ... that man is the grievance of grievances." Though on the 7th of June the king granted a satisfactory answer to the petition, the Commons proceeded with their remonstrance, and on the 11th demanded that he might no longer continue in office.

Once more Charles refused to surrender Buckingham, and a few days later he prorogued parliament in anger. The popular feeling was greatly excited. Lampoons circulated freely from hand to hand, and Dr Lambe, a quack doctor, who dabbled in astrology, and was believed to exercise influence over Buckingham, was murdered in the streets of London. Rude doggerel lines announced that the duke should share the doctor's fate.

With the clouds gathering round him, Buckingham went down to Portsmouth to take the command of one final expedition for the relief of La Rochelle. For the first time even he was beginning to acknowledge that he had undertaken a task beyond his powers. There was a force of inertia in the officials which resisted his efforts to spur them on to an enterprise which they believed to be doomed to failure. He entered gladly into a scheme of pacification proposed by the Venetian ambassador. But before he could know whether there was to be peace or war, the knife of an assassin put an end to his career. John Felton, who had served at Ré, had been disappointed of promotion, and had not been paid that which was due to him for his services, read the declaration of the Commons that Buckingham was a public enemy, and eagerly caught at the excuse for revenging his private wrongs under cover of those of his country. Waiting, on the morning of the 23rd of August, beside the door of the room in which Buckingham was breakfasting, he stabbed him to the heart as he came out.

Buckingham married Lady Katherine Manners, daughter of Francis, 6th earl of Rutland, by whom he left three sons and one daughter, of whom George, the second son (1628-1687), succeeded to the dukedom.

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(S. R. G.; P. C. Y.)

[1] *i.e.* in the Villiers line; see above.

[2] The *Life*, by Sir Henry Wotton, gives August 28th as the date of his birth, but, when relating his death on August 23rd, adds, "thus died the great peer in the 36th year of his age compleat and three days over." August 28th was therefore probably a misprint for August 20th.

BUCKINGHAM, GEORGE VILLIERS, 2ND DUKE OF[1] (1628-1687), English statesman, son of the 1st duke, was born on the 30th of January 1628. He was brought up, together with his younger brother Francis, by King Charles I. with his own children, and was educated at Trinity College, Cambridge, where he obtained the degree of M.A. in 1642. He fought for the king in the Civil War, and took part in the attack on Lichfield Close in April 1643. Subsequently, under the care of the earl of Northumberland, the two brothers travelled abroad and lived at Florence and Rome. When the Second Civil War broke out they joined the earl of Holland in Surrey, in July 1648. Lord Francis was killed near Kingston, and Buckingham and Holland were surprised at St Neots on the 10th, the duke succeeding in escaping to Holland. In consequence of his participation in the rebellion, his lands, which had been restored to him in 1647 on account of his youth, were now again confiscated, a considerable portion passing into the possession of Fairfax; and he refused to compound. Charles II. conferred on him the Garter on the 19th of September 1649, and admitted him to the privy council on the 6th of April 1650. In opposition to Hyde he supported the alliance with the Scottish presbyterians, accompanied Charles to Scotland in June, and allied himself with Argyll, dissuading Charles from joining the royalist plot of October 1650, and being suspected of betraying the plan to the convenanting leaders. In May he had been appointed general of the eastern association in England, and was commissioned to raise forces abroad; and in the following year he was chosen to lead the projected movement in Lancashire and to command the Scottish royalists. He was present with Charles at the battle of Worcester on the
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3rd of September 1651, and escaped safely alone to Rotterdam in October. His subsequent negotiations with Cromwell's government, and his readiness to sacrifice the interests of the church, separated him from the rest of Charles's advisers and diminished his influence; while his estrangement from the royal family was completed by his audacious courtship of the king's sister, the widowed princess of Orange, and by a money dispute with Charles. In 1657 he returned to England, and on the 15th of September married Mary, daughter of Lord Fairfax, who had fallen in love with him although the banns of her intended marriage with the earl of Chesterfield had been twice called in church. Buckingham was soon suspected of organizing a presbyterian plot against the government, and in spite of Fairfax's interest with Cromwell an order was issued for his arrest on the 9th of October. He was confined at York House about April 1658, and having broken bounds was rearrested on the 18th of August and imprisoned in the Tower, where he remained till the 23rd of February 1659, being then liberated on his promise not to abet the enemies of the government, and on Fairfax's security of £20,000. He joined the latter in his march against Lambert in January 1660, and afterwards claimed to have gained Fairfax to the cause of the Restoration.

On the king's return Buckingham, who met him at his landing at Dover, was at first received coldly; but he was soon again in favour, was appointed a gentleman of the bedchamber, carried the orb at the coronation on the 23rd of April 1661, and was made lord-lieutenant of the West Riding of Yorkshire on the 21st of September. The same year he accompanied the princess Henrietta to Paris on her marriage with the duke of Orleans, but made love to her himself with such imprudence that he was recalled. On the 28th of April 1662 he was admitted to the privy council. His confiscated estates amounting to £26,000 a year were restored to him, and he was reputed the king's richest subject. He took part in the suppression of the projected insurrection in Yorkshire in 1663, went to sea in the first Dutch war in 1665, and was employed in taking measures to resist the Dutch or French invasion in June 1666.

He was, however, debarred from high office by Clarendon's influence. Accordingly Buckingham's intrigues were now directed to effect the chancellor's ruin. He organized parties in both houses of parliament in support of the bill of 1666 prohibiting the import of Irish cattle, partly to oppose Clarendon and partly to thwart the duke of Ormonde. Having asserted during the debates that "whoever was against the bill had either an Irish interest or an Irish understanding," he was challenged by Lord Ossory. Buckingham avoided the encounter, and Ossory was sent to the Tower. A short time afterwards, during a conference between the two houses on the 19th of December, he came to blows with the marquess of Dorchester, pulling off the latter's periwig, while Dorchester at the close of the scuffle "had much of the duke's hair in his hand."[2] According to Clarendon no misdemeanour so flagrant had ever before offended the dignity of the House of Lords. The offending peers were both sent to the Tower, but were released after apologizing; and Buckingham vented his spite by raising a claim to the title of Lord Roos held by Dorchester's son-in-law. His opposition to the government had forfeited the king's favour, and he was now accused of treasonable intrigues, and of having cast the king's horoscope. His arrest was ordered on the 25th of February 1667, and he was dismissed from all his offices. He avoided

capture till the 27th of June, when he gave himself up and was imprisoned in the Tower. He was released, however, by July 17th, was restored to favour and to his appointments on the 15 of September, and took an active part in the prosecution of Clarendon. On the latter's fall he became the chief minister, though holding no high office except that of master of the horse, bought from the duke of Albermarle in 1668. In 1671 he was elected chancellor of Cambridge, and in 1672 high steward of Oxford university. He favoured religious toleration, and earned the praise of Richard Baxter; he supported a scheme of comprehension in 1668, and advised the declaration of indulgence in 1672. He upheld the original jurisdiction of the Lords in Skinner's case. With these exceptions Buckingham's tenure of office was chiefly marked by scandals and intrigues. His illicit connexion with the countess of Shrewsbury led to a duel with her husband at Barn Elms on the 16th of January 1668, in which Shrewsbury was fatally wounded. The tale that the countess, disguised as a page, witnessed the encounter, appears to have no foundation; but Buckingham, by installing the "widow of his own creation" in his own and his wife's house, outraged even the lax opinion of that day. He was thought to have originated the project of obtaining the divorce of the childless queen. He intrigued against James, against Sir William Coventry—one of the ablest statesmen of the time, whose fall he procured by provoking him to send him a challenge—and against the great duke of Ormonde, who was dismissed in 1669. He was even suspected of having instigated Thomas Blood's attempt to kidnap and murder Ormonde, and was charged with the crime in the king's presence by Ormonde's son, Lord Ossory, who threatened to shoot him dead in the event of his father's meeting with a violent end. Arlington, next to Buckingham himself the most powerful member of the cabal and a favourite of the king, was a rival less easy to overcome; and he derived considerable influence from the control of foreign affairs entrusted to him. Buckingham had from the first been an adherent of the French alliance, while Arlington concluded through Sir William Temple in 1668 the Triple Alliance. But on the complete *volte-face* and surrender made by Charles to France in 1670, Arlington as a Roman Catholic was entrusted with the first treaty of Dover of the 20th of May—which besides providing for the united attack on Holland, included Charles's undertaking to proclaim himself a Romanist and to reintroduce the Roman Catholic faith into England,—While Buckingham was sent to France to carry on the sham negotiations which led to the public treaties of the 31st of December 1670 and the 2nd of February 1672. He was much pleased with his reception by Louis XIV., declared that he had "more honours done him than ever were given to any subject," and was presented with a pension of 10,000 livres a year for Lady Shrewsbury. In June 1672 he accompanied Arlington to the Hague to impose terms on the prince of Orange, and with Arlington arranged the new treaty with Louis. After all this activity he suffered a keen disappointment in being passed over for the command of the English forces in favour of Schomberg. He now knew of the secret treaty of Dover, and towards the end of 1673 his jealousy of Arlington became open hostility. He threatened to impeach him, and endeavoured with the help of Louis to stir up a faction against him in parliament. This, however, was unsuccessful, and in January 1674 an attack was made upon Buckingham himself simultaneously in both houses. In the Lords the trustees of the young earl of Shrewsbury complained that Buckingham continued publicly his intimacy with the countess, and that a son of theirs had been buried in Westminster Abbey with the title of earl of Coventry; and Buckingham, after presenting an apology, was required, as was the countess, to give security for £10,000 not to cohabit together again. In the Commons he was attacked as the promoter of the French alliance, of "popery" and arbitrary government. He defended himself chiefly by endeavouring to throw the blame upon Arlington; but an address was voted petitioning the king to remove him from his councils, presence and from employment for ever. Charles, who had only been waiting for a favourable opportunity, and who was enraged at Buckingham's disclosures, consented with alacrity. Buckingham retired into private life, reformed his ways, attended church with his wife, began to pay his debts, became a "patriot," and was claimed by the country or opposition party as one of their leaders. In the spring of 1675 he was conspicuous for his opposition to the Test oath and for his abuse of the bishops, and on the 16th of November he introduced a bill for the relief of the nonconformists. On the 15th of February 1677 he was one of the four lords who endeavoured to embarrass the government by raising the question whether the parliament, not having assembled according to the act of
[v.04 p.0726] Edward III. once in the year, had not been dissolved by the recent prorogation. The motion was rejected and the four lords were ordered to apologize. On their refusing, they were sent to the Tower, Buckingham in particular exasperating the House by ridiculing its censure. He was released in July, and immediately entered into intrigues with Barillon, the French ambassador, with the object of hindering the grant of supplies to the king; and in 1678 he visited Paris to get the assistance of Louis XIV. for the cause of the opposition. He took an active part in the prosecution of those implicated in the supposed Popish Plot, and accused the lord chief justice (Sir William Scroggs) in his own court while on circuit of favouring the Roman Catholics. In consequence of his conduct a writ was issued for his apprehension, but it was never served. He promoted the return of Whig candidates to parliament, constituted himself the champion of the dissenters, and was admitted a freeman of the city of London. He, however, separated himself from the Whigs on the exclusion question, probably on account of his dislike of Monmouth and Shaftesbury, was absent from the great debate in the Lords on the 15th of November 1680, and was restored to the king's favour in 1684.

He took no part in public life after James's accession, but returned to his manor of Helmsley in Yorkshire, the cause of his withdrawal being probably exhausted health and exhausted finances. In 1685 he published a pamphlet, entitled *A short Discourse on the Reasonableness of Man's having a Religion* (reprinted in *Somers Tracts* (1813, ix. 13), in which after discussing the main subject he returned to his favourite topic, religious toleration. The tract provoked some rejoinders and was defended, amongst others, by William Penn, and by the author himself in *The*

Duke of Buckingham's Letter to the unknown author of a short answer to the Duke of Buckingham's Paper (1685). In hopes of converting him to Roman Catholicism James sent him a priest, but Buckingham turned his arguments into ridicule. He died on the 16th of April 1687, from a chill caught while hunting, in the house of a tenant at Kirkby Moorside in Yorkshire, expressing great repentance and feeling himself "despised by my country and I fear forsaken by my God."[3] The miserable picture of his end drawn by Pope, however, is greatly exaggerated. He was buried on the 7th of June 1687 in Henry VII.'s chapel in Westminster Abbey, in greater state, it was said, than the late king, and with greater splendour. With his death the family founded by the extraordinary rise to power and influence of the first duke ended. As he left no legitimate children the title became extinct, and his great estate had been completely dissipated; of the enormous mansion constructed by him at Cliveden in Buckinghamshire not a stone remains.

The ostentatious licence and the unscrupulous conduct of the Alcibiades of the 17th century have been deservedly censured. But even his critics agree that he was good-humoured, good-natured, generous, an unsurpassed mimic and the leader of fashion; and with his good looks, in spite of his moral faults and even crimes, he was irresistible to his contemporaries. Many examples of his amusing wit have survived. His portrait has been drawn by Burnet, Count Hamilton in the *Mémoires de Grammont*, Dryden, Pope in the *Epistle to Lord Bathurst*, and Sir Walter Scott in *Peveril of the Peak*. He is described by Reresby as "the first gentleman of person and wit I think I ever saw," and Burnet bears the same testimony. Dean Lockier, after alluding to his unrivalled skill in riding, dancing and fencing, adds, "When he came into the presence-chamber it was impossible for you not to follow him with your eye as he went along, he moved so gracefully." Racing and hunting were his favourite sports, and his name long survived in the hunting songs of Yorkshire. He was the patron of Cowley, Sprat, Matthew Clifford and Wycherley. He dabbled in chemistry, and for some years, according to Burnet, "he thought he was very near the finding of the philosopher's stone." He set up glass works at Lambeth the productions of which were praised by Evelyn; and he spent much money, according to his biographer Brian Fairfax, in building *insanae substructions*. Dryden described him under the character of Zimri in the celebrated lines in *Absalom and Achitophel* (to which Buckingham replied in *Poetical Reflections on a late Poem ... by a Person of Honour, 1682*):—

> "A man so various, that he seemed to be
> Not one, but all mankind's epitome;
> Stiff in opinions, always in the wrong,
> Was everything by starts and nothing long;
> But in the course of one revolving moon,
> Was chymist, fiddler, statesman and buffoon....
> Beggar'd by fools, whom still he found too late,
> He had his jest, but they had his estate."

Buckingham, however, cannot with any truth be called the "epitome of mankind." On the contrary, the distinguishing features of his life are its incompleteness, aimlessness, imperfection, insignificance, neglect of talents and waste of opportunities. "He saw and approved the best," says Brian Fairfax, "but did too often *deteriora sequi*." He is more severely but more justly judged by himself. In gay moments indeed he had written—

> "Methinks, I see the wanton houres flee,
> And as they passe, turne back and laugh at me,"[4]—

but his last recorded words on the approach of death, "O! what a prodigal have I been of that most valuable of all possessions—Time!" express with exact truth the fundamental flaw of his character and career, of which he had at last become conscious.

Buckingham wrote occasional verses and satires showing undoubted but undeveloped poetical gifts, a collection of which, containing however many pieces not from his pen, was first published by Tom Brown in 1704; while a few extracts from a commonplace book of Buckingham of some interest are given in an article in the *Quarterly Review* of January 1898. He was the author of *The Rehearsal*, an amusing and clever satire on the heroic drama and especially on Dryden (first performed on the 7th of December 1671, at the Theatre Royal, and first published in 1672), a deservedly popular play which was imitated by Fielding in *Tom Thumb the Great*, and by Sheridan in the *Critic*. Buckingham also published two adapted plays, *The Chances*, altered from Fletcher's play of the same name (1682) and *The Restoration or Right will take place*, from Beaumont and Fletcher's *Philaster* (publ. 1714); and also *The Battle of Sedgmoor* and *The Militant Couple* (publ. 1704). The latest edition of his works is that by T. Evans (2 vols. 8vo, 1775). Another work is named by Wood *A Demonstration of the Deity*, of which there is now no trace.

Bibliography.—The life of Buckingham has been well and accurately traced and the chief authorities collected in the article in the *Dict, of Nat. Biography* (1899) by C.H. Firth, and in *George Villiers, 2nd Duke of Buckingham*, by Lady Burghclere (1903). Other biographies are in Wood's *Athenae Oxon* (Bliss), iv. 207; in *Biographia Britannica*; by Brian Fairfax, printed in H. Walpole's *Catalogue of Pictures of George Duke of Buckingham* (1758); in Arber's edition of the *Rehearsal* (1868); and by the author of *Hudibras* in *The Genuine Remains of Mr Samuel Butler*, by R. Thyer (1759), ii. 72. The following may also be mentioned:—*Quarterly Review, Jan. 1898* (commonplace book); *A Conference on the Doctrine of Transubstantiation between ... the Duke of Buckingham and Father FitzGerald* (1714); *A Narrative of the Cause and Manner of the*

Imprisonment of the Lords (1677); *The Declaration of the ... Duke of Buckingham and the Earls of Holland and Peterborough ... associated for the King* (1648); S.R. Gardiner's *Hist. of the Commonwealth* (1894-1901); *Hist. of Eng. Poetry*, by W.J. Courthope (1903), iii. 460; Horace Walpole's *Royal and Noble Authors*, iii. 304; *Miscellania Aulica*, by T. Brown (1702); and the *Fairfax Correspondence* (1848-1849). For the correspondence see *Charles II. and Scotland in 1650* (Scottish History Soc., vol. xvii., 1894); *Calendars of St. Pap. Dom.; Hist. MSS. Comm. Series, MSS. of Duke of Buccleuch at Montagu House, of Mrs Frankland-Russell-Astley*, of *Marq. of Ormonde*, and *Various Collections*; and *English Hist. Rev.* (April 1905), xx. 373.

(P. C. Y.)

[1] i.e. in the Villiers line; see above.

[2] Clarendon, *Life and Continuation*, 979.

[3] *Quarterly Review*, January 1898, p. 110.

[4] From his Common place Book (*Quarterly Rev.* vol. 187, p. 87).

BUCKINGHAM, HENRY STAFFORD, 2ND DUKE OF[1] (1454-1483), was the son of Humphrey Stafford, killed at the first battle of St Albans in 1455, and grandson of Humphrey the 1st duke (cr. 1444), killed at Northampton in 1460, both fighting for Lancaster. The 1st duke, who bore the title of earl of Buckingham in right of his mother, was the son of Edmund, 5th earl of Stafford, [v.04 p.0727] and of Anne, daughter of Thomas, duke of Gloucester, youngest son of Edward III.; Henry's mother was Margaret, daughter of Edmund Beaufort, 2nd duke of Somerset, grandson of John of Gaunt. Thus he came on both sides of the blood royal, and this, coupled with the vastness of his inheritance, made the young duke's future of importance to Edward IV. He was recognized as duke in 1465, and next year was married to Catherine Woodville, the queen's sister. On reaching manhood he was made a knight of the Garter in 1474, and in 1478 was high steward at the trial of George, duke of Clarence. He had not otherwise filled any position of importance, but his fidelity might seem to have been secured by his marriage. However, after Edward's death, Buckingham was one of the first persons worked upon by Richard, duke of Gloucester. It was through his help that Richard obtained possession of the young king, and he was at once rewarded with the offices of justiciar and chamberlain of North and South Wales, and constable of all the royal castles in the principality and Welsh Marches. In the proceedings which led to the deposition of Edward V. he took a prominent part, and on the 24th of June 1483 he urged the citizens at the Guildhall to take Richard as king, in a speech of much eloquence, "for he was neither unlearned and of nature marvellously well spoken." (More). At Richard's coronation he served as chamberlain, and immediately afterwards was made constable of England and confirmed in his powers in Wales. Richard might well have believed that the duke's support was secured. But early in August Buckingham withdrew from the court to Brecon. He may have thought that he deserved an even greater reward, or possibly had dreams of establishing his own claims to the crown. At all events, at Brecon he fell somewhat easily under the influence of his prisoner, John Morton (*q.v.*), who induced him to give his support to his cousin Henry Tudor, earl of Richmond. A widespread plot was soon formed, but Richard had early warning, and on the 15th of October, issued a proclamation against Buckingham. Buckingham, as arranged, prepared to enter England with a large force of Welshmen. His advance was stopped by an extraordinary flood on the Severn, his army melted away without striking a blow, and he himself took refuge with a follower, Ralph Bannister, at Lacon Hall, near Wem. The man betrayed him for a large reward, and on the 1st of November, Buckingham was brought to the king at Salisbury. Richard refused to see him, and after a summary trial had him executed next day (2nd of November 1483), though it was a Sunday.

Buckingham's eldest son, Edward (1478-1521), eventually succeeded him as 3rd duke, the attainder being removed in 1485; the second son, Henry, was afterwards earl of Wiltshire. The 3rd duke played an important part as lord high constable at the opening of the reign of Henry VIII., and is introduced into Shakespeare's play of that king, but he fell through his opposition to Wolsey, and in 1521 was condemned for treason and executed (17th of May); the title was then forfeited with his attainder, his only son Henry (1501-1563), who in his father's lifetime was styled earl of Stafford, being, however, given back his estates in 1522, and in 1547 restored in blood by parliament with the title of Baron Stafford, which became extinct in this line with Roger, 5th Baron in 1640. In that year the barony of Stafford was granted to William Howard (1614-1680), who after two months was created Viscount Stafford; he was beheaded in 1680, and his son was created earl of Stafford in 1688, a title which became extinct in 1762; but in 1825 the descent to the barony of 1640 was established, to the satisfaction of the House of Lords, in the person of Sir G.W. Jerningham, in whose family it then continued.

The chief original authorities for the life of the 2nd duke of Buckingham are the *Continuation of the Croyland Chronicle*; Sir Thomas More's *Richard III.*; and Fabyan's *Chronicle*. Amongst modern authorities consult J. Gairdner's *Richard III.*; and Sir. J. Ramsay's *Lancaster and York*.

(C. L. K.)

[1] i.e. in the Stafford line; see above.

BUCKINGHAM, JAMES SILK (1786-1855), English author and traveller, was born near Falmouth on the 25th of August 1786, the son of a farmer. His youth was spent at sea. After years of wandering he established in 1818 the *Calcutta Journal*. This venture at first proved highly

successful, but in 1823 the paper's outspoken criticisms of the East India Company led to the expulsion of Buckingham from India and to the suppression of the paper by John Adam, the acting governor-general. His case was brought before parliament, and a pension of £200 a year was subsequently awarded him by the East India Company as compensation. Buckingham continued his journalistic ventures on his return to England, and started the *Oriental Herald* (1824) and the *Athenaeum* (1828) which was not a success in his hands. In parliament, where he sat as member for Sheffield from 1832-1837, he was a strong advocate of social reform. He was a most voluminous writer. He had travelled much in Europe, America and the East, and wrote a great number of useful books of travel. In 1851 the value of these and of his other literary work was recognized by the grant of a civil list pension of £200 a year. At the time of his death in London, on the 30th of June 1855, Buckingham was at work on his autobiography, two volumes of the intended four being completed and published (1855).

His youngest son, Leicester Silk Buckingham (1825-1867), achieved no little popularity as a playwright, several of his free adaptations of French comedies being produced in London between 1860 and 1867.

BUCKINGHAM, a market town and municipal borough and the county town of Buckinghamshire, England, in the Buckingham parliamentary division, 61 m. N.W. of London by a branch of the London & North-Western railway. Pop. (1901) 3152. It lies in an open valley on the upper part of the river Ouse, which encircles the main portion of the town on three sides. The church of St Peter and St Paul, which was extensively restored by Sir Gilbert Scott, a native of this neighbourhood, is of the 18th century, and stands on the site of the old castle; the town hall dates from the close of the previous century; and the grammar school was founded by Edward VI., in part occupying buildings of earlier date, which retain Perpendicular and Decorated windows, and a Norman door. A chantry, founded in 1268 by Matthew Stratton, archdeacon of Buckingham, previously occupied the site; the Norman work may be a remnant of the chapel of a gild of the Holy Trinity. The manor house is of the early part of the 17th century, and other old houses remain. The adjacent mansion of Stowe, approached from the town by a magnificent avenue of elms, and surrounded by gardens very beautifully laid out, was the seat of the dukes of Buckingham until the extinction of the title in 1889. Buckingham is served by a branch of the Grand Junction Canal, and has agricultural trade, manufactures of condensed milk and artificial manure, maltings and flour-mills; while an old industry survives to a modified extent in the manufacture of pillow-lace. The borough is under a mayor, 4 aldermen and 12 councillors. Area, 5006 acres.

Buckingham (Bochingeham, Bukyngham) was an important stronghold in pre-Conquest times, and in 918 Edward the Elder encamped there with his army for four weeks, and threw up two forts on either side of the water. At the time of the Domesday survey there were twenty-six burgesses in Buckingham, which, together with the hamlet of Bourton, was assessed at one hide. Although it appears as a borough thus early, the town received no charter until 1554, when Queen Mary created it a free borough corporate with a bailiff, twelve principal burgesses and a steward, and defined the boundaries as extending in width from Dudley bridge to Thornborowe bridge and in length from Chackmore bridge to Padbury Mill bridge. A charter from Charles II. in 1684 was very shortly abandoned in favour of the original grant, which held force until the Municipal Corporations Act of 1835. In 1529 and from 1545 onwards Buckingham returned two members to parliament, until deprived by the Representation of the People Act of 1867 of one member, and by the Redistribution of Seats Act of 1885 of the other. Early mentions occur of markets and fairs, and from 1522, when Henry VIII. granted to Sir Henry Marney the borough of Buckingham with a Saturday market and two annual fairs, grants of fairs by various sovereigns were numerous. Buckingham was formerly an important agricultural centre, and Edward III. fixed here one of the staples for wool, but after the removal of these to Calais the trade suffered such decay that in an act of 32 Henry VIII. Buckingham is mentioned among thirty-six impoverished towns.

[v.04 p.0728]

BUCKINGHAM AND NORMANBY, JOHN SHEFFIELD, 1ST DUKE OF (1648-1721), English statesman and poet, was born on the 7th of April 1648. He was the son of Edmund, 2nd earl of Mulgrave, and succeeded to that title on his father's death in 1658. At the age of eighteen he joined the fleet, to serve in the first Dutch war; on the renewal of hostilities in 1672 he was present at the battle of Southwold Bay, and in the next year received the command of a ship. He was also made a colonel of infantry, and served for some time under Turenne. In 1680 he was put in charge of an expedition sent to relieve the town of Tangier. It was said that he was provided with a rotten ship in the hope that he would not return, but the reason of this abortive plot, if plot there was, is not exactly ascertained. At court he took the side of the duke of York, and helped to bring about Monmouth's disgrace. In 1682 he was dismissed from the court, apparently for putting himself forward as a suitor for the princess Anne, but on the accession of King James he received a seat in the privy council, and was made lord chamberlain. He supported James in his most unpopular measures, and stayed with him in London during the time of his flight. He also protected the Spanish ambassador from the dangerous anger of the mob. He acquiesced, however, in the Revolution, and in 1694 was made marquess of Normanby. In 1696 he refused in company with other Tory peers to sign an agreement to support William as their "rightful and lawful king" against Jacobite attempts, and was consequently dismissed from the privy council. On the accession of Anne, with whom he was a personal favourite, he became lord privy seal and lord-lieutenant of the North Riding of Yorkshire, and in 1703 duke of Buckingham and Normanby. During the predominance of the Whigs between 1705 and 1710, Buckingham was deprived of his office as lord privy seal, but in 1710 he was made lord steward, and in 1711 lord president of the

council. After the death of Anne he held no state appointment. He died on the 24th of February 1721 at his house in St James's Park, which stood on the site of the present Buckingham Palace. Buckingham was succeeded by his son, Edmund (1716-1735) on whose death the titles became extinct.

Buckingham, who is better known by his inherited titles as Lord Mulgrave, was the author of "An Account of the Revolution" and some other essays, and of numerous poems, among them the *Essay on Poetry* and the *Essay on Satire*. It is probable that the *Essay on Satire*, which attacked many notable persons, "sauntering Charles" amongst others, was circulated in MS. It was often attributed at the time to Dryden, who accordingly suffered a thrashing at the hands of Rochester's bravoes for the reflections it contained upon the earl. Mulgrave was a patron of Dryden, who may possibly have revised it, but was certainly not responsible, although it is commonly printed with his works. Mulgrave adapted Shakespeare's *Julius Caesar*, breaking it up into two plays, *Julius Caesar* and *Marcus Brutus*. He introduced choruses between the acts, two of these being written by Pope, and an incongruous love scene between Brutus and Portia. He was a constant friend and patron of Pope, who expressed a flattering opinion of his *Essay on Poetry*. This, although smoothly enough written, deals chiefly with commonplaces.

In 1721 Edmund Curll published a pirated edition of his works, and was brought before the bar of the House of Lords for breach of privilege accordingly. An authorized edition under the superintendence of Pope appeared in 1723, but the authorities cut out the "Account of the Revolution" and "The Feast of the Gods" on account of their alleged Jacobite tendencies. These were printed at the Hague in 1727. Pope disingenuously repudiated any knowledge of the contents. Other editions reappeared in 1723, 1726, 1729, 1740 and 1753. His *Poems* were included in Johnson's and other editions of the British poets.

BUCKINGHAMSHIRE, EARLS OF. The first earl of Buckinghamshire (to be distinguished from the earls of Buckingham, *q.v.*) was John Hobart (c. 1694-1756), a descendant of Sir Henry Hobart (d. 1625), attorney-general and chief justice of the common pleas under James I., who was made a baronet in 1611, and who was the great-grandson of Sir James Hobart (d. 1507), attorney-general to Henry VII. The Hobarts had been settled in Norfolk and Suffolk for many years, when in 1728 John Hobart, who was a son of Sir Henry Hobart, the 4th baronet (d. 1698), was created Baron Hobart of Blickling. In 1740 Hobart became lord-lieutenant of Norfolk and in 1746 earl of Buckinghamshire, his sister, Henrietta Howard, countess of Suffolk, being the mistress of George II. He died on the 22nd of September 1756, and was succeeded as 2nd earl[1] by his eldest son John (1723-1793), who was member of parliament for Norwich and comptroller of the royal household before his accession to the title. From 1762 to 1766 he was ambassador to Russia, and from 1776 to 1780 lord-lieutenant of Ireland, but he was hardly equal to the exceptional difficulties with which he had to deal in the latter position. He died without sons at Blickling Hall, Norfolk, on the 3rd of August 1793, when his half-brother George (c. 1730-1804), became 3rd earl. Blickling Hall and his Norfolk estates, however, passed to his daughter, Henrietta (1762-1805), the wife of William Kerr, afterwards 6th marquess of Lothian.

Robert Hobart, 4th earl of Buckinghamshire (1760-1816), the eldest son of the 3rd earl, was born on the 6th of May 1760. He was a soldier, and then a member of both the English and the Irish Houses of Commons; from 1789 to 1793 he was chief secretary to the lord-lieutenant of Ireland, exerting his influence in this country to prevent any concessions to the Roman Catholics. In 1793, being known by the courtesy title of Lord Hobart, he was sent to Madras as governor, but in 1798, after serious differences between himself and the governor-general of India, Sir John Shore, afterwards Lord Teignmouth, he was recalled. Returning to British politics, Hobart was called up to the House of Lords in 1798 (succeeding to the earldom of Buckinghamshire in 1804); he favoured the union between England and Ireland; from March 1801 to May 1804 he was secretary for war and the colonies (his family name being taken for Hobart Town in Tasmania), and in 1805 he became chancellor of the duchy of Lancaster under Pitt. For a short time he was joint postmaster-general, and from 1812 until his death on the 4th of February 1816 he was president of the Board of Control, a post for which his Indian experience had fitted him.

The 4th earl left no sons, and his titles passed to his nephew, George Robert Hobart (1789-1849), a son of George Vere Hobart (1761-1802), lieutenant-governor of Grenada. In 1824 the 5th earl inherited the Buckinghamshire estates of the Hampden family and took the name of Hampden, his ancestor, Sir John Hobart, 3rd baronet, having married Mary Hampden about 1655. On his death in February 1849 his brother, Augustus Edward Hobart (1793-1884), who took the name of Hobart-Hampden in 1878, became 6th earl. His two sons, Vere Henry, Lord Hobart (1818-1875), governor of Madras from 1872, and Frederick John Hobart (1821-1875), predeceased him, and when the 6th earl died he was succeeded by his grandson, Sidney Carr Hobart-Hampden (b. 1860), who became 7th earl of Buckinghamshire, and who added to his name that of Mercer-Henderson. Another of the 6th earl's sons was Augustus Charles Hobart-Hampden, generally known as Hobart Pasha (*q.v.*).

See Lord Hobart's *Essays and Miscellaneous Writings*, edited with biography by Lady Hobart (1885).

[1] Until 1784, when George Grenville, Earl Temple, was created marquess of Buckingham, the 2nd earl of Buckinghamshire always signed himself "Buckingham"; his contemporaries knew him by this name, and hence a certain amount of confusion has arisen.

BUCKINGHAMSHIRE (abbreviated *Bucks*) a south midland county of England, bounded N. by Northamptonshire, E. by Bedfordshire, Hertfordshire and Middlesex, S. for a short distance by Surrey, and by Berkshire, and W. by Oxfordshire. Its area is 743.2 sq. m. The county is divided between the basins of the rivers Ouse and Thames. The first in its uppermost course forms part of the north-western boundary, passes the towns of Buckingham, Stony Stratford, Wolverton, Newport Pagnell and Olney, and before quitting the county forms a short stretch of the north-eastern boundary. The principal tributary it receives within the county is the Ouzel. The Thames forms the entire southern boundary; and of its tributaries Buckinghamshire includes the upper part of the Thames. To the north-west of Buckingham, and both east and west of the Ouzel, the land rises in gentle undulations to a height of nearly 500 ft., and north of the Thames valley a few nearly isolated hills stand boldly, such as Brill Hill and Muswell Hill, each over 600 ft., but the
[v.04 p.0729] hilliest part of the county is the south, which is occupied by part of the Chiltern system, the general direction of which is from south-west to north-east. The crest-line of these hills crosses the county at its narrowest point, along a line, above the towns of Prince's Risborough and Wendover, not exceeding 11 m. in length. This line divides the county into two parts of quite different physical character; for to the south almost the whole land is hilly (the longer slope of the Chiltern system lying in this direction), well wooded, and pleasantly diversified with narrow vales. The chief of these are watered by the Wye, Misbourne and Chess streams. The beech tree is predominant in the woods, in so much that William Camden, writing c. 1585, supposed the county to take name from this feature (A.S. *boc*, beech). In the south a remnant of ancient forest is preserved as public ground under the name of Burnham Beeches. The Chilterns reach a height of nearly 900 ft. within the county.

Geology.—The northern half of the county is occupied by Jurassic strata, in the southern half Cretaceous rocks predominate except in the south-eastern corner, where they are covered by Tertiary beds. Thus the oldest rocks are in the north, succeeded continuously by younger strata to the south; the general dip of all the rocks is south-easterly. A few patches of Upper Lias Clay appear near the northern boundary near Grafton Regis and Castle Thorpe, and again in the valley of the Ouse near Stoke Goldington and Weston Underwood. The Oolitic series is represented by the Great Oolite, with limestones in the upper part, much quarried for building stones at Westbury, Thornborough, Brock, Whittlewood Forest, &c.; the lower portions are more argillaceous. The Forest Marble is seen about Thornton as a thin bed of clay with an oyster-bearing limestone at the base. Next above is the Cornbrash, a series of rubbly and occasionally hard limestones and thin clays. The outcrop runs by Tingwick, Buckingham, Berehampton and Newport Pagnell, it is quarried at Wolverton and elsewhere for road metal. Inliers of these rocks occur at Marsh Gibbon and Stan Hill. The Oxford Clay and Kimmeridge Clay, with the Gault, lie in the vale of Aylesbury. The clay is covered by numerous outliers of Portland, Purbeck and Lower Greensand beds. The Portland beds are sandy below, calcareous above; the outcrop follows the normal direction in the county, from south-west to north-east, from Thame through Aylesbury; they are quarried at several places for building stone and fossils are abundant. The Hartwell Clay is in the Lower Portland. Freshwater Purbeck beds lie below the Portland and Lower Greensand beds; they cap the ridge between Oving and Whitchurch. Glass-making sands have been worked from the Lower Greensand at Hartwell, and phosphatic nodules from the same beds at Brickhill as well as from the Gault at Towersey. A broad band of Gault, a bluish clay, extends from Towersey across the county in a north-easterly direction. Resting upon the Gault is the Upper Greensand; at the junction of the two formations numerous springs arise, a circumstance which has no doubt determined the site of several villages. The Chalk rises abruptly from the low lying argillaceous plain to form the Chiltern Hills. The form of the whole of the hilly district round Chesham, High Wycombe and the Chalfonts is determined by the Chalk. Reading beds, mottled clays and sands, repose upon the Chalk at Woburn, Barnham, Fulmer and Denham, and these are in turn covered by the London Clay, which is exposed on the slopes about Stoke Common and Iver. Between the Tertiary-capped Chalk plateau and the Thames, a gentler slope, covered with alluvial gravel and brick earth, reaches down to the river. Thick deposits of plateau gravel cover most of the high ground in the southern corner of the county, while much of the northern part is obscured by glacial clays and gravels.

Industries.—The agricultural capacities of the soil vary greatly in different localities. On the lower lands, especially in the Vale of Aylesbury, about the headwaters of the Thame, it is extremely fertile; while on the hills it is usually poor and thin. The proportion of cultivated land is high, being about 83% of the whole. Of this a large and growing portion is in permanent pasture; cattle and sheep being reared in great numbers for the London markets, to which also are sent quantities of ducks, for which the district round Aylesbury is famous. Wheat and oats are the principal grain crops, though both decrease in importance. Turnips and swedes for the cattle are the chief green crops; and dairy-farming is largely practised. There is no general manufacturing industry, but a considerable amount of lace-making and straw-plaiting is carried on locally; and at High Wycombe and in its neighbourhood there is a thriving trade in various articles of turnery, such as chairs and bowls, from beech and other hard woods. The introduction of lace-making in this and neighbouring counties is attributed to Flemish, and later to French immigrants, but also to Catharine of Aragon during her residence (c. 1532) at Ampthill. Down to the later part of the 19th century a general holiday celebrated by lace-makers on the 25th of November was known as "Cattarn's Day."

Communications.—The main line of the London & North-Western railway crosses the north-east part of the county. Bletchley is an important junction on this system, branches diverging east to Fenny Stratford, Bedford and Cambridge, and west to Oxford and Banbury, Buckingham being served by the western branch. There is also a branch from Cheddington to Aylesbury. The

Metropolitan-Great Central joint line serves Amersham, Chesham (by a branch), and Aylesbury, joining the North-Western Oxford branch at Verney Junction; this line is used by the Great Central railway, the main line of which continues north-westward from Quainton Road. A light railway connects this station with the large village of Brill to the south-west. The Great Central and the Great Western companies jointly own a line passing through Beaconsfield, High Wycombe, and Prince's Risborough, which is connected northward with the Great Central system. Before the opening of this line in 1906 the Great Western branch from Maidenhead to Oxford was the only line serving High Wycombe and Prince's Risborough, from which there are branches to Watlington and Aylesbury. The main line of this company crosses the extreme south of the county by Slough and Taplow. The Grand Junction Canal, reaching the valley of the Ouse by way of the Ouzel valley from the south, has branches to Aylesbury and to Buckingham. Except the Thames none of the rivers in the county is continuously navigable.

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Population and Administration.—The area of the ancient county is 475,682 acres, with a population in 1891 of 185,284, and in 1901 of 195,764. The area of the administrative county is 479,358 acres. The county contains eight hundreds, of which three, namely Stoke, Burnham and Desborough, form the "Chiltern Hundreds" (*q.v.*). The hundred of Aylesbury retains its ancient designation of the "three hundreds of Aylesbury." The municipal boroughs are Buckingham, the county town (pop. 3152), and Wycombe, officially Chepping Wycombe, also Chipping or High Wycombe (15,542). The other urban districts are Aylesbury (9243), Beaconsfield (1570), Chesham (7245), Eton (3301), Fenny Stratford (4799), Linslade, on the Ouzel opposite to Leighton Buzzard in Bedfordshire (2157), Marlow (4526), Newport Pagnell (4028), Slough (11,453). Among the lesser market towns may be mentioned Amersham (2674), Ivinghoe (808), Olney (2684), Prince's Risborough (2189), Stony Stratford (2353), Wendover (2009) and Winslow (1703). At Wolverton (5323) are the carriage works of the London & North-Western railway. Several of the villages on and near the banks of the Thames have become centres of residence, such as Taplow, Cookham and Bourne End, Burnham and Wooburn. Buckinghamshire is in the midland circuit, and assizes are held at Aylesbury. It has one court of quarter sessions, and is divided into thirteen petty sessional divisions. The boroughs of Buckingham and Wycombe have separate commissions of the peace. The administrative county contains 230 civil parishes. Buckinghamshire is almost entirely within the diocese of Oxford, and 215 ecclesiastical parishes are situated wholly or in part within it. There are three parliamentary divisions, Northern or Buckingham, Mid or Aylesbury, and Southern or Wycombe, each returning one member; and the county contains a small part of the parliamentary borough of Windsor (chiefly in Berkshire). The most notable institution within the county is Eton College, the famous public school founded by Henry VI.

History.—The district which was to become Buckinghamshire was reached by the West Saxons in 571, as by a series of victories they pushed their way north along the Thames valley. With the grouping of the settlements into kingdoms and the consolidation of Mercia under Offa, Buckinghamshire was included in Mercia until, with the submission of that kingdom to the Northmen, it became part of the Danelaw. In the 10th century Buckinghamshire suffered frequently from the ravages of the Danes, and numerous barrows and earthworks mark the
[v.04 p.0730] scenes of struggles against the invaders. These relics are especially abundant in the vale of Aylesbury, probably at this time one of the richest and best protected of the Saxon settlements. The Chiltern district, on the other hand, is said to have been an impassable forest infested by hordes of robbers and wild beasts. In the reign of Edward the Confessor, Leofstan, 12th abbot of St Albans, cut down large tracts of wood in this district and granted the manor of Hamstead (Herts) to a valiant knight and two fellow-soldiers on condition that they should check the depredations of the robbers. The same reason led at an early period to the appointment of a steward of the Chiltern Hundreds, and this office being continued long after the necessity for it had ceased to exist, gradually became the sinecure it is to-day. The district was not finally disforested until the reign of James I.

At the time of the Norman invasion Buckinghamshire was probably included in the earldom of Leofwine, son of Godwin, and the support which it lent him at the battle of Hastings was punished by sweeping confiscations after the Conquest. The proximity of Buckinghamshire to London caused it to be involved in most of the great national events of the ensuing centuries. During the war between King John and his barons William Mauduit held Hanslape Castle against the king, until in 1216 it was captured and demolished by Falkes de Bréauté. The county was

visited severely by the Black Death, and Winslow was one of many districts which were almost entirely depopulated. In the civil war Buckinghamshire was one of the first counties to join in an association for mutual defence on the side of the parliament, which had important garrisons at Aylesbury, Brill and elsewhere. Newport Pagnell was for a short time garrisoned by the royalist troops, and in 1644 the king fixed his headquarters at Buckingham.

The shire of Buckingham originated with the division of Mercia in the reign of Edward the Elder, and was probably formed by the aggregation of pre-existing hundreds round the county town, a fact which explains the curious irregularities of the boundary line. The eighteen hundreds of the Domesday survey have now been reduced to eight, of which the three Chiltern hundreds, Desborough, Burnham and Stoke, are unaltered in extent as well as in name. The remainder have been formed each by the union of three of the ancient hundreds, and Aylesbury is still designated "the three hundreds of Aylesbury." All, except Newport and Buckingham, retain the names of Domesday hundreds, and the shire has altered little on its outer lines since the survey. Until the time of Queen Elizabeth Buckinghamshire and Bedfordshire had a common sheriff. The shire court of the former county was held at Aylesbury.

The ecclesiastical history of Buckinghamshire is not easy to trace, as there is no local chronicler, but the earliest churches were probably subject to the West Saxon see of Dorchester, and when after the Conquest the bishop's stool was transferred to Lincoln no change of jurisdiction ensued. After the dissolution of the monasteries it was proposed to form a new diocese to include Bedfordshire and Buckinghamshire, but the project was abandoned, and both remained in the Lincoln diocese until 1837, when the latter was transferred to Oxford. The arch-deaconry was probably founded towards the close of the 11th century by Bishop Rémy, and the subdivision into rural deaneries followed shortly after. A dean of Thornborough is mentioned in the 12th century, and in the taxation of Nicholas IV. eight deaneries are given, comprising 186 parishes. In 1855 the deaneries were reconstructed and made eighteen in number.

On the redistribution of estates after the Conquest only two Englishmen continued to retain estates of any importance, and the chief landowners at this date were Walter Giffard, first earl of Buckingham, and Odo, bishop of Bayeux. Few of the great Buckinghamshire estates, however, remained with the same proprietors for any length of time. Many became annexed by religious establishments, while others reverted to the crown and were disposed of by various grants. The family of Hampden alone claim to have held the estate from which the name is derived in an unbroken line from Saxon times.

Buckinghamshire has always ranked as an agricultural rather than a manufacturing county, and has long been famed for its corn and cattle. Fuller mentions the vale of Aylesbury as producing the biggest bodied sheep in England, and "Buckinghamshire bread and beef" is an old proverb. Lace-making, first introduced into this county by the Fleming refugees from the Alva persecution, became a very profitable industry. The monopolies of James I. considerably injured this trade, and in 1623 a petition was addressed to the high sheriff of Buckinghamshire representing the distress of the people owing to the decay of bone lace-making. Newport Pagnell and Olney were especially famous for their lace, and the parish of Hanslape is said to have made an annual profit of £8000 to £9000 from lace manufacture. The straw-plait industry was introduced in the reign of George I., and formerly gave employment to a large number of the population.

The county was first represented in parliament by two members in 1290. The representation increased as the towns acquired representative rights, until in 1603 the county with its boroughs made a total return of fourteen members. By the Reform Act of 1832 this was reduced to eleven, and by the Redistribution of Seats Act of 1885 the boroughs were deprived of representation and the county returned three members for three divisions.

Antiquities.—Buckinghamshire contains no ecclesiastical buildings of the first rank. Monastic remains are scanty, but two former abbeys may be noted. At Medmenham, on the Thames above Marlow, there are fragments, incorporated into a residence, of a Cistercian abbey founded in 1201; which became notorious in the middle of the 18th century as the meeting-place of a convivial club called the "Franciscans" after its founder, Sir Francis Dashwood, afterwards Lord le Despencer (1708-1781), and also known as the "Hell-Fire Club," of which John Wilkes, Bubb Dodington and other political notorieties were members. The motto of the club, *fay ce que voudras* (do what you will), inscribed on a doorway at the abbey, was borrowed from Rabelais' description of the abbey of Thelema in *Gargantua*. The remains of the Augustinian Notley Abbey (1162), incorporated with a farm-house, deserve mention rather for their picturesque situation by the river Thame than for their architectural value. Turning to churches, there is workmanship considered to be of pre-Norman date in Wing church, in the neighbourhood of Leighton Buzzard, including a polygonal apse and crypt. Stewkley church, in the same locality, shows the finest Norman work in the county; the building is almost wholly of the later part of this period, and the ornamentation is very rich. The Early English work of Chetwode and Haddenham churches, both in the west of the county, is noteworthy; especially in the first, which, as it stands, is the eastern part of a priory church of Augustinians (1244). Good specimens of the Decorated style are not wanting, though none is of special note; but the county contains three fine examples of Perpendicular architecture in Eton College chapel and the churches of Maids Moreton to the north, and Hillesden to the south, of Buckingham. Ancient domestic architecture is chiefly confined to a few country houses, of which Chequers Court, dating from the close of the 16th century, is of interest not only from the architectural standpoint but from its beautiful situation high among the Chiltern Hills between Prince's Risborough and Wendover, and from a remarkable collection of relics of Oliver Cromwell, preserved here as a consequence of the

marriage, in 1664, of John Russell, a grandson of the Protector, into the family to which the house then belonged. The manor-house of Hampden, among the hills east of Prince's Risborough, was for many generations the abode of the family of that name, and is still in the possession of descendants of John Hampden, who fell at the battle of Chalgrove in 1643, and is buried in Hampden church. Fine county seats are numerous—there may be mentioned Stowe (Buckingham), formerly the seat of the dukes of Buckingham; Cliveden and Hedsor, two among the many beautifully situated mansions by the bank of the Thames; and Claydon House in the
[v.04 p.0731] west of the county. Among the Chiltern Hills, also, there are several splendid domains. Associations with eminent men have given a high fame to several towns or villages of Buckinghamshire. Such are the connexion of Beaconsfield with Edmund Waller and Edmund Burke, that of Hughenden near Wycombe with Benjamin Disraeli, Lord Beaconsfield, whose father's residence was at Bradenham; of Olney and Stoke Pogis with the poets Cowper and Gray respectively. At Chalfont St Giles a cottage still stands in which Milton completed *Paradise Lost* and began *Paradise Regained*. In earlier life he had lived and worked at Horton, near the Thames below Windsor.

AUTHORITIES.—The original standard history is the laborious work of G. Lipscomb, *History and Antiquities of the County of Buckingham* (London, 1831-1847). Other works are: Browne Willis, *History and Antiquities of the Town, Hundred, and Deanery of Buckingham* (London, 1755); D. and S. Lysons, *Magna Britannia*, vol. i.; R. Gibbs, *Buckingham* (Aylesbury, 1878-1882); *Worthies of Buckingham* (Aylesbury, 1886); and *Buckingham Miscellany* (Aylesbury, 1891); G.S. Roscoe, *Buckingham Sketches* (London, 1891); P.H. Ditchfield, *Memorials of Old Buckinghamshire* (London, 1901); *Victoria County History*, "Buckinghamshire."

BUCKLAND, FRANCIS TREVELYAN (1826-1880), English zoologist, son of Dean William Buckland the geologist, was born at Oxford on the 17th of December 1826. He was educated at Winchester and Christ Church, taking his degree in 1848, and then adopted the medical profession, studying at St George's hospital, London, where he became house-surgeon in 1852. The pursuit of anatomy led him to a good deal of out-of-the-way research in zoology, and in 1856 he became a regular writer on natural history for the newly established *Field*, particularly on the subject of fish. In 1866 he started *Land and Water* on similar lines. In 1867 he was appointed government inspector of fisheries, and in the course of his work travelled constantly about the country, being largely responsible for the increased attention paid to the scientific side of pisciculture. Among his publications, besides articles and official reports, were *Fish Hatching* (1863), *Curiosities of Natural History* (4 vols., 1857-1872), *Logbook of a Fisherman* (1875), *Natural History of British Fishes* (1881). He died on the 19th of December 1880.

See *Life* by G.C. Bompas (1885).

BUCKLAND, WILLIAM (1784-1856), English divine and geologist, eldest son of the Rev. Charles Buckland, rector of Templeton and Trusham, in Devon, was born at Axminster on the 12th of March 1784. He was educated at the grammar school of Tiverton, and at Winchester, and in 1801 was elected a scholar of Corpus Christi College, Oxford, becoming B.A. in 1804. In 1809 he was elected a fellow of his college, and was admitted into holy orders. From early boyhood he had exhibited a strong taste for natural science, which was subsequently stimulated by the lectures of Dr John Kidd on mineralogy and chemistry; and his attention was especially drawn to the then infant science of geology. He also attended the lectures of Sir Christopher Pegge (1765-1822) on anatomy. He now devoted himself systematically to an examination of the geological structure of Great Britain, making excursions, and investigating the order of superposition of the strata and the characters of the organic remains which they contained. In 1813, on the resignation of Dr Kidd, he was appointed reader in mineralogy in Oxford; and the interest excited by his lectures was so great that in 1819 a readership in geology was founded and especially endowed by the treasury, Dr Buckland being the first holder of the new appointment. In 1818 Dr Buckland was elected a fellow of the Royal Society, and in 1824 and again in 1840 he was chosen president of the Geological Society of London. In 1825 he was presented by his college to the living of Stoke Charity, near Whitchurch, Hants, and in the same year he was appointed by Lord Liverpool to a canonry of the cathedral of Christ Church, Oxford, when the degree of D.D. was conferred upon him. In 1825, also, he married Mary, the eldest daughter of Mr Benjamin Morland of Sheepstead House, near Abingdon, Berks, by whose abilities and excellent judgment he was materially assisted in his literary labours. In 1832 he presided over the second meeting of the British Association, which was then held at Oxford. In 1845 he was appointed by Sir Robert Peel to the vacant deanery of Westminster, and was soon after inducted to the living of Islip, near Oxford, a preferment attached to the deanery. In 1847 he was appointed a trustee in the British Museum; and in 1848 he was awarded the Wollaston medal by the Geological Society of London. In 1849 his health began to give way under the increasing pressure of his multifarious duties; and the later years of his life were overshadowed by a serious illness, which compelled him to live in retirement. He died on the 24th of August 1856, and was buried in a spot which he had himself chosen, in Islip churchyard.

Buckland was a man many-sided in his abilities, and of a singularly wide range of attainments. Apart from his published works and memoirs in connexion with the special department of geology, and in addition to the work entailed upon him by the positions which he at different times held in the Church of England, he entered with great enthusiasm into many practical questions connected with agricultural and sanitary science, and various social and even medical problems. As a teacher he possessed powers of the highest order; and the university of Oxford is enriched by the large and valuable private collections, illustrative of geology and mineralogy,

which he amassed in the course of his active life. It is, however, upon his published scientific works that Dr Buckland's great reputation is mainly based. His first great work was the well-known *Reliquiae Diluvianae, or Observations on the Organic Remains contained in caves, fissures, and diluvial gravel attesting the Action of a Universal Deluge*, published in 1823 (2nd ed. 1824), in which he supplemented his former observations on the remains of extinct animals discovered in the cavern of Kirkdale in Yorkshire, and expounded his views as to the bearing of these and similar cases on the Biblical account of the Deluge. Thirteen years after the publication of the *Reliquiae*, Dr Buckland w as called upon, in accordance with the will of the earl of Bridgewater, to write one of the series of works known as the *Bridgewater Treatises*. The design of these treatises was to exhibit the "power, wisdom, and goodness of God, as manifested in the Creation," and none of them was of greater value, as evinced by its vitality, than that on "Geology and Mineralogy." Originally published in 1836, it has gone through three editions, and though not a "manual" of geological science, it still possesses high value as a storehouse of geological and palaeontological facts bearing upon the particular argument which it was designed to illustrate. The third edition, issued in 1858, was edited by his son Francis T. Buckland, and is accompanied by a memoir of the author and a list of his publications.

Of Dr Buckland's numerous original contributions to the sciences of Geology and Palaeontology, the following may be mentioned:—(1) "On the Structure of the Alps and adjoining parts of the Continent, and their relation to the Secondary and Transition Rocks of England" (*Annals of Phil.*, 1821); (2) "Account of an Assemblage of Fossil Teeth and Bones of Elephant, Rhinoceros, Hippopotamus, &c., discovered in a cave at Kirkdale in Yorkshire in the year 1821" (*Phil. Trans.*); (3) "On the Quartz Rock of the Lickey Hill in Worcestershire" (*Trans. Geol. Soc.*); (4) "On the Megalosaurus or Great Fossil Lizard of Stonesfield" (Ibid.); (5) "On the Cycadeoideae, a Family of Plants found in the Oolite Quarries of the Isle of Portland" (Ibid.); (6) "On the Discovery of a New Species of Pterodactyle in the Lias of Lyme Regis" (Ibid.); (7) "On the Discovery of Coprolites or Fossil Faeces in the Lias of Lyme Regis, and in other Formations" (Ibid.); (8) "On the Evidences of Glaciers in Scotland and the North of England" (*Proc. Geol. Soc. Lond.*); (9) "On the South-Western Coal District of England" (joint paper with the Rev. W.D. Conybeare, *Trans. Geol. Soc. Lond.*); (10) "On the Geology of the neighbourhood of Weymouth, and the adjacent parts of the Coast of Dorset" (joint paper with Sir H. De la Beche, *Trans. Geol. Soc. Lond.*).

With regard to the Glacial theory propounded by Agassiz, no one welcomed it with greater ardour than Buckland, and he zealously sought to trace out evidences of former glaciation in Britain. A record of the interesting discussion which took place at the Geological Society's meeting in
[v.04 p.0732] London in November 1840, after the reading of a paper by Buckland, was printed in the *Midland Naturalist*, October 1883.

BUCKLE, HENRY THOMAS (1821-1862), English historian, author of the *History of Civilization*, the son of Thomas Henry Buckle, a wealthy London merchant, was born at Lee, in Kent, on the 24th of November 1821. Owing to his delicate health he was only a very short time at school, and never at college, but the love of reading having been early awakened in him, he was allowed ample means of gratifying it. He gained his first distinctions not in literature but in chess, being reputed, before he was twenty, one of the first players in the world. After his father's death in January 1840 he spent some time with his mother on the continent (1840-1844). He had by that time formed the resolution to direct all his reading and to devote all his energies to the preparation of some great historical work, and during the next seventeen years he bestowed ten hours each day in working out his purpose. At first he contemplated a history of the middle ages, but by 1851 he had decided in favour of a history of civilization. The six years which followed were occupied in writing and rewriting, altering and revising the first volume, which appeared in June 1857. It at once made its author a literary and even social celebrity,—the lion of a London season. On the 1st of March 1858 he delivered at the Royal Institution a public lecture (the only one he ever gave) on the *Influence of Women on the Progress of Knowledge*, which was published in *Fraser's Magazine* for April 1858, and reprinted in the first volume of the *Miscellaneous and Posthumous Works*. On the 1st of April 1859 a crushing and desolating affliction fell upon him in the death of his mother. It was under the immediate impression of his loss that he concluded a review he was writing of J.S. Mill's *Essay on Liberty* with an argument for immortality, based on the yearning of the affections to regain communion with the beloved dead,—on the impossibility of standing up and living, if we believed the separation were final. The argument is a strange one to have been used by a man who had maintained so strongly that "we have the testimony of all history to prove the extreme fallibility of consciousness." The review appeared in *Fraser's Magazine*, May 1859, and is to be found also in the *Miscellaneous and Posthumous Works* (1872). The second volume of his history was published in May 1861. Soon after he left England for the East, in order to recruit his spirits and restore his health. From the end of October 1861 to the beginning of March 1862 was spent by him in Egypt, from which he went over the desert of Sinai and of Edom to Syria, reaching Jerusalem on the 19th of April 1862. After staying there eleven days, he set out for Europe by Beyrout, but at Nazareth he was attacked by fever; and he died at Damascus on the 29th of May 1862.

Buckle's fame, which must rest wholly on his *History of Civilization in England*, is no longer what it was in the decade following his death. His *History* is a gigantic unfinished introduction, of which the plan was, first to state the general principles of the author's method and the general laws which govern the course of human progress; and secondly, to exemplify these principles and laws through the histories of certain nations characterized by prominent and peculiar features,—Spain and Scotland, the United States and Germany. Its chief ideas are—(1) That, owing partly to the want of ability in historians, and partly to the complexity of social phenomena, extremely

little had as yet been done towards discovering the principles which govern the character and destiny of nations, or, in other words, towards establishing a science of history; (2) That, while the theological dogma of predestination is a barren hypothesis beyond the province of knowledge, and the metaphysical dogma of free will rests on an erroneous belief in the infallibility of consciousness, it is proved by science, and especially by statistics, that human actions are governed by laws as fixed and regular as those which rule in the physical world; (3) That climate, soil, food, and the aspects of nature are the primary causes of intellectual progress, —the first three indirectly, through determining the accumulation and distribution of wealth, and the last by directly influencing the accumulation and distribution of thought, the imagination being stimulated and the understanding subdued when the phenomena of the external world are sublime and terrible, the understanding being emboldened and the imagination curbed when they are small and feeble; (4) That the great division between European and non-European civilization turns on the fact that in Europe man is stronger than nature, and that elsewhere nature is stronger than man, the consequence of which is that in Europe alone has man subdued nature to his service; (5) That the advance of European civilization is characterized by a continually diminishing influence of physical laws, and a continually increasing influence of mental laws; (6) That the mental laws which regulate the progress of society cannot be discovered by the metaphysical method, that is, by the introspective study of the individual mind, but only by such a comprehensive survey of facts as will enable us to eliminate disturbances, that is, by the method of averages; (7) That human progress has been due, not to moral agencies, which are stationary, and which balance one another in such a manner that their influence is unfelt over any long period, but to intellectual activity, which has been constantly varying and advancing:—"The actions of individuals are greatly affected by their moral feelings and passions; but these being antagonistic to the passions and feelings of other individuals, are balanced by them, so that their effect is, in the great average of human affairs, nowhere to be seen, and the total actions of mankind, considered as a whole, are left to be regulated by the total knowledge of which mankind is possessed"; (8) That individual efforts are insignificant in the great mass of human affairs, and that great men, although they exist, and must "at present" be looked upon as disturbing forces, are merely the creatures of the age to which they belong; (9) That religion, literature and government are, at the best, the products and not the causes of civilization; (10) That the progress of civilization varies directly as "scepticism," the disposition to doubt and to investigate, and inversely as "credulity" or "the protective spirit," a disposition to maintain, without examination, established beliefs and practices.

Unfortunately Buckle either could not define, or cared not to define, the general conceptions with which he worked, such as those denoted by the terms "civilization," "history," "science," "law," "scepticism," and "protective spirit"; the consequence is that his arguments are often fallacies. Moreover, the looseness of his statements and the rashness of his inferences regarding statistical averages make him, as a great authority has remarked, the *enfant terrible* of moral statisticians. He brought a vast amount of information from the most varied and distant sources to confirm his opinions, and the abundance of his materials never perplexed or burdened him in his argumentation, but examples of well-conducted historical argument are rare in his pages. He sometimes altered and contorted the facts; he very often unduly simplified his problems; he was very apt when he had proved a favourite opinion true to infer it to be the whole truth. On the other hand, many of his ideas have passed into the common literary stock, and have been more precisely elaborated by later writers on sociology and history; and though his own work is now somewhat neglected, its influence was immensely valuable in provoking further research and speculation.

See his *Life* by A.W. Huth (1880).

BUCKNER, SIMON BOLIVAR (1823-), American soldier and political leader, was born in Hart county, Kentucky, on the 1st of April 1823. He graduated at West Point in 1844, and was assistant professor of geography, history and ethics there in 1845-1846. He fought in several battles of the Mexican War, received the brevet of first lieutenant for gallantry at Churubusco, where he was wounded, and later, after the storming of Chapultepec, received the brevet of captain. In 1848-1850 he was assistant instructor of infantry tactics at West Point. During the succeeding five years he was in the recruiting service, on frontier duty, and finally in the subsistence department. He resigned from the army in March 1855. During the futile attempt of Governor Beriah Magoffin to maintain Kentucky in a position of neutrality, he was commander of
[v.04 p.0733] the state guard; but in September 1861, after the entry of Union forces into the state, he openly espoused the Confederate cause and was commissioned brigadier-general, later becoming lieutenant-general. He was third in command of Fort Donelson at the time of General Grant's attack (February 1862), and it fell to him, after the escape of Generals Floyd and Pillow, to surrender the post with its large garrison and valuable supplies. General Buckner was exchanged in August of the same year, and subsequently served under General Bragg in the invasion of Kentucky and the campaign of Chickamauga. He was governor of Kentucky in 1887-1891, was a member of the Kentucky constitutional convention of 1890, and in 1896 was the candidate of the National or "Gold" Democrats for vice-president of the United States.

BUCKRAM (a word common, in various early forms, to many European languages, as in the Fr. *bouqueran* or Ital. *bucherame*, the derivation of which is unknown), in early usage the name of a fine linen or cotton cloth, but now only of a coarse fabric of linen or cotton stiffened with glue or other substances, used for linings of clothes and in bookbinding. Falstaff's "men in buckram" (Shakespeare, *Henry IV.*, pt. i. II. 4) has become a proverbial phrase for any imaginary persons.

BUCKSTONE, JOHN BALDWIN (1802-1879), English actor and dramatic writer, was born at Hoxton on the 14th of September 1802. He was articled to a solicitor, but soon exchanged the law for the stage. After some years as a provincial actor he made his first London appearance, on the 30th of January 1823, at the Surrey theatre, as Ramsay in the *Fortunes of Nigel*. His success led to his engagement in 1827 at the Adelphi, where he remained as leading low comedian until 1833. At the Haymarket, which he joined for summer seasons in 1833, and of which he was lessee from 1853 to 1878, he appeared as Bobby Trot in his own *Luke the Labourer*; and here were produced a number of his plays and farces, *Ellen Wareham, Uncle Tom* and others. After his return from a visit to the United States in 1840 he played at several London theatres, among them the Lyceum, where he was Box at the first representation of *Box and Cox*. As manager of the Haymarket he surrounded himself with an admirable company, including Sothern and the Kendals. He produced the plays of Gilbert, Planché, Tom Taylor and Robertson, as well as his own, and in most of these he acted. He died on the 31st of October 1879. He was the author of 150 plays, some of which have been very popular. His daughter, Lucy Isabella Buckstone (1858-1893), was an actress, who made her first London appearance at the Haymarket theatre as Ada Ingot in *David Garrick* in 1875.

BUCKTHORN, known botanically as *Rhamnus cathartica* (natural order Rhamnaceae), a much-branched shrub reaching 10 ft. in height, with a blackish bark, spinous branchlets, and ovate, sharply-serrated leaves, 1 to 2 in. long, arranged several together at the ends of the shoots. The small green flowers are regular and have the parts in fours; male and female flowers are borne on different plants. The fruit is succulent, black and globose, and contains four stones. The plant is a native of England, occurring in woods and thickets chiefly on the chalk; it is rare in Ireland and not wild in Scotland. It is native in Europe, north Africa and north Asia, and naturalized in some parts of eastern North America. The fruit has strong purgative properties, and the bark yields a yellow dye.

An allied species, *Rhamnus Frangula*, is also common in England, and is known as berry-bearing or black alder. It is distinguished from buckthorn by the absence of spiny branchlets, its non-serrated leaves, and bisexual flowers with parts in fives. The fruits are purgative and yield a green dye when unripe. The soft porous wood, called black dogwood, is used for gunpowder. Dyes are obtained from fruits and bark of other species of *Rhamnus*, such as *R. infectoria*, *R. tinctoria* and *R. davurica*—the two latter yielding the China green of commerce. Several varieties of *R. Alaternus*, a Mediterranean species, are grown in shrubberies.

Sea-buckthorn is *Hippophae rhamnoides*, a willow-like shrub, 1 to 8 ft. in height, with narrow leaves silvery on the underside, and globose orange-yellow fruits one-third of an inch in diameter. It occurs on sandy seashores from York to Kent and Sussex, but is not common.

American buckthorns are: *Rhamnus purshiana* or *Cascara sagrada*, of the Pacific coast, producing cascara bark, and *R. Caroliniana*, the alder-buckthorn. *Bumelia lycioides* (or *lanuginosa*) is popularly called "southern buckthorn."

BUCKWHEAT, the fruit (so-called seeds) of *Fagopyrum esculentum* (natural order Polygonaceae), a herbaceous plant, native of central Asia, but cultivated in Europe and North America; also extensively cultivated in the Himalaya, as well as an allied species *F. tataricum*. The fruit has a dark brown tough rind enclosing the kernel or seed, and is three-sided in form, with sharp angles, similar in shape to beech-mast, whence the name from the Ger. *Buchweizen*, beechwheat. Buckwheat is grown in Great Britain only to supply food for pheasants and to feed poultry, which devour the seeds with avidity. In the northern countries of Europe, however, the seeds are employed as human food, chiefly in the form of cakes, which when baked thin have an agreeable taste, with a darkish somewhat violet colour. The meal of buckwheat is also baked into crumpets, as a favourite dainty among Dutch children, and in the Russian army buckwheat groats are served out as part of the soldiers' rations, which they cook with butter, tallow or hemp-seed oil. Buckwheat is also used as food in the United States, where "buckwheat cakes" are a national dish; and by the Hindus it is eaten on "bart" or fast days, being one of the phalahas, or lawful foods for such occasions. When it is used as food for cattle the hard sharp angular rind must first be removed. As compared with the principal cereal grains, buckwheat is poor in nitrogenous substances and fat; but the rapidity and ease with which it can be grown render it a fit crop for very poor, badly tilled land. An immense quantity of buckwheat honey is collected in Russia, bees showing a marked preference for the flowers of the plant. The plant is also used as a green fodder.

In the United States buckwheat is sown at the end of June or beginning of July, the amount of seed varying from 3 to 5 pecks to the acre. The crop matures rapidly and continues blooming till frosts set in, so that at harvest, which is usually set to occur just before this period, the grain is in various stages of ripeness. It is cut by hand or with the self-delivery reaper, and allowed to lie in the swath for a few days and then set up in shocks. The stalks are not tied into bundles as in the case of other grain crops, the tops of the shocks being bound round and held together by twisting stems round them. The threshing is done on the field in most cases.

BUCOLICS (from the Gr. βουκολικός, "pertaining to a herdsman"), a term occasionally used for rural or pastoral poetry. The expression has been traced back in English to the beginning of the 14th century, being used to describe the "Eclogues" of Virgil. The most celebrated collection of bucolics in antiquity is that of Theocritus, of which about thirty, in the Doric dialect, and mainly written in hexameter verse, have been preserved. This was the name, as is believed, originally given by Virgil to his pastoral poems, with the direct object of challenging comparison with the

writings of Theocritus. In modern times the term "bucolics" has not often been specifically given by the poets to their pastorals; the main exception being that of Ronsard, who collected his eclogues under the title of "Les Bucoliques." In general practice the word is almost a synonym for pastoral poetry, but has come to bear a slightly more agricultural than shepherd signification, so that the "Georgics" of Virgil has grown to seem almost more "bucolic" than his "Eclogues." (See also PASTORAL.)

(E. G.)

BUCYRUS, a city and the county-seat of Crawford county, Ohio, U.S.A., on the Sandusky river, 62 m. N. of Columbus. Pop. (1890) 5974; (1900) 6560 (756 foreign-born); (1910) 8122. It is served by the Pennsylvania, the Toledo, Walhonding Valley & Ohio (Pennsylvania system), and the Ohio Central railways, and by interurban electric lines. The Ohio Central, of which Bucyrus is a division terminal, has shops here. The city lies at an elevation of about 1000 ft. above sea-level, and is surrounded by a country well adapted to agriculture and stock-raising. Among its manufactures are machinery, structural steel, ventilating and heating apparatus, furniture, interior woodwork, ploughs, wagons, carriages, copper products and clay-working machines. Bucyrus was first settled in 1817; it was laid out as a town in 1822, was incorporated as a village in 1830, and became a city in 1885. The county-seat was permanently established here in 1830.

[v.04 p.0734]

BUDAPEST, the capital and largest town of the kingdom of Hungary, and the second town of the Austro-Hungarian monarchy, 163 m. S.E. of Vienna by rail. Budapest is situated on both banks of the Danube, and is formed of the former towns of Buda (Ger. *Ofen*) together with O-Buda (Ger. *Alt-Ofen*) on the right bank, and of Pest together with Köbánya (Ger. *Steinbruch*) on the left bank, which were all incorporated into one municipality in 1872. It lies at a point where the Danube has definitely taken its southward course, and just where the outlying spurs of the outer ramifications of the Alps, namely, the Bakony Mountains, meet the Carpathians. Budapest is situated nearly in the centre of Hungary, and dominates by its strategical position the approach from the west to the great Hungarian plain. The imposing size of the Danube, 300 to 650 yds. broad, and the sharp contrast of the two banks, place Budapest among the most finely situated of the larger towns of Europe. On the one side is a flat sandy plain, in which lies Pest, modern of aspect regularly laid out, and presenting a long frontage of handsome buildings to the river. On the other the ancient town of Buda straggles capriciously over a series of small and steep hills, commanded by the fortress and the Blocksberg (770 ft. high, 390 ft. above the Danube), and backed beyond by spurs of mountains, which rise in the form of terraces one above the other. The hills are generally devoid of forests, while those near the towns were formerly covered with vineyards, which produced a good red wine. The vineyards have been almost completely destroyed by the phylloxera.

Budapest covers an area of 78 sq. m., and is divided into ten municipal districts, namely Vár (Festung), Viziváros (Wasserstadt), Ó-Buda (Alt-Ofen), all on the right bank, belonging to Buda, and Belváros (Inner City), Lipótváros (Leopoldstadt), Terézváros (Theresienstadt), Erzsébetváros (Elisabethstadt), Józsefváros (Josephstadt), Ferenczváros (Franzstadt), and Köbánya (Steinbruch), all on the left bank, belonging to Pest. Buda, with its royal palace, the various ministries, and other government offices, is the official centre, while Pest is the commercial and industrial part, as well as the centre of the nationalistic and intellectual life of the town. The two banks of the Danube are united by six bridges, including two fine suspension bridges; the first of them, generally known as the Ketten-Brücke, constructed by the brothers Tiernay and Adam Clark in 1842-1849, is one of the largest in Europe. It is 410 yds. long, 39 ft. broad, 36 ft. high above the mean level of the water, and its chains rest on two pillars 160 ft. high; its ends are ornamented with four colossal stone lions. At one end is a tunnel, 383 yds. long, constructed by Adam Clark in 1854, which pierces the castle hill and connects the quarter known as the Christinenstadt with the Danube. The other suspension bridge is the Schwurplatz bridge, completed in 1903, 56 ft. broad, with a span of 317 yds. The other bridges are the Margaret bridge, with a junction bridge towards the Margaret island, the Franz Joseph bridge, and two railway bridges.

Perhaps the most attractive part of Budapest is the line of broad quays on the left bank of the Danube, which extend for a distance of 2½ m. from the Margaret bridge to the custom-house, and are lined with imposing buildings. The most important of these is the Franz Joseph Quai, 1 m. long, which contains the most fashionable cafés and hotels, and is the favourite promenade. The inner town is surrounded by the Innere Ring-Strasse, a circle of wide boulevards on the site of the old wall. Wide tree-shaded streets, like the Király Utcza, the Kerrepesi Ut, and the Üllöi Ut, also form the lines of demarcation between the different districts. The inner ring is connected by the Váczi Körut (Waitzner-Ring) with the Grosse Ring-Strasse, a succession of boulevards, describing a semicircle beginning at the Margaret bridge and ending at the Boráros Platz, near the custom-house quay, through about the middle of the town. One of the most beautiful streets in the town is the Andrássy Ut, 1½ m. long, connecting Váczi Körut with Városliget (*Stadtwäldchen*), the favourite public park of Budapest. It is a busy thoroughfare, lined in its first half with magnificent new buildings, and in its second half, where it attains a width of 150 ft., with handsome villas standing in their own gardens, which give the impression rather of a fashionable summer resort than the centre of a great city. Budapest possesses numerous squares, generally ornamented with monuments of prominent Hungarians, usually the work of Hungarian artists.

Buildings.—Though of ancient origin, neither Buda nor Pest has much to show in the way of venerable buildings. The oldest church is the Matthias church in Buda, begun by King Bela IV. in the 13th century, completed in the 15th century, and restored in 1890-1896. It was used as a

mosque during the Turkish occupation, and here took place the coronation of Franz Joseph as king of Hungary in 1867. The garrison church, a Gothic building of the 13th century, and the Reformed church, finished in 1898, are the other ecclesiastical buildings in Buda worth mentioning. The oldest church in Pest is the parish church situated in the Eskü-Ter (Schwur-Platz) in the inner town; it was built in 1500, in the Gothic style, and restored in 1890. The most magnificent church in Pest is the Leopoldstadt Basilica, a Romanesque building with a dome 315 ft. in height, begun in 1851; next comes the Franzstadt church, also a Romanesque building, erected in 1874. Besides several modern churches, Budapest possesses a beautiful synagogue, in the Moorish style, erected in 1861, and another, in the Moorish-Byzantine style, built in 1872, while in 1901 the construction of a much larger synagogue was begun. In Buda, near the Kaiserbad, and not far from the Margaret bridge, is a small octagonal Turkish mosque, with a dome 25 ft. high, beneath which is the grave of a Turkish monk. By a special article in the treaty of Karlowitz of 1699 the emperor of Austria undertook to preserve this monument.

Among the secular buildings the first place is taken by the royal palace in Buda, which, together with the old fortress, crowns the summit of a hill, and forms the nucleus of the town. The palace erected by Maria Theresa in 1748-1771 was partly burned in 1849, but has been restored and largely extended since 1894. In the court chapel are preserved the regalia of Hungary, namely, the crown of St Stephen, the sceptre, orb, sword and the coronation robes. It is surrounded by a magnificent garden, which descends in steep terraces to the Danube, and which offers a splendid view of the town lying on the opposite bank. New and palatial buildings of the various ministries, several high and middle schools, a few big hospitals, and the residences of several Hungarian magnates, are among the principal edifices in this part of the town.

The long range of substantial buildings fronting the left bank of the Danube includes the Houses of Parliament (see ARCHITECTURE, Plate IX. fig. 115), a huge limestone edifice in the late Gothic style, covering an area of 3¾ acres, erected in 1883-1902; the Academy, in Renaissance style, erected in 1862-1864, containing a lofty reception room, a library, a historic picture gallery, and a botanic collection; the Redoute buildings, a large structure in a mixed Romanesque and Moorish style, erected for balls and other social purposes; the extensive custom-house at the lower end of the quays, and several fine hotels and insurance offices. In the beautiful Andrássy Ut are the opera-house (1875-1884), in the Italian Renaissance style; the academy of music; the old and new exhibition building; the national drawing school; and the museum of fine arts (1900-1905), in which was installed in 1905 the national gallery, formed by Prince Esterházy, bought by the government in 1865 for £130,000, and formerly housed in the academy, and the collection of modern pictures from the national museum. At the end of the street is one of the numerous monuments erected in various parts of the country to commemorate the thousandth anniversary
[v.04 p.0735] of the foundation of the kingdom of Hungary. Other buildings remarkable for their size and interest are: the national museum (1836-1844); the town-hall (1869-1875), in the early Renaissance style; the university, with a baroque façade (rebuilt 1900), and the university library (opened in 1875), a handsome Renaissance building; the palace of justice (1896), a magnificent edifice situated not far from the Houses of Parliament. In its neighbourhood also are the palatial buildings of the ministries of justice and of agriculture. There are also the exchange (1905); the Austro-Hungarian bank (1904); the central post and telegraph office; the art-industrial museum (1893-1897), in oriental style, with some characteristically Hungarian ornamentations; several handsome theatres; large barracks; technical and secondary schools; two great railway termini and a central market (1897) to be mentioned. To the south-east of the town lies the vast slaughter-house (1870-1872), which, with the adjacent cattle-market, covers nearly 30 acres of ground. The building activity of Budapest since 1867 has been extraordinary, and the town has undergone a thorough transformation. The removal of slums and the regulation of the older parts of the town, in connexion with the construction of the two new bridges across the Danube and of the railway termini, went hand-in-hand with the extension of the town, new quarters springing up on both banks of the Danube. This process is still going on, and Budapest has become one of the handsomest capitals of Europe.

Education.—Budapest is the intellectual capital of Hungary. At the head of its educational institutions stands the university, which was attended in 1900 by 4983 students—only about 2000 in 1880—and has a staff of nearly 200 professors and lecturers. It has been completely transformed into a national Hungarian seat of learning since 1867, and great efforts have been made to keep at home the Hungarian students, who before then frequented other universities and specially that of Vienna. It is well provided with scientific laboratories, botanic garden, and various collections, and possesses a library with nearly a quarter of a million volumes. The university of Budapest, the only one in Hungary proper, was established at Tyrnau in 1635, removed to Buda in 1777, and transferred to Pest in 1783. Next to it comes the polytechnic, attended by 1816 students in 1900, which is also thoroughly equipped for a scientific training. Other high schools are a veterinary academy, a Roman Catholic seminary, a Protestant theological college, a rabbinical institute, a commercial academy, to which has been added in 1899 an academy for the study of oriental languages, and military academies for the training of Hungarian officers. Budapest possesses an adequate number of elementary and secondary schools, as well as a great number of special and technical schools. At the head of the scientific societies stands the academy of sciences, founded in 1825, for the encouragement of the study of the Hungarian language and the various sciences except theology. Next to it comes the national museum, founded in 1807 through the donations of Count Stephan Széchényi, which contains extensive collections of antiquities, natural history and ethnology, and a rich library which, in its manuscript department of over 20,000 MSS., contains the oldest specimens of the Hungarian language. Another society which has done great service for the cultivation of the Hungarian

language is the Kisfaludy society, founded in 1836. It began by distributing prizes for the best literary productions of the year, then it started the collection and publication of the Hungarian folklore, and lastly undertook the translation into the Hungarian language of the masterpieces of foreign literatures. The influence exercised by this society is very great, and it has attracted within its circle the best writers of Hungary. Another society similar in aim with this one is the Petöfi society, founded in 1875. Amongst the numerous scientific associations are the central statistical department, and the Budapest communal bureau of statistics, which under the directorship of Dr Joseph de Körösy has gained a European reputation.

The artistic life in Budapest is fostered by the academy of music, which once had Franz Liszt as its director, a *conservatoire* of music, a dramatic school, and a school for painting and for drawing, all maintained by the government. Budapest possesses, besides an opera house, eight theatres, of which two are subsidized by the government and one by the municipality. The performances are almost exclusively in Hungarian, the exceptions being the occasional appearance of French, Italian and other foreign artists. Performances in German are under a popular taboo, and they are never given in a theatre at Budapest.

Trade.—-In commerce and industry Budapest is by far the most important town in Hungary, and in the former, if not also in the latter, it is second to Vienna alone in the Austro-Hungarian monarchy. The principal industries are steam flour-milling, distilling, and the manufacture of machinery, railway plant, carriages, cutlery, gold and silver wares, chemicals, bricks, jute, and the usual articles produced in large towns for home consumption. The trade of Budapest is mainly in corn, flour, cattle, horses, pigs, wines, spirits, wool, wood, hides, and in the articles manufactured in the town. The efforts of the Hungarian government to establish a great home industry, and the measures taken to that effect, have benefited Budapest to a greater degree than any other Hungarian town, and the progress made is remarkable. The increase in the number of joint-stock companies, and the capital thus invested in industrial undertakings, furnish a valuable indication. In 1873 there were 28 such companies with a total capital of £2,224,900; in 1890, 75 with a capital of £9,352,000; and in 1899 no fewer than 242 with a total capital of £31,378,655. Budapest owes its great commercial importance to its situation on the Danube, on which the greater part of its trade is carried. The introduction of steamboats on the Danube in 1830 was one of the earliest material causes of the progress of Budapest, and gave a great stimulus to its corn trade. This still continues to operate, having been promoted by the flour-milling industry, which was revolutionized by certain local inventions. Budapest is actually one of the greatest milling centres in the world, possessing a number of magnificent establishments, fitted with machinery invented and manufactured in the city. Budapest is, besides, connected with all the principal places in Austria and Hungary by a well-developed net of railways, which all radiate from here.

Population.—Few European towns grew so rapidly as Budapest generally, and Pest particularly, during the 19th century, and probably none has witnessed such a thorough transformation since 1867. In 1799 the joint population of Buda and Pest was 54,179, of which 24,306 belonged to Buda, and 29,870 belonged to Pest, being the first time that the population of Pest exceeded that of Buda. By 1840, however, Buda had added but 14,000 to its population while that of Pest had more than doubled; and of the joint population of 270,685 in 1869, fully 200,000 fell to the share of Pest. In 1880 the civil population of Budapest was 360,551, an increase since 1869 of 32%; and in 1890 it was 491,938, and increase of 36.57% in the decade. In the matter of the increase of its population alone, Budapest has only been slightly surpassed by one European town, namely, Berlin. Both capitals multiplied their population by nine in the first nine decades of the century. According to an interesting and instructive comparison of the growth of twenty-eight European cities made by Dr Joseph de Körösy, Berlin in 1890 showed an increase, as compared with the beginning of the century, of 818% and Budapest of 809%. Within the same period the increase of Paris was 343%, and of London 340%. In 1900 the civil population of Budapest was 716,476 inhabitants, showing an increase of 44.82% in the decade. To this must be added a garrison of 15,846 men, making a total population 732,322. Of the total population, civil and military, 578,458 were Magyars, 104,520 were Germans, 25,168 were Slovaks, and the remainder was composed of Croatians, Servians, Rumanians, Russians, Greeks, Armenians, Gypsies, &c. According to religion, there were 445,023 Roman Catholics, 5806 Greek Catholics, 4422 Greek Orthodox; 67,319 were Protestants of the Helvetic, and 38,811 were Protestants of the Augsburg Confessions; 168,985 were Jews, and the remainder belonged to various other creeds. A striking feature in the progress of Budapest is the decline in the death-rate, which sank from 43.4 per
[v.04 p.0736] thousand in 1874 to 20.6 per thousand in 1900. In addition to the increased influx of persons in the prime of life, this is due largely to the improved water-supply and better sanitary conditions generally, including increased hospital accommodation.

Social Position.—Budapest is the seat of the government of Hungary, of the parliament, and of all the highest official authorities—civil, military, judicial and financial. It is the meeting-place, alternately with Vienna, of the Austro-Hungarian delegations, and it was elected to an equality with Vienna as a royal residence in 1892. It is the see of a Roman Catholic archbishop. The town is administered by an elected municipal council, which consists of 400 members. As Paris is sometimes said to be France, so may Budapest with almost greater truth be said to be Hungary. Its composite population is a faithful reflection of the heterogeneous elements in the dominions of the Habsburgs, while the trade and industry of Hungary are centralized at Budapest in a way that can scarcely be affirmed of any other European capital. In virtue of its cultural institutions, it is also the intellectual and artistic centre of Hungary. The movement in favour of Magyarizing all institutions has found its strongest development in Budapest, where the German names have all

been removed from the buildings and streets. The wonderful progress of Budapest is undoubtedly due to the revival of the Hungarian national spirit in the first half of the 19th century, and to the energetic and systematic efforts of the government and people of Hungary since the restoration of the constitution. So far as Hungary was concerned, Budapest in 1867 at once became the favoured rival of Vienna, with the important additional advantage that it had no such competitors within its own sphere as Vienna had in the Austrian provincial capitals. The political, intellectual, and social life of Hungary was centred in Budapest, and had largely been so since 1848, when it became the seat of the legislature, as it was that of the Austrian central administration which followed the revolution. The ideal of a prosperous, brilliant and attractive Magyar capital, which would keep the nobles and the intellectual flower of the country at home, uniting them in the service of the Fatherland, had received a powerful impetus from Count Stephan Széchényi, the great Hungarian reformer of the pre-Revolutionary period. His work, continued by patriotic and able successors, was now taken up as the common task of the government and the nation. Thus the promotion of the interests of the capital and the centralization of the public and commercial life of the country have formed an integral part of the policy of the state since the restoration of the constitution. Budapest has profited largely by the encouragement of agriculture, trade and industry, by the nationalization of the railways, by the development of inland navigation, and also by the neglect of similar measures in favour of Vienna.

From that time to the present day the record of the Hungarian capital has been one of uninterrupted advance, not merely in externals, such as the removal of slums, the reconstruction of the town, the development of communications, industry and trade, and the erection of important public buildings, but also in the mental, moral and physical elevation of the inhabitants; besides another important gain from the point of view of the Hungarian statesman, namely, the progressive increase and improvement of status of the Magyar element of the population. When it is remembered that the ideal of both the authorities and the people is the ultimate monopoly of the home market by Hungarian industry and trade, and the strengthening of the Magyar influence by centralization, it is easy to understand the progress of Budapest.

Politically, this ambitious and progressive capital is the creation of the Magyar upper classes. Commercially and industrially, it may be said to be the work of the Jews. The sound judgment of the former led them to welcome and appreciate the co-operation of the latter. Indeed, a readiness to assimilate foreign elements is characteristic of Magyar patriotism, which has, particularly within the last generation, made numerous converts among the other nationalities of Hungary, and—for national purposes—may be considered to have quite absorbed the Hungarian Jews. It has thus come to pass that there is no anti-Semitism in Budapest, although the Hebrew element is proportionately much larger (21% as compared with 9%) than it is in Vienna, the Mecca of the Jew-baiter.

Budapest has long been celebrated for its mineral springs and baths, some of them having been already used during the Roman period. They rise at the foot of the Blocksberg, and are powerful chalybeate and sulphureous hot springs, with a temperature of 80°-150° Fahr. The principal baths are the Bruckbad and the Kaiserbad, both dating from the Turkish period; the St Lucasbad; and the Raitzenbad, rebuilt in 1860, one of the most magnificent establishments of its kind, which was connected through a gallery with the royal palace in the time of Matthias Corvin. There is an artesian well of sulphureous water with a temperature of 153° Fahr. in the Stadtwäldchen; and another, yielding sulphureous water with a temperature of 110° Fahr., which is used for both drinking and bathing, in the Margaret island. The mineral springs, which yield bitter alkaline waters, are situated in the plain south of the Blocksberg, and are over 40 in number. The principal are the Hunyadi-János spring, of which about 1,000,000 bottles are exported annually, the Arpad spring, and the Apenta spring.

The largest and most popular of the parks in Budapest is the Városliget, on the north-east side of the town. It has an area of 286 acres, and contains the zoological garden. On an island in its large pond are situated the agricultural (1902-1904) and the ethnographical museums. It was in this park that the millennium exhibition of 1896 took place. A still more delightful resort is the Margaret island, a long narrow island in the Danube, the property of the archduke Joseph, which has been laid out in the style of an English park, with fine trees, velvety turf and a group of villas and bath-houses. The name of the island is derived from St Margaret, the daughter of King Bela IV. (13th century), who built here a convent, the ruins of which are still in existence. To the west of Buda extends the hill (1463 ft.) of Sváb-Hegy (*Schwabenberg*), with extensive view and numerous villas; it is ascended by a rack-and-pinion railway. A favourite spot is the Zugliget (*Auwinkel*), a wooded dale on the northern slope of the hill. To the north of Ó-Buda, about 4 m. from the Margaret island, on the right bank of the Danube, are the remains of the Roman colony of Aquincum. They include the foundations of an amphitheatre, of a temple, of an aqueduct, of baths and of a castrum. The objects found here are preserved in a small museum. To the north of Pest lies the historic Rákos field, where the Hungarian diets were held in the open air from the 10th to the 14th century; and 23 m. to the north lies the royal castle of Gödöllö, with its beautiful park.

History.—The history of Budapest consists of the separate history of the two sister towns, Buda and Pest. The Romans founded, in the 2nd century A.D., on the right bank of the Danube, on the site of the actual Ó-Buda, a colony, on the place of a former Celtic settlement. This colony was named Aquincum, a transformation from the former Celtic name of *Ak-ink*, meaning "rich waters." The Roman occupation lasted till A.D. 376, and then the place was invaded by Huns, Ostrogoths, and later by Avars and Slavs. When the Magyars came into the country, at the end of

the 10th century, they preserved the names of Buda and Pest, which they found for these two places. The origin of Pest proper is obscure, but the name, apparently derived from the old Slavonic *pestj*, a stove (like Ofen, the German name of Buda), seems to point to an early Slavonic settlement. The Romans never gained a foothold on this side of the river.

When it first appears in history Pest was essentially a German settlement, and a chronicler of the 13th century describes it as "Villa Teutonica ditissima." Christianity was introduced early in the 11th century. In 1241 Pest was destroyed by the Tatars, after whose departure in 1244 it was created a royal free city by Bela IV., and repeopled with colonists of various nationalities. The succeeding period seems to have been one of considerable prosperity, though Pest was completely eclipsed by the sister town of Buda with its fortress and palace. This fortress and palace were built by King Bela IV. in 1247, and were the nucleus round which the town of Buda
[v.04 p.0737] was built, which soon gained great importance, and became in 1361 the capital of Hungary. In 1526 Pest was taken and pillaged by the Turks, and from 1541 to 1686 Buda was the seat of a Turkish pasha. Pest in the meantime entirely lost its importance, and on the departure of the Turks was left little more than a heap of ruins. Its favourable situation and the renewal of former privileges helped it to revive, and in 1723 it became the seat of the highest Hungarian officials. Maria Theresa and Joseph II. did much to increase its importance, but the rapid growth which enabled it completely to outstrip Buda belongs entirely to the 19th century. A signal proof of its vitality was given in 1838 by the speed and ease with which it recovered from a disastrous inundation that destroyed 3000 houses. In 1848 Pest became the seat of the revolutionary diet, but in the following year the insurgents had to retire before the Austrians under Windischgrätz. A little later the Austrians had to retire in their turn, leaving a garrison in the fortress of Buda, and, while the Hungarians endeavoured to capture this position, General Hentzi retaliated by bombarding Pest, doing great damage to the town. In 1872 both towns were united into one municipality. In 1896 took place here the millennium exhibition, in celebration of the thousandth anniversary of the foundation of the kingdom of Hungary.

Bibliography.—The official publications of the Budapest Communal Bureau of Statistics have acquired a European repute for their completeness, and their fearless exposure of shortcomings has been an element in the progress of the town. Reference should also be made to separate works of the director of that institution, Dr Joseph de Körösy, known in England for his discovery of the law of marital fertility, published by the Royal Society, and by his labours in the development of comparative international statistics. His *Statistique Internationale des grandes villes* and *Bulletin annuel des finances des grandes villes* give valuable comparative data. See also *Die Österreichisch-Ungarische Monarchie in Wort und Bild* (Wien, 1886-1902, 24 vols.); volume xii., published in 1893, is devoted to Budapest.

(O. Br.)

BUDAUN, a town and district of British India, in the Rohilkhand division of the United Provinces. The town is near the left bank of the river Sot. Pop. (1901) 39,031. There are ruins of an immense fort and a very handsome mosque of imposing size, crowned with a dome, and built in 1223 in great part from the materials of an ancient Hindu temple. The American Methodist mission maintains several girls' schools, and there is a high school for boys. According to tradition Budaun was founded about A.D. 905, and an inscription, probably of the 12th century, gives a list of twelve Rathor kings reigning at Budaun (called Vodamayuta). The first authentic historical event connected with it, however, is its capture by Kutb-ud-din in 1196, after which it became a very important post on the northern frontier of the Delhi empire. In the 13th century two of its governors, Shams-ud-din Altamsh, the builder of the great mosque referred to above, and his son Rukn-ud-din Firoz, attained the imperial throne. In 1571 the town was burnt, and about a hundred years later, under Shah Jahan, the seat of the governorship was transferred to Bareilly; after which the importance of Budaun declined. It ultimately came into the power of the Rohillas, and in 1838 was made the headquarters of a British district. In 1857 the people of Budaun sided with the mutineers, and a native government was set up, which lasted until General Penny's victory at Kakrala (April 1858) led to the restoration of British authority.

The District Of Budaun has an area of 1987 sq. m. Pop. (1901) 1,025,753. The country is low, level, and is generally fertile, and watered by the Ganges, the Ramganga, the Sot or Yarwafadar, and the Mahawa. Budaun district was ceded to the British government in 1801 by the nawab of Oudh. There are several indigo factories. The district is crossed by two lines of the Oudh & Rohilkhand railway, and by a narrow-gauge line from Bareilly. The chief centre of trade is Bilsi.

BUDDEUS, JOHANN FRANZ (1667-1729), German Lutheran divine, was born at Anklam, a town of Pomerania, where his father was pastor. He studied with great distinction at Greifswald and at Wittenberg, and having made a special study of languages, theology and history, was appointed professor of Greek and Latin at Coburg in 1692, professor of moral philosophy in the university of Halle in 1693, and in 1705 professor of theology at Jena. Here he was held in high esteem, and in 1715 became Primarius of his faculty and member of the Consistory. His principal works are: *Leipzig, allgemeines historisches Lexikon* (Leipzig, 1709 ff.); *Historia, Ecclesiastica Veteris Testamenti* (4 vols., Halle, 1709); *Elementa Philosophiae Practicae, Instrumentalis, et Theoreticae* (3 vols., 1697); *Selecta Juris Naturae et Gentium* (Halle, 1704); *Miscellanea Sacra* (3 vols., Jena, 1727); and *Isagoge Historico-Theologica ad Theologiam Universam, singulasque ejus partes* (2 vols., 1727).

BUDDHA. According to the Buddhist theory (see Buddhism), a "Buddha" appears from time to time in the world and preaches the true doctrine. After a certain lapse of time this teaching is

corrupted and lost, and is not restored till a new Buddha appears. In Europe, Buddha is used to designate the last historical Buddha, whose family name was Gotama, and who was the son of Suddhōdana, one of the chiefs of the tribe of the Sākiyas, one of the republican clans then still existent in India.

We are accustomed to find the legendary and the miraculous gathering, like a halo, around the early history of religious leaders, until the sober truth runs the risk of being altogether neglected for the glittering and edifying falsehood. The Buddha has not escaped the fate which has befallen the founders of other religions; and as late as the year 1854 Professor Wilson of Oxford read a paper before the Royal Asiatic Society of London in which he maintained that the supposed life of Buddha was a myth, and "Buddha himself merely an imaginary being." No one, however, would now support this view; and it is admitted that, under the mass of miraculous tales which have been handed down regarding him, there is a basis of truth already sufficiently clear to render possible an intelligent history.

The circumstances under which the future Buddha was born were somewhat as follows.[1] In the 6th century B.C. the Āryan tribes had long been settled far down the valley of the Ganges. The old child-like joy in life so manifest in the Vedas had died away; the worship of nature had developed or degenerated into the worship of new and less pure divinities; and the Vedic songs themselves, whose freedom was little compatible with the spirit of the age, had faded into an obscurity which did not lessen their value to the priests. The country was politically split up into little principalities, most of them governed by some petty despot, whose interests were not often the same as those of the community. There were still, however, about a dozen free republics, most of them with aristocratic government, and it was in these that reforming movements met with most approval and support. A convenient belief in the doctrine of the transmigration of souls satisfied the unfortunate that their woes were the natural result of their own deeds in a former birth, and, though unavoidable now, might be escaped in a future state of existence by present good conduct. While hoping for a better fate in their next birth, the poor turned for succour and advice in this to the aid of astrology, witchcraft and animism—a belief in which seems to underlie all
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religions, and still survives even in England.[2] The inspiriting wars against the enemies of the Āryan people, the infidel deniers of the Āryan gods, had given place to a succession of internecine feuds between the chiefs of neighbouring clans. In literature an age of poets had long since made way for an age of commentators and grammarians, who thought that the old poems must have been the work of gods. But the darkest period was succeeded by the dawn of a reformation; travelling logicians were willing to maintain these against all the world; whilst here and there ascetics strove to raise themselves above the gods, and hermits earnestly sought for some satisfactory solution of the mysteries of life. These were the teachers whom the people chiefly delighted to honour. Though the ranks of the priesthood were for ever firmly closed against intruders, a man of lay birth, a Kshatriya or Vaisya, whose mind revolted against the orthodox creed, and whose heart was stirred by mingled zeal and ambition, might find through these irregular orders an entrance to the career of a religious teacher and reformer.

The Sākiya clan was then seated in a tract of country probably two or three thousand square miles in extent, the chief town of which was Kapilavastu, situate about 27° 37′ N. by 83° 11′ E., some days' journey north of Benares. Their territory stretched up into the lower slopes of the mountains, and was mostly in what is now Nepal, but it included territory now on the British side of the frontier. It is in this part of the Sākiya country that the interesting discovery was made of the monument they erected to their famous clansman. From their well-watered rice-fields, the main source of their wealth, they could see the giant Himālayas looming up against the clear blue of the Indian sky. Their supplies of water were drawn from the river Rohini, the modern Kohāna; and though the use of the river was in times of drought the cause of disputes between the Sākiyas and the neighbouring Koliyans, the two clans were then at peace; and two daughters of a chieftain of Koli, which was only 11 m. east of Kapilavastu, were the principal wives of Suddhōdana. Both were childless, and great was the rejoicing when, in about the forty-fifth year of her age, the elder sister, Mahā Māyā, promised her husband a son. In due time she started with the intention of being confined at her parents' home, but the party halting on the way under the shade of some lofty satin-trees, in a pleasant garden called Lumbini on the river-side, her son, the future Buddha, was there unexpectedly born. The exact site of this garden has been recently rediscovered, marked by an inscribed pillar put up by Asoka (see *J.R.A.S.*, 1898).

He was in after years more generally known by his family name of Gotama, but his individual name was Siddhattha. When he was nineteen years old he was married to his cousin Yasodharā, daughter of a Koliyan chief, and gave himself up to a life of luxury. This is the solitary record of his youth; we hear nothing more till, in his twenty-ninth year, it is related that, driving to his pleasure-grounds one day, he was struck by the sight of a man utterly broken down by age, on another occasion by the sight of a man suffering from a loathsome disease, and some months after by the horrible sight of a decomposing corpse. Each time his charioteer, whose name was Channa, told him that such was the fate of all living beings. Soon after he saw an ascetic walking in a calm and dignified manner, and asking who that was, was told by his charioteer the character and aims of the Wanderers, the travelling teachers, who played so great a part in the intellectual life of the time. The different accounts of these visions vary so much as to cast great doubts on their accuracy; and the oldest one of all (*Anguttara*, i. 145) speaks of ideas only, not of actual visions. It is, however, clear from what follows, that about this time the mind of the young Räjput must, from some cause or other, have been deeply stirred. Many an earnest heart full of disappointment or enthusiasm has gone through a similar struggle, has learnt to look upon all earthly gains and hopes as worse than vanity, has envied the calm life of the cloister, troubled by

none of these things, and has longed for an opportunity of entire self-surrender to abstinence and meditation.

Subjectively, though not objectively, these visions may be supposed to have appeared to Gotama. After seeing the last of them, he is said, in the later accounts, to have spent the afternoon in his pleasure-grounds by the river-side; and having bathed, to have entered his chariot in order to return home. Just then a messenger arrived with the news that his wife Yasodhara had given birth to a son, his only child. "This," said Gotama quietly, "is a new and strong tie I shall have to break." But the people of Kapilavastu were greatly delighted at the birth of the young heir, the raja's only grandson. Gotama's return became an ovation; musicians preceded and followed his chariot, while shouts of joy and triumph fell on his ear. Among these sounds one especially attracted his attention. It was the voice of a young girl, his cousin, who sang a stanza, saying, "Happy the father, happy the mother, happy the wife of such a son and husband." In the word "happy" lay a double meaning; it meant also freed from the chains of rebirth, delivered, *saved*. Grateful to one who, at such a time, reminded him of his highest hopes, Gotama, to whom such things had no longer any value, took off his collar of pearls and sent it to her. She imagined that this was the beginning of a courtship, and began to build daydreams about becoming his principal wife, but he took no further notice of her and passed on. That evening the dancing-girls came to go through the Natch dances, then as now so common on festive occasions in many parts of India; but he paid them no attention, and gradually fell into an uneasy slumber. At midnight he awoke; the dancing-girls were lying in the ante-room; an overpowering loathing filled his soul. He arose instantly with a mind fully made up—"roused into activity," says the Sinhalese chronicle, "like a man who is told that his house is on fire." He called out to know who was on guard, and finding it was his charioteer Channa, he told him to saddle his horse. While Channa was gone Siddhattha gently opened the door of the room where Yasodhara was sleeping, surrounded by flowers, with one hand on the head of their child. He had hoped to take the babe in his arms for the last time before he went, but now he stood for a few moments irresolute on the threshold looking at them. At last the fear of awakening Yasodhara prevailed; he tore himself away, promising himself to return to them as soon as his mind had become clear, as soon as he had become a Buddha,—*i.e.* Enlightened,—and then he could return to them not only as husband and father, but as teacher and saviour. It is said to have been broad moonlight on the full moon of the month of July, when the young chief, with Channa as his sole companion, leaving his father's home, his wealth and social position, his wife and child behind him, went out into the wilderness to become a penniless and despised student, and a homeless wanderer. This is the circumstance which has given its name to a Sanskrit work, the Mahabhinishkramana Sutra, or Sutra of the Great Renunciation.

Next is related an event in which we may again see a subjective experience given under the form of an objective reality. Mara, the great tempter, appears in the sky, and urges Gotama to stop, promising him, in seven days, a universal kingdom over the four great continents if he will but give up his enterprise.[3] When his words fail to have any effect, the tempter consoles himself by the confident hope that he will still overcome his enemy, saying, "Sooner or later some lustful or malicious or angry thought must arise in his mind; in that moment I shall be his master"; and from that hour, adds the legend, "as a shadow always follows the body, so he too from that day always followed the Blessed One, striving to throw every obstacle in his way towards the Buddhahood." Gotama rides a long distance that night, only stopping at the banks of the Anoma beyond the Koliyan territory. There, on the sandy bank of the river, at a spot where later piety erected a dagaba (a solid dome-shaped relic shrine), he cuts off with his sword his long flowing locks, and, taking off his ornaments, sends them and the horse back in charge of the unwilling
[v.04 p.0739] Channa to Kapilavastu. The next seven days were spent alone in a grove of mango trees near by, whence the recluse walks on to Rajagriha, the capital of Magadha, and residence of Bimbisara, one of the then most powerful rulers in the valley of the Ganges. He was favourably received by the raja; but though asked to do so, he would not as yet assume the responsibilities of a teacher. He attached himself first to a brahmin sophist named Alara, and afterwards to another named Udraka, from whom he learnt all that Indian philosophy had then to teach. Still unsatisfied, he next retired to the jungle of Uruvela, on the most northerly spur of the Vindhya range of mountains, and there for six years, attended by five faithful disciples, he gave himself up to the severest penance and self-torture, till his fame as an ascetic spread in all the country round about "like the sound," says the Burmese chronicle, "of a great bell hung in the canopy of the skies."[4] At last one day, when he was walking in a much enfeebled state, he felt on a sudden an extreme weakness, like that caused by dire starvation, and unable to stand any longer he fell to the ground. Some thought he was dead, but he recovered, and from that time took regular food and gave up his severe penance, so much so that his five disciples soon ceased to respect him, and leaving him went to Benares.

There now ensued a second struggle in Gotama's mind, described with all the wealth of poetry and imagination of which the Indian mind is master. The crisis culminated on a day, each event of which is surrounded in the Buddhist accounts with the wildest legends, on which the very thoughts passing through the mind of Buddha appear in gorgeous descriptions as angels of darkness or of light. To us, now taught by the experiences of centuries how weak such exaggerations are compared with the effect of a plain unvarnished tale, these legends may appear childish or absurd, but they have a depth of meaning to those who strive to read between the lines of such rude and inarticulate attempts to describe the indescribable. That which (the previous and subsequent career of the teacher being borne in mind) seems to be possible and even probable, appears to be somewhat as follows.

Disenchanted and dissatisfied, Gotama had given up all that most men value, to seek peace in secluded study and self-denial. Failing to attain his object by learning the wisdom of others, and living the simple life of a student, he had devoted himself to that intense meditation and penance which all philosophers then said would raise men above the gods. Still unsatisfied, longing always for a certainty that seemed ever just beyond his grasp, he had added vigil to vigil, and penance to penance, until at last, when to the wondering view of others he had become more than a saint, his bodily strength and his indomitable resolution and faith had together suddenly and completely broken down. Then, when the sympathy of others would have been most welcome, he found his friends falling away from him, and his disciples leaving him for other teachers. Soon after, if not on the very day when his followers had left him, he wandered out towards the banks of the Neranjara, receiving his morning meal from the hands of Sujata, the daughter of a neighbouring villager, and set himself down to eat it under the shade of a large tree (a *Ficus religiosa*), to be known from that time as the sacred Bo tree or tree of wisdom. There he remained through the long hours of that day debating with himself what next to do. All his old temptations came back upon him with renewed force. For years he had looked at all earthly good through the medium of a philosophy which taught him that it, without exception, contained within itself the seeds of bitterness, and was altogether worthless and impermanent; but now to his wavering faith the sweet delights of home and love, the charms of wealth and power, began to show themselves in a different light, and glow again with attractive colours. He doubted, and agonized in his doubt; but as the sun set, the religious side of his nature had won the victory, and seems to have come out even purified from the struggle. He had attained to Nirvana, had become clear in his mind, a Buddha, an Enlightened One. From that night he not only did not claim any merit on account of his self-mortification, but took every opportunity of declaring that from such penances no advantage at all would be derived. All that night he is said to have remained in deep meditation under the Bo tree; and the orthodox Buddhists believe that for seven times seven nights and days he continued fasting near the spot, when the archangel Brahmā came and ministered to him. As for himself, his heart was now fixed,—his mind was made up,—but he realized more than he had ever done before the power of temptation, and the difficulty, the almost impossibility, of understanding and holding to the truth. For others subject to the same temptations, but without that earnestness and insight which he felt himself to possess, faith might be quite impossible, and it would only be waste of time and trouble to try to show to them "the only path of peace." To one in his position this thought would be so very natural, that we need not hesitate to accept the fact of its occurrence as related in the oldest records. It is quite consistent with his whole career that it was love and pity for others—otherwise, as it seemed to him, helplessly doomed and lost—-which at last overcame every other consideration, and made Gotama resolve to announce his doctrine to the world.

The teacher, now 35 years of age, intended to proclaim his new gospel first to his old teachers Ālāra and Udraka, but finding that they were dead, he determined to address himself to his former five disciples, and accordingly went to the Deer-forest near Benares where they were then living. An old *gāthhā*, or hymn (translated in *Vinaya Texts*, i. 90) tells us how the Buddha, rapt with the idea of his great mission, meets an acquaintance, one Upaka, a wandering sophist, on the way. The latter, struck with his expression, asks him whose religion it is that makes him so glad, and yet so calm. The reply is striking. "I am now on my way," says the Buddha, "to the city of Benares, to beat the drum of the Ambrosia (to set up the light of the doctrine of Nirvana) in the darkness of the world!" and he proclaims himself the Buddha who alone knows, and knows no teacher. Upaka says: "You profess yourself, then, friend, to be an Arahat and a conqueror?" The Buddha says: "Those indeed are conquerors who, as I have now, have conquered the intoxications (the mental intoxication arising from ignorance, sensuality or craving after future life). Evil dispositions have ceased in me; therefore is it that I am conqueror!" His acquaintance rejoins: "In that case, venerable Gotama, your way lies yonder!" and he himself, shaking his head, turns in the opposite direction.

Nothing daunted, the new prophet walked on to Benares, and in the cool of the evening went on to the Deer-forest where the five ascetics were living. Seeing him coming, they resolved not to recognize as a superior one who had broken his vows; to address him by his name, and not as "master" or "teacher"; only, he being a Kshatriya, to offer him a seat. He understands their change of manner, calmly tells them not to mock him by calling him "the venerable Gotama"; that he has found the ambrosia of truth and can lead them to it. They object, naturally enough, from the ascetic point of view, that he had failed before while he was keeping his body under, and how can his mind have won the victory now, when he serves and yields to his body. Buddha replies by explaining to them the principles of his new gospel, in the form of noble truths, and the Noble Eightfold Path (see Buddhism).

It is nearly certain that Buddha had a commanding presence, and one of those deep, rich, thrilling voices which so many of the successful leaders of men have possessed. We know his deep earnestness, and his thorough conviction of the truth of his new gospel. When we further remember the relation which the five students mentioned above had long borne to him, and that they had passed through a similar culture, it is not difficult to understand that his persuasions were successful, and that his old disciples were the first to acknowledge him in his new character. The later books say that they were all converted at once; but, according to the most ancient Pāli record—though their old love and reverence had been so rekindled when the Buddha came near that their cold resolutions quite broke down, and they vied with each other in such acts of personal attention as an Indian disciple loves to pay to his teacher,—yet it was only after the Buddha had for five days talked to them, sometimes separately, sometimes together, that

they accepted in its entirety his plan of salvation.[5]

The Buddha then remained at the Deer-forest near Benares until the number of his personal followers was about threescore, and that of the outside believers somewhat greater. The principal among the former was a rich young man named Yasa, who had first come to him at night out of fear of his relations, and afterwards shaved his head, put on the yellow robe, and succeeded in bringing many of his former friends and companions to the teacher, his mother and his wife being the first female disciples, and his father the first lay devotee. It should be noticed in passing that the idea of a priesthood with mystical powers is altogether repugnant to Buddhism; every one's salvation is entirely dependent on the modification or growth of his own inner nature, resulting from his own exertions. The life of a recluse is held to be the most conducive to that state of sweet serenity at which the most ardent disciples aim; but that of a layman, of a believing householder, is held in high honour; and a believer who does not as yet feel himself able or willing to cast off the ties of home or of business, may yet "enter the paths," and by a life of rectitude and kindness ensure for himself a rebirth under more favourable conditions for his growth in holiness.

After the rainy season Gotama called together those of his disciples who had devoted themselves to the higher life, and said to them: "I am free from the five hindrances which, like an immense net, hold men and angels in their power; you too (owing to my teaching) are set free. Go ye now, brethren, and wander for the gain and welfare of the many, out of compassion for the world, to the benefit of gods and men. Preach the doctrine, beauteous in inception, beauteous in continuation, beauteous in its end. Proclaim the pure and perfect life. Let no two go together. I also go, brethren, to the General's village in the wilds of Uruvelā."[6] Throughout his career, Gotama yearly adopted the same plan, collecting his disciples round him in the rainy season, and after it was over travelling about as an itinerant preacher; but in subsequent years he was always accompanied by some of his most attached disciples.

In the solitudes of Uruvelā there were at this time three brothers, fire-worshippers and hermit philosophers, who had gathered round them a number of scholars, and enjoyed a considerable reputation as teachers. Gotama settled among them, and after a time they became believers in his system,—the elder brother, Kassapa, taking henceforth a principal place among his followers. His first set sermon to his new disciples is called by Bishop Bigandet the Sermon on the Mount. Its subject was a jungle-fire which broke out on the opposite hillside. He warned his hearers against the fires of concupiscence, anger, ignorance, birth, death, decay and anxiety; and taking each of the senses in order he compared all human sensations to a burning flame which seems to be something it is not, which produces pleasure and pain, but passes rapidly away, and ends only in destruction.[7]

Accompanied by his new disciples, the Buddha walked on to Rājagaha, the capital of King Bimbisāra, who, not unmindful of their former interview, came out to welcome him. Seeing Kassapa, who as the chronicle puts it, was as well known to them as the banner of the city, the people at first doubted who was the teacher and who the disciple, but Kassapa put an end to their hesitation by stating that he had now given up his belief in the efficacy of sacrifices either great or small; that Nirvāna was a state of rest to be attained only by a change of heart; and that he had become a disciple of the Buddha. Gotama then spoke to the king on the miseries of the world which arise from passion, and on the possibility of release by following the way of salvation. The rāja invited him and his disciples to eat their simple mid-day meal at his house on the following morning; and then presented the Buddha with a garden called Veluvana or Bamboo-grove, afterwards celebrated as the place where the Buddha spent many rainy seasons, and preached many of his most complete discourses. There he taught for some time, attracting large numbers of hearers, among whom two, Sāriputta and Moggallāna, who afterwards became conspicuous leaders in the new crusade, then joined the Sangha or Society, as the Buddha's order of mendicants was called.

Meanwhile the prophet's father, Suddhōdana, who had anxiously watched his son's career, heard that he had given up his asceticism, and had appeared as a Wanderer, an itinerant preacher and teacher. He sent therefore to him, urging him to come home, that he might see him once more before he died. The Buddha accordingly started for Kapilavastu, and stopped according to his custom in a grove outside the town. His father and uncles and others came to see him there, but the latter were angry, and would pay him no reverence. It was the custom to invite such teachers and their disciples for the next day's meal, but they all left without doing so. The next day, therefore, Gotama set out at the usual hour, carrying his bowl to beg for a meal. As he entered the city, he hesitated whether he should not go straight to his father's house, but determined to adhere to his custom. It soon reached his father's ears that his son was walking through the streets begging. Startled at such news he rose up, seizing the end of his outer robe, and hastened to the place where Gotama was, exclaiming, "Illustrious Buddha, why do you expose us all to such shame? Is it necessary to go from door to door begging your food? Do you imagine that I am not able to supply the wants of so many mendicants?" "My noble father," was the reply, "this is the custom of all our race." "How so?" said his father. "Are you not descended from an illustrious line? no single person of our race has ever acted so indecorously." "My noble father," said Gotama, "you and your family may claim the privileges of Kshatriya descent; my descent is from the prophets (Buddhas) of old, and they have always acted so; the customs of the law (Dharma) are good both for this world and the world that is to come. But, my father, when a man has found a treasure, it is his duty to offer the most precious of the jewels to his father first. Do not delay, let me share with you the treasure I have found." Suddhōdana, abashed, took his son's bowl and

led him to his house.

Eighteen months had now elapsed since the turning-point of Gotama's career—his great struggle under the Bo tree. Thus far all the accounts follow chronological order. From this time they simply narrate disconnected stories about the Buddha, or the persons with whom he was brought into contact,—the same story being usually found in more than one account, but not often in the same order. It is not as yet possible, except very partially, to arrange chronologically the snatches of biography to be gleaned from these stories. They are mostly told to show the occasion on which some memorable act of the Buddha took place, or some memorable saying was uttered, and are as exact as to place as they are indistinct as to time. It would be impossible within the limits of this article to give any large number of them, but space may be found for one or two.

A merchant from Sūnaparanta having joined the Society was desirous of preaching to his relations, and is said to have asked Gotama's permission to do so. "The people of Sūnaparanta," said the teacher, "are exceedingly violent. If they revile you what will you do?" "I will make no reply," said the mendicant. "And if they strike you?" "I will not strike in return," was the reply. "And if they try to kill you?" "Death is no evil in itself; many even desire it, to escape from the vanities of life, but I shall take no steps either to hasten or to delay the time of my departure." These answers were held satisfactory, and the monk started on his mission.

At another time a rich farmer held a harvest home, and the Buddha, wishing to preach to him, is said to have taken his alms-bowl and stood by the side of the field and begged. The farmer, a
[v.04 p.0741] wealthy brāhmin, said to him, "Why do you come and beg? I plough and sow and earn my food; you should do the same." "I too, O brahmin," said the beggar, "plough and sow; and having ploughed and sown I eat." "You profess only to be a farmer; no one sees your ploughing, what do you mean?" said the brahmin. "For my cultivation," said the beggar, "faith is the seed, self-combat is the fertilizing rain, the weeds I destroy are the cleaving to existence, wisdom is my plough, and its guiding-shaft is modesty; perseverance draws my plough, and I guide it with the rein of my mind; the field I work is in the law, and the harvest that I reap is the never-dying nectar of Nirvāna, Those who reap this harvest destroy all the weeds of sorrow."

On another occasion he is said to have brought back to her right mind a young mother whom sorrow had for a time deprived of reason. Her name was Kisāgotamī. She had been married early, as is the custom in the East, and had a child when she was still a girl. When the beautiful boy could run alone he died. The young girl in her love for it carried the dead child clasped to her bosom, and went from house to house of her pitying friends asking them to give her medicine for it. But a Buddhist convert thinking "she does not understand," said to her, "My good girl, I myself have no such medicine as you ask for, but I think I know of one who has." "Oh, tell me who that is?" said Kisāgotamī. "The Buddha can give you medicine; go to him," was the answer. She went to Gotama; and doing homage to him said, "Lord and master, do you know any medicine that will be good for my child?" "Yes, I know of some," said the teacher. Now it was the custom for patients or their friends to provide the herbs which the doctors required; so she asked what herbs he would want. "I want some mustard-seed," he said; and when the poor girl eagerly promised to bring some of so common a drug, he added, "you must get it from some house where no son, or husband, or parent or slave has died." "Very good," she said; and went to ask for it, still carrying her dead child with her. The people said, "Here is mustard-seed, take it"; but when she asked, "In my friend's house has any son died, or a husband, or a parent or slave?" They answered, "Lady! what is this that you say? the living are few, but the dead are many." Then she went to other houses, but one said "I have lost a son," another "We have lost our parents," another "I have lost my slave." At last, not being able to find a single house where no one had died, her mind began to clear, and summoning up resolution she left the dead body of her child in a forest, and returning to the Buddha paid him homage. He said to her, "Have you the mustard-seed?" "My lord," she replied, "I have not; the people tell me that the living are few, but the dead are many." Then he talked to her on that essential part of his system, the impermanency of all things, till her doubts were cleared away, she accepted her lot, became a disciple, and entered the "first path."

For forty-five years after entering on his mission Gotama itinerated in the valley of the Ganges, not going farther than about 250 m. from Benares, and always spending the rainy months at one spot—usually at one of the *viharas*,[8] or homes, which had been given to the society. In the twentieth year his cousin Ānanda became a mendicant, and from that time seems to have attended on the Buddha, being constantly near him, and delighting to render him all the personal service which love and reverence could suggest. Another cousin, Devadatta, the son of the rāja of Koli, also joined the society, but became envious of the teacher, and stirred up Ajatasattu (who, having killed his father Bimbisara, had become king of Rajagaha) to persecute Gotama. The account of the manner in which the Buddha is said to have overcome the wicked devices of this apostate cousin and his parricide protector is quite legendary; but the general fact of Ajatasattu's opposition to the new sect and of his subsequent conversion may be accepted.

The confused and legendary notices of the journeyings of Gotama are succeeded by tolerably clear accounts of the last few days of his life.[9] On a journey towards Kusinārā, a town about 120 m. north-north-east of Benares, and about 80 m. due east of Kapilavastu, the teacher, being then eighty years of age, had rested for a short time in a grove at Pāwā, presented to the society by a goldsmith of that place named Chunda. Chunda prepared for the mendicants a mid-day meal, and after the meal the Buddha started for Kusinārā. He had not gone far when he was obliged to rest, and soon afterwards he said, "Ānanda, I am thirsty," and they gave him water to drink. Half-way

between the two towns flows the river Kukushtā. There Gotama rested again, and bathed for the last time. Feeling that he was dying, and careful lest Chunda should be reproached by himself or others, he said to Ānanda, "After I am gone tell Chunda that he will receive in a future birth very great reward; for, having eaten of the food he gave me, I am about to die; and if he should still doubt, say that it was from my own mouth that you heard this. There are two gifts which will be blest above all others, namely, Sujātā's gift before I attained wisdom under the Bo tree, and this gift of Chunda's before I pass away." After halting again and again the party at length reached the river Hiranyavati, close by Kusinārā, and there for the last time the teacher rested. Lying down under some Sal trees, with his face towards the south, he talked long and earnestly with Ānanda about his burial, and about certain rules which were to be observed by the society after his death. Towards the end of this conversation, when it was evening, Ānanda broke down and went aside to weep, but the Buddha missed him, and sending for him comforted him with the promise of Nirvāna, and repeated what he had so often said before about the impermanence of all things,—"O Ānanda! do not weep; do not let yourself be troubled. You known what I have said; sooner or later we must part from all we hold most dear. This body of ours contains within itself the power which renews its strength for a time, but also the causes which lead to its destruction. Is there anything put together which shall not dissolve? But you, too, shall be free from this delusion, this world of sense, this law of change. Beloved," added he, speaking to the rest of the disciples, "Ānanda for long years has served me with devoted affection." And he spoke to them at some length on the kindness of Ānanda.

About midnight Subhadra, a brahmin philosopher of Kusinārā, came to ask some questions of the Buddha, but Ānanda, fearing that this might lead to a longer discussion than the sick teacher could bear, would not admit him. Gotama heard the sound of their talk, and asking what it was, told them to let Subhadra come. The latter began by asking whether the six great teachers knew all laws, or whether there were some that they did not know, or knew only partially. "This is not the time," was the answer, "for such discussions. To true wisdom there is only one way, the path that is laid down in my system. Many have already followed it, and conquering the lust and pride and anger of their own hearts, have become free from ignorance and doubt and wrong belief, have entered the calm state of universal kindliness, and have reached Nirvāna even in this life. O Subhadra! I do not speak to you of things I have not experienced. Since I was twenty-nine years old till now I have striven after pure and perfect wisdom, and following the good path, have found Nirvāna." A rule had been made that no follower of a rival system should be admitted to the society without four months' probation. So deeply did the words or the impressive manner of the dying teacher work upon Subhadra that he asked to be admitted at once, and Gotama granted his request. Then turning to his disciples he said, "When I have passed away and am no longer with you, do not think that the Buddha has left you, and is not still in your midst. You have my words, my explanations of the deep things of truth, the laws I have laid down for the society; let them be your guide; the Buddha has not left you." Soon afterwards he again spoke to them, urging them
[v.04 p.0742] to reverence one another, and rebuked one of the disciples who spoke indiscriminately all that occurred to him. Towards the morning he asked whether any one had any doubt about the Buddha, the law or the society; if so, he would clear them up. No one answered, and Ānanda expressed his surprise that amongst so many none should doubt, and all be firmly attached to the law. But the Buddha laid stress on the final perseverance of the saints, saying that even the least among the disciples who had entered the first path only, still had his heart fixed on the way to perfection, and constantly strove after the three higher paths. "No doubt," he said, "can be found in the mind of a true disciple." After another pause he said: "Behold now, brethren, this is my exhortation to you. Decay is inherent in all component things. Work out, therefore, your emancipation with diligence!" These were the last words the Buddha spoke; shortly afterwards he became unconscious, and in that state passed away.

Authorities On The Life Of The Buddha.—Canonical Pāli (reached their present shape before the 4th century B.C.); episodes only, three of them long: (1) *Birth*; text in *Majjhima Nikāya*, ed. Trenckner and Chalmers (London, Pāli Text Society, 1888-1899), vol. iii. pp. 118-124; also in *Anguttara Nikāya*, ed. Morris and Hardy (Pāli Text Society, 1888-1900), vol. ii. pp. 130-132. (2) *Adoration of the babe*; old ballad; text in *Sutta Nipāta*, ed. Fausböll (Pāli Text Society, 1884), pp. 128-131; translation by the same in *Sacred Books of the East* (Oxford, 1881), vol. x. pp. 124-131. (3) *Youth at home*; text in *Anguttara Nikāya*, i. 145. (4) *The going forth*; old ballad; text in *Sutta Nipata*, pp. 70-74 (London, 1896), pp. 99-101; prose account in *Dīgha Nikāya*, ed. Rhys Davids and Carpenter (Pāli Text Society, 1890-1893), vol. i. p. 115, translated by Rhys Davids in *Dialogues of the Buddha* (Oxford, 1899), pp. 147-149. (5) *First long episode*; the going forth, years of study and penance, attainment of Nirvāna and Buddhahood, and conversion of first five converts; text in *Majjhima*, all together at ii. 93; parts repeated at i. 163-175, 240-249; ii. 212; *Vinaya*, ed. Oldenberg (London, 1879-1883), vol. i. pp. 1-13. (6) *Second long episode*; from the conversation of the five down to the end of the first year of the teaching; text in *Vinaya*, i. 13-44, translated by Oldenberg in *Vinaya Texts*, i. 73-151. (7) *Visit to Kapilavastu*; text in *Vinaya*, i. 82; translation by Oldenberg in *Vinaya Texts* (Oxford, 1881-1885), vol. i. pp. 207-210. (8) *Third long episode*; the last days; text in *Dīgha Nikāya* (the *Mahāparinibbāna Suttanta*), vol. ii. pp. 72-168, translated by Rhys Davids *in Buddhist Suttas* (Oxford, 1881), pp. 1-136. Buddhist Sanskrit Texts: (i) *Mahāvastu* (probably 2nd century B.C.); edited by Senart (3 vols., Paris, 1882-1897), summary in French prefixed to each volume; down to the end of first year of the teaching. (2) *Lalita Vistara* (probably 1st century B.C.); edited by Mitra (Calcutta, 1877); translated into French by Foucaux (Paris, 1884); down to the first sermon. (3) *Buddha Carita*, by Ašvaghosha, probably 2nd century A.D. edited by Cowell (Oxford, 1892); translated by Cowell (Oxford, 1894, S.B.E. vol. xlix.); an elegant poem; stops just before the attainment of Buddhahood. (These three works reproduce

and amplify the above episodes Nos. 1-6; they retain here and there a very old tradition as to arrangement of clauses or turns of expression.) Later Pāli: The commentary on the *Jātaka*, written probably in the 5th century A.D., gives a consecutive narrative, from the birth to the end of the second year of the teaching, based on the canonical texts, but much altered and amplified; edited by Fausböll in *Jātaka*, vol. i. (London, 1877), pp. 1-94; translated by Rhys Davids in *Buddhist Birth Stories* (London, 1880), pp. 1-133. Modern Works: (i) Tibetan; *Life of the Buddha*; episodes collected and translated by W. Woodville Rockhill (London, 1884), from Tibetan texts of the 9th and 10th centuries A.D. (2) Sinhalese; episodes collected and translated by Spence Hardy from Sinhalese texts of the 12th and later centuries, in *Manual of Buddhism* (London, 1897, 2nd edition), pp. 138-359. (3) Burmese: *The Life or Legend of Gaudama* (3rd edition, London, 1880), by the Right Rev. P. Bigandet, translated from a Burmese work of A.D. 1773. (The Burmese is, in its turn, a translation from a Pāli work of unknown date; it gives the whole life, and is the only consecutive biography we have.) (4) Kambojian: *Pathama Sambodhian*; translated into French by A. Leclère in *Livres sacrés du Cambodge* (Paris, 1906).

(T. W. R. D.)

[1] *Note on the Date of the Buddha.*—The now generally accepted date of the Buddha is arrived at by adding together two numbers, one being the date of the accession of Asoka to the throne, the second being the length of the interval between that date and that of the death of the Buddha. The first figure, that of the date of Asoka, is arrived at by the mention in one of his edicts of certain Greek kings, as then living. The dates of these last are approximately known; and arguing from these dates the date of Asoka's accession has been fixed by various scholars (at dates varying only by a difference of five years more or less) at about 270 B.C. The second figure, the total interval between Asoka's accession and the Buddha's death, is given in the Ceylon Chronicles as 218 years. Adding these two together, the date of the Buddha's death would be 488 B.C., and, as he was eighty years old at the time of his death, the date of his birth would be 568 B.C. The dates for his death and birth accepted in Burma, Siam and Ceylon are about half a century earlier, namely, 543 and 623 B.C., the difference being in the date of Asoka's accession. It will be seen that the dates as adopted in Europe are approximate only, and liable to correction if better data are obtainable. The details of this chronological question are discussed at length in Professor Rhys Davids' *Ancient Coins and Measures of Ceylon* (London, 1877), where the previous discussions are referred to.

[2] See report of *Rex*. v. *Neuhaus*, Clerkenwell Sessions, September 15, 1906.

[3] The various legends of Mara are the subject of an exhaustive critical analysis in Windsisch's *Mara and Buddha* (Leipzig, 1895).

[4] Bigandet, p. 49; and compare *Jataka*, p. 67, line 27.

[5] *Vinaya Texts*, i. 97-99; cf. *Jataka*, vol. i. p. 82, lines 11-19.

[6] *Samyutta*, i. 105.

[7] Cf. Big. p. 99, with Hardy, *M.B.* p. 191. The Pali name is *aditta-pariyaya*: the sermon on the lessons to be drawn from burning. The text is *Vinaya*, i. 34 = *Samyutta*, iv. 19. A literal translation will be found in *Vinaya Texts*, i. 134, 135.

[8] These were at first simple huts, built for the mendicants in some grove of palm-trees as a retreat during the rainy season; but they gradually increased in splendour and magnificence till the decay of Buddhism set in. See the authorities quoted in *Buddhist India*, pp. 141, 142.

[9] The text of the account of this last journey is the *Mahāparinibbāna Suttanta*, vol. ii. of the *Dīgha* (ed. Rhys Davids and Carpenter) The translation is in Rhys Davids' *Buddhist Suttas*.

BUDDHAGHOSA, a celebrated Buddhist writer. He was a Brahmin by birth and was born near the great Bodhi tree at Budh Gayā; in north India about A.D. 390, his father's name being Kesī. His teacher, Revata, induced him to go to Ceylon, where the commentaries on the scriptures had been preserved in the Sinhalese language, with the object of translating them into Pāli. He went accordingly to Anuradhapura, studied there under Sanghapāla, and asked leave of the fraternity there to translate the commentaries. With their consent he then did so, having first shown his ability by writing the work *Visuddhi Magga* (the Path of Purity, a kind of summary of Buddhist doctrine). When he had completed his many years' labours he returned to the neighbourhood of the Bodhi tree in north India. Before he came to Ceylon he had already written a book entitled *Nānodaya* (the Rise of Knowledge), and had commenced a commentary on the principal psychological manual contained in the *Pitakas*. This latter work he afterwards rewrote in Ceylon, as the present text (now published by the Pāli Text Society) shows. One volume of the *Sumangala Vilāsinī* (a portion of the commentaries mentioned above) has been edited, and extracts from his comment on the Buddhist canon law. This last work has been discovered in a nearly contemporaneous Chinese translation (an edition in Pāli is based on a comparison with that translation). The works here mentioned form, however, only a small portion of what Buddhaghosa wrote. His industry must have been prodigious. He is known to have written books that would fill about 20 octavo volumes of about 400 pages each; and there are other writings ascribed to him which may or may not be really his work. It is too early therefore to attempt a criticism of it. But it is already clear that, when made acceptable, it will be of the greatest value for the history of

Indian literature and of Indian ideas. So much is uncertain at present in that history for want of definite dates that the voluminous writings of an author whose date is approximately certain will afford a standard by which the age of other writings can be tested. And as the original commentaries in Sinhalese are now lost his works are the only evidence we have of the traditions then handed down in the Buddhist community. The main source of our information about Buddhaghosa is the *Mahāvamsa*, written in Anurādhapura about fifty years after he was working there. But there are numerous references to him in Pāli books on Pāli literature; and a Burmese author of unknown date, but possibly of the 15th century, has compiled a biography of him, the *Buddhaghos' Uppatti*, of little value and no critical judgment.

See *Mahāvamsa*, ch. xxxvii. (ed. Turnour, Colombo, 1837); "Gandhavaramsa," p. 59, in *Journal of the Pāli Text Society* (1886); *Buddhghosuppatti* (text and translation, ed. by E. Gray, London, 1893); *Sumangala Vilāsinī*, edited by T. W. Rhys Davids and J. E. Carpenter, vol. i. (London, Pāli Text Society, 1886). (T. W. R. D.)

BUDDHISM, the religion held by the followers of the Buddha (*q.v.*), and covering a large area in India and east and central Asia.

Essential Doctrines.—We are fortunate in having preserved for us the official report of the Buddha's discourse, in which he expounded what he considered the main features of his system to the five men he first tried to win over to his new-found faith. There is no reason to doubt its substantial accuracy, not as to words, but as to purport. In any case it is what the compilers of the oldest extant documents believed their teacher to have regarded as the most important points in his teaching. Such a summary must be better than any that could now be made. It is incorporated into two divisions of their sacred books, first among the *suttas* containing the doctrine, and again in the rules of the society or order he founded (*Samyutta*, v. 421 = *Vinaya*, i. 10). The gist of it, omitting a few repetitions, is as follows:—

> "There are two aims which he who has given up the world ought not to follow after—devotion, on the one hand, to those things whose attractions depend upon the passions, a low and pagan ideal, fit only for the worldly-minded, ignoble, unprofitable, and the practice on the other hand of asceticism, which is painful, ignoble, unprofitable. There is a Middle Path discovered by the Tathāgata[1]—a path which opens the eyes, and bestows understanding, which leads to peace, to insight, to the higher wisdom, to Nirvāna. Verily! it is this Noble Eightfold Path; that is to say, Right Views, Right Aspirations, Right Speech, Right Conduct, Right Mode of Livelihood, Right Effort, Right Mindfulness, and Right Rapture.
>
> "Now this is the Noble Truth as to suffering. Birth is attended with pain, decay is painful, disease is painful, death is painful. Union with the unpleasant is painful, painful is separation from the pleasant; and any craving unsatisfied, that too is painful. In brief, the five aggregates of clinging (that is, the conditions of individuality) are painful.
>
> "Now this is the Noble Truth as to the origin of suffering. Verily! it is the craving thirst that causes the renewal of becomings, that is accompanied by sensual delights, and seeks satisfaction now here, now there—that is to say, the craving for the gratification of the senses, or the craving for a future life, or the craving for prosperity.
>
> [v.04 p.0743] "Now this is the Noble Truth as to the passing away of pain. Verily! it is the passing away so that no passion remains, the giving up, the getting rid of, the being emancipated from, the harbouring no longer of this craving thirst.
>
> "Now this is the Noble Truth as to the way that leads to the passing away of pain. Verily! it is this Noble Eightfold Path, that is to say, Right Views, Right Aspirations, Right speech, conduct and mode of livelihood, Right Effort, Right Mindfulness and Right Rapture."

A few words follow as to the threefold way in which the speaker claimed to have grasped each of these Four Truths. That is all. There is not a word about God or the soul, not a word about the Buddha or Buddhism. It seems simple, almost jejune; so thin and weak that one wonders how it can have formed the foundation for a system so mighty in its historical results. But the simple words are pregnant with meaning. Their implications were clear enough to the hearers to whom they were addressed. They were not intended, however, to answer the questionings of a 20th-century European questioner, and are liable now to be misunderstood. Fortunately each word, each clause, each idea in the discourse is repeated, commented on, enlarged upon, almost *ad nauseam*, in the *suttas*, and a short comment in the light of those explanations may bring out the meaning that was meant.[2]

The passing away of pain or suffering is said to depend on an emancipation. And the Buddha is elsewhere (*Vinaya* ii. 239) made to declare: "Just as the great ocean has one taste only, the taste of salt, just so have this doctrine and discipline but one flavour only, the flavour of emancipation"; and again, "When a brother has, by himself, known and realized, and continues to abide, here in this visible world, in that emancipation of mind, in that emancipation of heart, which is Arahatship; that is a condition higher still and sweeter still, for the sake of which the brethren lead the religious life under me."[3] The emancipation is found in a habit of mind, in the being free from a specified sort of craving that is said to be the origin of certain specified sorts of pain. In some European books this is completely spoiled by being represented as the doctrine that

existence is misery, and that desire is to be suppressed. Nothing of the kind is said in the text. The description of suffering or pain is, in fact, a string of truisms, quite plain and indisputable until the last clause. That clause declares that the *Upādāna Skandhas*, the five groups of the constituent parts of every individual, involve pain. Put into modern language this is that the conditions necessary to make an individual are also the conditions that necessarily give rise to sorrow. No sooner has an individual become separate, become an individual, than disease and decay begin to act upon it. Individuality involves limitation, limitation in its turn involves ignorance, and ignorance is the source of sorrow. Union with the unpleasant, separation from the pleasant, unsatisfied craving, are each a result of individuality. This is a deeper generalization than that which says, "A man is born to trouble as the sparks fly upward." But it is put forward as a mere statement of fact. And the previous history of religious belief in India would tend to show that emphasis was laid on the fact, less as an explanation of the origin of evil, than as a protest against a then current pessimistic idea that salvation could not be reached on earth, and must therefore be sought for in a rebirth in heaven, in the *Brahmaloka*. For if the fact—the fact that the conditions of individuality are the conditions, also, of pain—were admitted, then the individual there would still not have escaped from sorrow. If the five ascetics to whom the words were addressed once admitted this implication, logic would drive them also to admit all that followed.

The threefold division of craving at the end of the second truth might be rendered "the lust of the flesh, the lust of life and the love of this present world." The two last are said elsewhere to be directed against two sets of thinkers called the Eternalists and the Annihilationists, who held respectively the everlasting-life-heresy and the let-us-eat-and-drink-for-tomorrow-we-die-heresy. [4] This may be so, but in any case the division of craving would have appealed to the five hearers as correct.

The word translated "noble" in Noble Path, Noble Truth, is *ariya*, which also means Aryan.[5] The negative, un-Aryan, is used of each of the two low aims. It is possible that this rendering should have been introduced into the translation; but the ethical meaning, though still associated with the tribal meaning, had probably already become predominant in the language of the time.

The details of the Path include several terms whose meaning and implication are by no means apparent at first sight. Right Views, for instance, means mainly right views as to the Four Truths and the Three Signs. Of the latter, one is identical, or nearly so, with the First Truth. The others are Impermanence and Non-soul (the absence of a soul)—both declared to be "signs" of every individual, whether god, animal or man. Of these two again the Impermanence has become an Indian rather than a Buddhist idea, and we are to a certain extent familiar with it also in the West. There is no Being, there is only a Becoming. The state of every individual is unstable, temporary, sure to pass away. Even in the lowest class of things, we find, in each individual, form and material qualities. In the higher classes there is a continually rising series of mental qualities also. It is the union of these that makes the individual. Every person, or thing, or god, is therefore a putting together, a compound; and in each individual, without any exception, the relation of its component parts is ever changing, is never the same for two consecutive moments. It follows that no sooner has separateness, individuality, begun, than dissolution, disintegration, also begins. There can be no individuality without a putting together: there can be no putting together without a becoming: there can be no becoming without a becoming different: and there can be no becoming different without a dissolution, a passing away, which sooner or later will inevitably be complete.

Heracleitus, who was a generation or two later than the Buddha, had very similar ideas;[6] and similar ideas are found in post-Buddhistic Indian works.[7] But in neither case are they worked out in the same uncompromising way. Both in Europe, and in all Indian thought except the Buddhist, souls, and the gods who are made in imitation of souls, are considered as exceptions. To these spirits is attributed a Being without Becoming, an individuality without change, a beginning without an end. To hold any such view would, according to the doctrine of the Noble (or Aryan) Path, be erroneous, and the error would block the way against the very entrance on the Path.

So important is this position in Buddhism that it is put in the forefront of Buddhist expositions of Buddhism. The Buddha himself is stated in the books to have devoted to it the very first discourse he addressed to the first converts.[8] The first in the collection of the *Dialogues of Gotama* discusses, and completely, categorically, and systematically rejects, all the current theories about "souls." Later books follow these precedents. Thus the *Kathā Vatthu*, the latest book included in the canon, discusses points of disagreement that had arisen in the community. It places this question of "soul" at the head of all the points it deals with, and devotes to it an amount of space quite overshadowing all the rest.[9] So also in the earliest Buddhist book later than the canon—the very interesting and suggestive series of conversations between the Greek king Menander and the Buddhist teacher Nāgasena. It is precisely this question of the "soul" that the unknown author takes up first, describing how Nāgasena convinces the king that there is no such thing as the "soul" in the ordinary sense, and he returns to the subject again and again.[10]

After Right Views come Right Aspirations. It is evil desires, low ideals, useless cravings, idle excitements, that are to be suppressed by the cultivation of the opposite—of right desires, lofty aspirations. In one of the Dialogues[11] instances are given—the desire for emancipation from sensuality, aspirations towards the attainment of love to others, the wish not to injure any living

thing, the desire for the eradication of wrong and for the promotion of right dispositions in one's own heart, and so on. This portion of the Path is indeed quite simple, and would require no commentary were it not for the still constantly repeated blunder that Buddhism teaches the suppression of all desire.

Of the remaining stages of the Path it is only necessary to mention two. The one is Right Effort. A constant intellectual alertness is required. This is not only insisted upon elsewhere in countless passages, but of the three cardinal sins in Buddhism (*rāga*, *dosa*, *moha*) the last and worst is stupidity or dullness, the others being sensuality and ill-will. Right Effort is closely connected with the seventh stage, Right Mindfulness. Two of the dialogues are devoted to this subject, and it is constantly referred to elsewhere.[12] The disciple, whatsoever he does—whether going forth or coming back, standing or walking, speaking or silent, eating or drinking—is to keep clearly in mind all that it means, the temporary character of the act, its ethical significance, and above all that behind the act there is no actor (goer, seer, eater, speaker) that is an eternally persistent unity. It is the Buddhist analogue to the Christian precept: "Whether therefore ye eat or drink, or whatsoever ye do, do all to the glory of God."

Under the head of Right Conduct the two most important points are Love and Joy. Love is in Pāli *Mettā*, and the *Metta Sutta*[13] says (no doubt with reference to the Right Mindfulness just described): "As a mother, even at the risk of her own life, protects her son, her only son, so let him cultivate love without measure towards all beings. Let him cultivate towards the whole world —above, below, around—a heart of love unstinted, unmixed with the sense of differing or opposing interests. Let a man maintain this mindfulness all the while he is awake, whether he be standing, walking, sitting or lying down. This state of heart is the best in the world."

Often elsewhere four such states are described, the Brahma Vihāras or Sublime Conditions. They are Love, Sorrow at the sorrows of others, Joy in the joys of others, and Equanimity as regards one's own joys and sorrows.[14] Each of these feelings was to be deliberately practised, beginning with a single object, and gradually increasing till the whole world was suffused with the feeling. "Our mind shall not waver. No evil speech will we utter. Tender and compassionate will we abide, loving in heart, void of malice within. And we will be ever suffusing such a one with the rays of our loving thought. And with that feeling as a basis we will ever be suffusing the whole wide world with thought of love far-reaching, grown great, beyond measure, void of anger or ill-will." [15]

The relative importance of love, as compared with other habits, is thus described. "All the means that can be used as bases for doing right are not worth the sixteenth part of the emancipation of the heart through love. That takes all those up into itself, outshining them in radiance and glory. Just as whatsoever stars there be, their radiance avails not the sixteenth part of the radiance of the moon. That takes all those up into itself, outshining them in radiance and glory—just as in the last month of the rains, at harvest time, the sun, mounting up on high into the clear and cloudless sky, overwhelms all darkness in the realms of space, and shines forth in radiance and glory—just as in the night, when the dawn is breaking, the morning star shines out in radiance and glory—just so all the means that can be used as helps towards doing right avail not the sixteenth part of the emancipation of the heart through love."[16]

The above is the positive side; the qualities (*dhammā*) that have to be acquired. The negative side, the qualities that have to be suppressed by the cultivation of the opposite virtues, are the Ten Bonds (*Samyojanas*), the Four Intoxications (*Āsavā*) and the Five Hindrances (*Nīvaranas*).

The Ten Bonds are: (1) Delusion about the soul; (2) Doubt; (3) Dependence on good works; (4) Sensuality; (5) Hatred, ill-feeling; (6) Love of life on earth; (7) Desire for life in heaven; (8) Pride; (9) Self-righteousness; (10) Ignorance. The Four Intoxications are the mental intoxication arising respectively from (1) Bodily passions, (2) Becoming, (3) Delusion, (4) Ignorance. The Five Hindrances are (1) Hankering after worldly advantages, (2) The corruption arising out of the wish to injure, (3) Torpor of mind, (4) Fretfulness and worry, (5) Wavering of mind.[17] "When these five hindrances have been cut away from within him, he looks upon himself as freed from debt, rid of disease, out of jail, a free man and secure. And gladness springs up within him on his realizing that, and joy arises to him thus gladdened, and so rejoicing all his frame becomes at ease, and being thus at ease he is filled with a sense of peace, and in that peace his heart is stayed."[18]

To have realized the Truths, and traversed the Path; to have broken the Bonds, put an end to the Intoxications, and got rid of the Hindrances, is to have attained the ideal, the Fruit, as it is called, of Arahatship. One might fill columns with the praises, many of them among the most beautiful passages in Pāli poetry and prose, lavished on this condition of mind, the state of the man made perfect according to the Buddhist faith. Many are the pet names, the poetic epithets bestowed upon it—the harbour of refuge, the cool cave, the island amidst the floods, the place of bliss, emancipation, liberation, safety, the supreme, the transcendent, the uncreated, the tranquil, the home of peace, the calm, the end of suffering, the medicine for all evil, the unshaken, the ambrosia, the immaterial, the imperishable, the abiding, the farther shore, the unending, the bliss of effort, the supreme joy, the ineffable, the detachment, the holy city, and many others. Perhaps the most frequent in the Buddhist text is Arahatship, "the state of him who is worthy"; and the one exclusively used in Europe is Nirvāna, the "dying out"; that is, the dying out in the heart of the fell fire of the three cardinal sins—sensuality, ill-will and stupidity.[19]

The choice of this term by European writers, a choice made long before any of the Buddhist canonical texts had been published or translated, has had a most unfortunate result. Those writers did not share, could not be expected to share, the exuberant optimism of the early Buddhists. Themselves giving up this world as hopeless, and looking for salvation in the next, they naturally thought the Buddhists must do the same, and in the absence of any authentic scriptures, to correct the mistake, they interpreted Nirvāna, in terms of their own belief, as a state to be reached after death. As such they supposed the "dying out" must mean the dying out of a "soul"; and endless were the discussions as to whether this meant eternal trance, or absolute annihilation, of the "soul." It is now thirty years since the right interpretation, founded on the canonical texts, has been given, but outside the ranks of Pāli scholars the old blunder is still often repeated. It should be added that the belief in salvation in this world, in this life, has appealed so strongly to Indian sympathies that from the time of the rise of Buddhism down to the present day it has been adopted as a part of general Indian belief, and *Jīvanmukti*, salvation during this life, has become a commonplace in the religious language of India.

[v.04 p.0745] *Adopted Doctrines.*—The above are the essential doctrines of the original Buddhism. They are at the same time its distinctive doctrines; that is to say, the doctrines that distinguish it from all previous teaching in India. But the Buddha, while rejecting the sacrifices and the ritualistic magic of the brahmin schools, the animistic superstitions of the people, the asceticism and soul-theory of the Jains, and the pantheistic speculations of the poets of the pre-Buddhistic *Upanishads*, still retained the belief in transmigration. This belief—the transmigration of the soul, after the death of the body, into other bodies, either of men, beasts or gods—is part of the animistic creed so widely found throughout the world that it was probably universal. In India it had already, before the rise of Buddhism, been raised into an ethical conception by the associated doctrine of *Karma*, according to which a man's social position in life and his physical advantages, or the reverse, were the result of his actions in a previous birth. The doctrine thus afforded an explanation, quite complete to those who believed it, of the apparent anomalies and wrongs in the distribution here of happiness or woe. A man, for instance, is blind. This is owing to his lust of the eye in a previous birth. But he has also unusual powers of hearing. This is because he loved, in a previous birth, to listen to the preaching of the law. The explanation could always be exact, for it was scarcely more than a repetition of the point to be explained. It fits the facts because it is derived from them. And it cannot be disproved, for it lies in a sphere beyond the reach of human inquiry.

It was because it thus provided a moral cause that it was retained in Buddhism. But as the Buddha did not acknowledge a soul, the link of connexion between one life and the next had to be found somewhere else. The Buddha found it (as Plato also found it)[20] in the influence exercised upon one life by a desire felt in the previous life. When two thinkers of such eminence (probably the two greatest ethical thinkers of antiquity) have arrived independently at this strange conclusion, have agreed in ascribing to cravings, felt in this life, so great, and to us so inconceivable, a power over the future life, we may well hesitate before we condemn the idea as intrinsically absurd, and we may take note of the important fact that, given similar conditions, similar stages in the development of religious belief, men's thoughts, even in spite of the most unquestioned individual originality, tend though they may never produce exactly the same results, to work in similar ways.

In India, before Buddhism, conflicting and contradictory views prevailed as to the precise mode of action of *Karma*; and we find this confusion reflected in Buddhist theory. The prevailing views are tacked on, as it were, to the essential doctrines of Buddhism, without being thoroughly assimilated to them, or logically incorporated with them. Thus in the story of the good layman Citta, it is an aspiration expressed on the deathbed;[21] in the dialogue on the subject, it is a thought dwelt on during life,[22] in the numerous stories in the *Peta* and *Vimāna Vatthus* it is usually some isolated act, in the discussions in the *Dhamma Sangani* it is some mental disposition, which is the *Karma* (doing or action) in the one life determining the position of the individual in the next. These are really conflicting propositions. They are only alike in the fact that in each case a moral cause is given for the position in which the individual finds himself now; and the moral cause is his own act.

In the popular belief, followed also in the brahmin theology, the bridge between the two lives was a minute and subtle entity called the soul, which left the one body at death, through a hole at the top of the head, and entered into the new body. The new body happened to be there, ready, with no soul in it. The soul did not make the body. In the Buddhist adaptation of this theory no soul, no consciousness, no memory, goes over from one body to the other. It is the grasping, the craving, still existing at the death of the one body that causes the new set of *Skandhas*, that is, the new body with its mental tendencies and capacities, to arise. How this takes place is nowhere explained.

The Indian theory of *Karma* has been worked out with many points of great beauty and ethical value. And the Buddhist adaptation of it, avoiding some of the difficulties common to it and to the allied European theories of fate and predestination, tries to explain the weight of the universe in its action on the individual, the heavy hand of the immeasurable past we cannot escape, the close connexion between all forms of life, and the mysteries of inherited character. Incidentally it held out the hope, to those who believed in it, of a mode of escape from the miseries of transmigration. For as the Arahat had conquered the cravings that were supposed to produce the new body, his actions were no longer *Karma*, but only *Kiriyā*, that led to no rebirth.[23]

Another point of Buddhist teaching adopted from previous belief was the practice of ecstatic meditation. In the very earliest times of the most remote animism we find the belief that a person, rapt from all sense of the outside world, possessed by a spirit, acquired from that state a degree of sanctity, was supposed to have a degree of insight, denied to ordinary mortals. In India from the soma frenzy in the *Vedas*, through the mystic reveries of the *Upanishads*, and the hypnotic trances of the ancient Yoga, allied beliefs and practices had never lost their importance and their charm. It is clear from the *Dialogues*, and other of the most ancient Buddhist records, [24] that the belief was in full force when Buddhism arose, and that the practice was followed by the Buddha's teachers. It was quite impossible for him to ignore the question; and the practice was admitted as a part of the training of the Buddhist Bhikshu. But it was not the highest or the most important part, and might be omitted altogether. The states of Rapture are called Conditions of Bliss, and they are regarded as useful for the help they give towards the removal of the mental obstacles to the attainment of Arahatship.[25] Of the thirty-seven constituent parts of Arahatship they enter into one group of four. To seek for Arahatship in the practice of the ecstasy alone is considered a deadly heresy.[26] So these practices are both pleasant in themselves, and useful as one of the means to the end proposed. But they are not the end, and the end can be reached without them. The most ancient form these exercises took is recorded in the often recurring paragraphs translated in Rhys Davids' *Dialogues of the Buddha* (i. 84-92). More modern, and much more elaborate, forms are given in the *Yogāvacaras Manual of Indian Mysticism as practised by Buddhists*, edited by Rhys Davids from a unique MS. for the Pāli Text Society in 1896. In the Introduction to this last work the various phases of the question are discussed at length.

Buddhist Texts. The Canonical Books.—It is necessary to remember that the Buddha, like other Indian teachers of his period, taught by conversation only. A highly-educated man (according to the education current at the time), speaking constantly to men of similar education, he followed the literary habit of his day by embodying his doctrines in set phrases (*sūtras*), on which he enlarged, on different occasions, in different ways. Writing was then widely known. But the lack of suitable writing materials made any lengthy books impossible. Such sūtras were therefore the recognized form of preserving and communicating opinion. They were catchwords, as it were, *memoria technica*, which could easily be remembered, and would recall the fuller expositions that had been based upon them. Shortly after the Buddha's time the Brahmins had their sūtras in Sanskrit, already a dead language. He purposely put his into the ordinary conversational idiom of the day, that is to say, into Pāli. When the Buddha died these sayings were collected together by his disciples into what they call the Four Nikāyas, or "collections." These cannot have reached their final form till about fifty or sixty years afterwards. Other sayings and verses, most of them ascribed, not to the Buddha, but to the disciples themselves, were put into a supplementary
[v.04 p.0746]
Nikāya. We know of slight additions made to this Nikāya as late as the time of Asoka, 3rd century B.C. And the developed doctrine, found in certain portions of it, shows that these are later than the four old Nikāyas. For a generation or two the books so put together were handed down by memory, though probably written memoranda were also used. And they were doubtless accompanied from the first, as they were being taught, by a running commentary. About one hundred years after the Buddha's death there was a schism in the community. Each of the two schools kept an arrangement of the canon—still in Pāli, or some allied dialect. Sanskrit was not used for any Buddhist works till long afterwards, and never used at all, so far as is known, for the canonical books. Each of these two schools broke up in the following centuries, into others. Several of them had their different arrangements of the canonical books, differing also in minor details. These books remained the only authorities for about five centuries, but they all, except only our extant Pāli Nikāyas, have been lost in India. These then are our authorities for the earliest period of Buddhism. Now what are these books?

We talk necessarily of Pāli *books*. They are not books in the modern sense. They are memorial sentences or verses intended to be learnt by heart. And the whole style and method of arrangement is entirely subordinated to this primary necessity. Each sūtra (Pāli, *sutta*) is very short; usually occupying only a page, or perhaps two, and containing a single proposition. When several of these, almost always those that contain propositions of a similar kind, are collected together in the framework of one dialogue, it is called a *sullanta*. The usual length of such a suttanta is about a dozen pages; only a few of them are longer, and a collection of such suttantas might be called a book. But it is as yet neither narrative nor essay. It is at most a string of passages, drawn up in similar form to assist the memory, and intended, not to be read, but to be learnt by heart. The first of the four Nikāyas is a collection of the longest of these suttantas, and it is called accordingly the *Dīgha Nikāya*, that is "the Collection of Long Ones" (*sci.* Suttantas). The next is the *Majjhima Nikāya*, the "Collection of the suttantas of Medium Length"—medium, that is, as being shorter than the suttantas in the Dīgha, and longer than the ordinary suttas preserved in the two following collections. Between them these first two collections contain 186 dialogues, in which the Buddha, or in a few cases one of his leading disciples, is represented as engaged in conversation on some one of the religious, or philosophic, or ethical points in that system which we now call Buddhism. In depth of philosophic insight, in the method of Socratic questioning often adopted, in the earnest and elevated tone of the whole, in the evidence they afford of the most cultured thought of the day, these dialogues constantly remind the reader of the dialogues of Plato. But not in style. They have indeed a style of their own; always dignified, and occasionally rising into eloquence. But for the reasons already given, it is entirely different from the style of Western writings which are always intended to be read. Historical scholars will, however, revere this collection of dialogues as one of the most priceless of the treasures of antiquity still preserved to us. It is to it, above all, that we shall always have to go for our

knowledge of the most ancient Buddhism. Of the 186, 175 had by 1907 been edited for the Pāli Text Society, and the remainder were either in the press or in preparation.

A disadvantage of the arrangement in dialogues, more especially as they follow one another according to length and not according to subject, is that it is not easy to find the statement of doctrine on any particular point which is interesting one at the moment. It is very likely just this consideration which led to the compilation of the two following Nikāyas. In the first of these, called the *Anguttara Nikāya*, all those points of Buddhist doctrine capable of expression in classes are set out in order. This practically includes most of the psychology and ethics of Buddhism. For it is a distinguishing mark of the dialogues themselves that the results arrived at are arranged in carefully systematized groups. We are familiar enough in the West with similar classifications, summed up in such expressions as the Seven Deadly Sins, the Ten Commandments, the Thirty-nine Articles, the Four Cardinal Virtues, the Seven Sacraments and a host of others. These numbered lists (it is true) are going out of fashion. The aid which they afford to memory is no longer required in an age in which books of reference abound. It was precisely as a help to memory that they were found so useful in the early Buddhist times, when the books were all learnt by heart, and had never as yet been written. And in the Anguttara we find set out in order first of all the units, then all the pairs, then all the trios, and so on. It is the longest book in the Buddhist Bible, and fills 1840 pages 8vo. The whole of the Pāli text has been published by the Pāli Text Society, but only portions have been translated into English. The next, and last, of these four collections contains again the whole, or nearly the whole, of the Buddhist doctrine; but arranged this time in order of subjects. It consists of 55 *Samyuttas* or groups. In each of these the suttas on the same subject, or in one or two cases the suttas addressed to the same sort of people, are grouped together. The whole of it has been published in five volumes by the Pāli Text Society. Only a few fragments have been translated.

Many hundreds of the short suttas and verses in these two collections are found, word for word, in the dialogues. And there are numerous instances of the introductory story stating how, and when, and to whom the sutta was enunciated—a sort of narrative framework in which the sutta is set—recurring also. This is very suggestive as to the way in which the earliest Buddhist records were gradually built up. The suttas came first embodying, in set phrases, the doctrine that had to be handed down. Those episodes, found in two or three different places, and always embodying several suttas, came next. Then several of these were woven together to form a suttanta. And finally the suttantas were grouped together into the two Nikāyas, and the suttas and episodes separately into the two others. Parallel with this evolution, so to say, of the suttas, the short statements of doctrine, in prose, ran the treatment of the verses. There was a great love of poetry in the communities in which Buddhism arose. Verses were helpful to the memory. And they were adopted not only for this reason. The adherents of the new view of life found pleasure in putting into appropriate verse the feelings of enthusiasm and of ecstasy which the reforming doctrines inspired. When particularly happy in literary finish, or peculiarly rich in religious feeling, such verses were not lost. These were handed on, from mouth to mouth, in the small companies of the brethren or sisters. The oldest verses are all lyrics, expressions either of emotion, or of some deep saying, some pregnant thought. Very few of them have been preserved alone. And even then they are so difficult to understand, so much like puzzles, that they were probably accompanied from the first by a sort of comment in prose, stating when, and why, and by whom they were supposed to have been uttered. As a general rule such a framework in prose is actually preserved in the old Buddhist literature. It is only in the very latest books included in the canon that the narrative part is also regularly in verse, so that a whole work consists of a collection of ballads. The last step, that of combining such ballads into one long epic poem, was not taken till after the canon was closed. The whole process, from the simple anecdote in mixed prose and verse, the so-called *ākhyāna*, to the complete epic, comes out with striking clearness in the history of the Buddhist canon. It is typical, one may notice in passing, of the evolution of the epic elsewhere; in Iceland, for instance, in Persia and in Greece. And we may safely draw the conclusion that if the great Indian epics, the Mahā-bhārata and the Rāmāyana, had been in existence when the formation of the Buddhist canon began, the course of its development would have been very different from what it was.

As will easily be understood, the same reasons which led to literary activity of this kind, in the earliest period, continued to hold good afterwards. A number of such efforts, after the Nikāyas had been closed, were included in a supplementary Nikāya called the *Khuddaka Nikāya*. It will
[v.04 p.0747] throw very useful light upon the intellectual level in the Buddhist community just after the earliest period, and upon literary life in the valley of the Ganges in the 4th or 5th century B.C., if we briefly explain what the tractates in this collection contain. The first, the *Khuddaka Pātha*, is a little tract of only a few pages. After a profession of faith in the Buddha, the doctrine and the order, there follows a paragraph setting out the thirty-four constituents of the human body—bones, blood, nerves and so on—strangely incongruous with what follows. For that is simply a few of the most beautiful poems to be found in the Buddhist scriptures. There is no apparent reason, except their exquisite versification, why these particular pieces should have been here brought together. It is most probable that this tiny volume was simply a sort of first lesson book for young neophytes when they joined the order. In any case that is one of the uses to which it is put at present. The text book is the *Dhammapada*. Here are brought together from ten to twenty stanzas on each of twenty-six selected points of Buddhist self-training or ethics. There are altogether 423 verses, gathered from various older sources, and strung together without any other internal connexion than that they relate more or less to the same subject. And the collector has not thought it necessary to choose stanzas written in the same metre, or in the same number of lines. We know that the early Christians were accustomed to sing hymns, both in their homes

and on the occasions of their meeting together. These hymns are now irretrievably lost. Had some one made a collection of about twenty isolated stanzas, chosen from these hymns, on each of about twenty subjects—such as Faith, Hope, Love, the Converted Man, Times of Trouble, Quiet Days, the Saviour, the Tree of Life, the Sweet Name, the Dove, the King, the Land of Peace, the Joy Unspeakable—we should have a Christian Dhammapada, and very precious such a collection would be. The Buddhist Dhammapada has been edited by Professor Fausböll (2nd ed., 1900), and has been frequently translated. Where the verses deal with those ideas that are common to Christians and Buddhists, the versions are easily intelligible, and some of the stanzas appeal very strongly to the Western sense of religious beauty. Where the stanzas are full of the technical terms of the Buddhist system of self-culture and self-control, it is often impossible, without expansions that spoil the poetry, or learned notes that distract the attention, to convey the full sense of the original. In all these distinctively Buddhist verses the existing translations (of which Professor Max Müller's is the best known, and Dr Karl Neumann's the best) are inadequate and sometimes quite erroneous. The connexion in which they were spoken is often apparent in the more ancient books from which these verses have been taken, and has been preserved in the commentary on the work itself.

In the next little work the framework, the whole paraphernalia of the ancient akhyāna, is included in the work itself, which is called *Udāna*, or "ecstatic utterances." The Buddha is represented, on various occasions during his long career, to have been so much moved by some event, or speech, or action, that he gave vent, as it were, to his pent-up feelings in a short, ecstatic utterance, couched, for the most part, in one or two lines of poetry. These outbursts, very terse and enigmatic, are charged with religious emotion, and turn often on some subtle point of Arahatship, that is, of the Buddhist ideal of life. The original text has been published by the Pāli Text Society. The little book, a garland of fifty of these gems, has been translated by General Strong. The next work is called the *Iti Vuttaka*. This contains 120 short passages, each of them leading up to a terse deep saying of the Buddha's, and introduced, in each case, with the words *Iti vuttam Bhagavalā*—"thus was it spoken by the Exalted One." These anecdotes may or may not be historically accurate. It is quite possible that the memory of the early disciples, highly trained as it was, enabled them to preserve a substantially true record of some of these speeches, and of the circumstances in which they were uttered. Some or all of them may also have been invented. In either case they are excellent evidence of the sort of questions on which discussions among the earliest Buddhists must have turned. These ecstatic utterances and deep sayings are attributed to the Buddha himself, and accompanied by the prose framework. There has also been preserved a collection of stanzas ascribed to his leading followers. Of these 107 are brethren, and 73 sisters, in the order. The prose framework is in this case preserved only in the commentary, which also gives biographies of the authors. This work is called the *Thera-therī-gāthā*.

Another interesting collection is the *Jātaka* book, a set of verses supposed to have been uttered by the Buddha in some of his previous births. These are really 550 of the folk-tales current in India when the canon was being formed, the only thing Buddhist about them being that the Buddha, in a previous birth, is identified in each case with the hero in the little story. Here again the prose is preserved only in the commentary. And it is a most fortunate chance that this—the oldest, the most complete, and the most authentic collection of folklore extant—has thus been preserved intact to the present day. Many of these stories and fables have wandered to Europe, and are found in medieval homilies, poems and story-books. A full account of this curious migration will be found in the introduction to the present writer's *Buddhist Birth Stories*. A translation of the whole book is now published, under the editorship of Professor Cowell, at the Cambridge University Press. The last of these poetical works which it is necessary to mention is the *Sutta Nipāta*, containing fifty-five poems, all except the last merely short lyrics, many of great beauty. A very ancient commentary on the bulk of these poems has been included in the canon as a separate work. The poems themselves have been translated by Professor Fausböll in the *Sacred Books of the East*. The above works are our authority for the philosophy and ethics of the earliest Buddhists. We have also a complete statement of the rules of the order in the *Vinaya*, edited, in five volumes, by Professor Oldenberg. Three volumes of translations of these rules, by him and by the present writer, have also appeared in the *Sacred Books of the East*.

There have also been added to the canonical books seven works on *Abhidhamma*, a more elaborate and more classified exposition of the Dhamma or doctrine as set out in the *Nikāyas*. All these works are later. Only one of them has been translated, the so-called Dhamma Sangani. The introduction to this translation, published under the title of *Buddhist Psychology*, contains the fullest account that has yet appeared of the psychological conceptions on which Buddhist ethics are throughout based. The translator, Mrs Caroline Rhys Davids, estimates the date of this ancient manual for Buddhist students as the 4th century B.C.

Later Works.—So far the canon, almost all of which is now accessible to readers of Pāli. But a good deal of work is still required before the harvest of historical data contained in these texts shall have been made acceptable to students of philosophy and sociology. These works of the oldest period, the two centuries and a half, between the Buddha's time and that of Asoka, were followed by a voluminous literature in the following Periods—from Asoka to Kanishka, and from Kanishka to Buddhaghosa,—each of about three centuries. Many of these works are extant in MS.; but only five or six of the more important Have so far been published. Of these the most interesting is the Milinda, one of the earliest historical novels preserved to us. It is mainly religious and philosophical and purports to give the discussion, extending over several days, in which a Buddhist elder named Nāgasena succeeds in converting Milinda, that is Menander, the famous Greek king of Bactria, to Buddhism. The Pāli text has been edited and the work translated

into English. More important historically, though greatly inferior in style and ability, is the Mahāvastu or *Sublime Story*, in Sanskrit. The story is the one of chief importance to the Buddhists—the story, namely, of how the Buddha won, under the Bo Tree, the victory over ignorance, and attained to the Sambodhi, "the higher Wisdom," of Nirvāna. The story begins with his previous births, in which also he was accumulating the Buddha qualities. And as the Mahāvastu was a standard work of a particular sect, or rather school, called the Mahā-sanghikas, it has thus preserved for us the theory of the Buddha as held outside the followers of the cannon, by those whose views developed, in after centuries, into the Mahāyāna or modern form of Buddhism in India. But this book, like all the ancient books, was composed, not in the north, in
[v.04 p.0748] Nepal, but in the valley of the Ganges, and it is partly in prose, partly in verse. Two other works, the *Lalita Vistara* and the *Buddha Carita*, give us—but this, of course, is later—Sanskrit poems, epics, on the same subject. Of these, the former may be as old as the Christian era; the latter belongs to the 2nd century after Christ. Both of them have been edited and translated. The older one contains still a good deal of prose, the gist of it being often repeated in the verses. The later one is entirely in verse, and shows off the author's mastery of the artificial rules of prosody and poetics, according to which a poem, a mahā-kāvya, ought, according to the later writers on the *Ars poetica*, to be composed.

These three works deal only quite briefly and incidentally with any point of Buddhism outside of the Buddha legend. Of greater importance for the history of Buddhism are two later works, the *Netti Pakarana* and the *Saddharma Pundarīka*. The former, in Pāli, discusses a number of questions then of importance in the Buddhist community; and it relies throughout, as does the Milinda, on the canonical works, which it quotes largely. The latter, in Sanskrit, is the earliest exposition we have of the later Mahāyāna doctrine. Both these books may be dated in the 2nd or 3rd century of our era. The latter has been translated into English. We have now also the text of the *Prajnā Pāramitā*, a later treatise on the Mahāyāna system, which in time entirely replaced in India the original doctrines. To about the same age belongs also the *Divyāvadāna*, a collection of legends about the leading disciples of the Buddha, and important members of the order, through the subsequent three centuries. These legends are, however, of different dates, and in spite of the comparatively late period at which it was put into its present form, it contains some very ancient fragments.

The whole of the above works were composed in the north of India; that is to say, either north or a few miles south of the Ganges. The record is at present full of gaps. But we can even now obtain a full and accurate idea of the earliest Buddhism, and are able to trace the main lines of its development through the first eight or nine centuries of its career. The Pāli Text Society is still publishing two volumes a year; and the Russian Academy has inaugurated a series to contain the most important of the Sanskrit works still buried in MS. We have also now accessible in Pāli fourteen volumes of the commentaries of the great 5th-century scholars in south India and Ceylon, most of them the works either of Buddhaghosa of Budh Gaya, or of Dhammapāla of Kāncipura (the ancient name of Conjeeveram). These are full of important historical data on the social, as well as the religious, life of India during the periods of which they treat.

Modern Research.—The striking archaeological discoveries of recent years have both confirmed and added to our knowledge of the earliest period. Pre-eminent among these is the discovery, by Mr William Peppé, on the Birdpur estate, adjoining the boundary between English and Nepalese territory, of the stūpa, or cairn, erected by the Sākiya clan over their share of the ashes from the cremation pyre of the Buddha. About 12 m. to the north-east of this spot has been found an inscribed pillar, put up by Asoka as a record of his visit to the Lumbini Garden, as the place where the future Buddha had been born. Although more than two centuries later than the event to which it refers, this inscription is good evidence of the site of the garden. There had been no interruption of the tradition; and it is probable that the place was then still occupied by the descendants of the possessors in the Buddha's time. North-west of this another Asoka pillar has been discovered, recording his visit to the cairn erected by the Sakyas over the remains of Konāgamana, one of the previous Puddhas or teachers, whose follower Gotama the Buddha had claimed to be. These discoveries definitely determine the district occupied by the Sākiya republic in the 6th and 7th centuries B.C. The boundaries, of course, are not known; but the clan must have spread 30 m. or more along the lower slopes of the Himalayas and 30 m. or more southwards over the plains. It has been abandoned jungle since the 3rd century A.D., or perhaps earlier, so that the ruined sites, numerous through the whole district, have remained undisturbed, and further discoveries may be confidently expected.

The principal points on which this large number of older and better authorities has modified our knowledge are as follows:—

1. We have learnt that the division of Buddhism, originating with Burnouf, into northern and southern, is misleading. He found that the Buddhism in his Pāli MSS., which came from Ceylon, differed from that in his Sanskrit MSS., which came from Nepal. Now that the works he used have been made accessible in printed editions, we find that, wherever the existing MSS. came from, the original works themselves were all composed in the same stretch of country, that is, in the valley of the Ganges. The difference of the opinions expressed in the MSS. is due, not to the place where they are now found, but *to the difference of time* at which they were originally composed. Not one of the books mentioned above is either northern or southern. They all claim, and rightly claim, to belong, so far as their place of origin is concerned, to the Majjhima Desa, the middle country. It is undesirable to base the main division of our subject on an adventitious circumstance, and especially so when the nomenclature thus introduced (it is not found in the

books themselves) cuts right across the true line of division. The use of the terms northern and southern as applied, not to the existing MSS., but to the original books, or to the Buddhism they teach, not only does not help us, it is the source of serious misunderstanding. It inevitably leads careless writers to take for granted that we have, historically, two Buddhisms—one manufactured in Ceylon, the other in Nepal. Now this is admittedly wrong. What we have to consider is Buddhism varying through slight degrees, as the centuries pass by, in almost every book. We may call it one, or we may call it many. What is quite certain is that it is not two. And the most useful distinction to emphasize is, not the ambiguous and misleading geographical one—derived from the places where the modern copies of the MSS. are found; nor even, though that would be better, the linguistic one—but the chronological one. The use, therefore, of the inaccurate and misleading terms northern and southern ought no longer to be followed in scholarly works on Buddhism.

2. Our ideas as to the social conditions that prevailed, during the Buddha's lifetime, in the eastern valley of the Ganges have been modified. The people were divided into clans, many of them governed as republics, more or less aristocratic. In a few cases several of such republics had formed confederations, and in four cases such confederations had already become hereditary monarchies. The right historical analogy is not the state of Germany in the middle ages, but the state of Greece in the time of Socrates. The Sākiyas were still a republic. They had republics for their neighbours on the east and south, but on the western boundary was the kingdom of Kosala, the modern Oudh, which they acknowledged as a suzerain power. The Buddha's father was not a king. There were rājas in the clan, but the word meant at most something like consul or archon. All the four real kings were called Mahā-rāja. And Suddhodana, the teacher's father, was not even rāja. One of his cousins, named Bhaddiya, is styled a rāja; but Suddhodana is spoken of, like other citizens, as Suddhodana the Sākiyan. As the ancient books are very particular on this question of titles, this is decisive.

3. There was no caste—no caste, that is, in the modern sense of the term. We have long known that the connubium was the cause of a long and determined struggle between the patricians and the plebeians in Rome. Evidence has been yearly accumulating on the existence of restrictions as to intermarriage, and as to the right of eating together (commensality) among other Aryan tribes, Greeks, Germans, Russians and so on. Even without the fact of the existence now of such restrictions among the modern successors of the ancient Aryans in India, it would have been probable that they also were addicted to similar customs. It is certain that the notion of such usages was familiar enough to some at least of the tribes that preceded the Aryans in India. Rules of endogamy and exogamy; privileges, restricted to certain classes, of eating together, are not only Indian or Aryan, but world-wide phenomena. Both the spirit, and to a large degree the actual details, of modern Indian caste-usages are identical with these ancient, and no doubt universal, customs. It is in them that we have the key to the origin of caste.

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At any moment in the history of a nation such customs seem, to a superficial observer, to be fixed and immutable. As a matter of fact they are never quite the same in successive centuries, or even generations. The numerous and complicated details which we sum up under the convenient, but often misleading, single name of caste, are solely dependent for their sanction on public opinion. That opinion seems stable. But it is always tending to vary as to the degree of importance attached to some particular one of the details, as to the size and complexity of the particular groups in which each detail ought to be observed.

Owing to the fact that the particular group that in India worked its way to the top, based its claims on religious grounds, not on political power, nor on wealth, the system has, no doubt, lasted longer in India than in Europe. But public opinion still insists, in considerable circles even in Europe, on restrictions of a more or less defined kind, both as to marriage and as to eating together. And in India the problem still remains to trace, in the literature, the gradual growth of the system—the gradual formation of new sections among the people, the gradual extension of the institution to the families of people engaged in certain trades, belonging to the same group, or sect, or tribe, tracing their ancestry, whether rightly or wrongly, to the same source. All these factors, and others besides, are real factors. But they are phases of the extension and growth, not explanations of the origin of the system.

There is no evidence to show that at the time of the rise of Buddhism there was any substantial difference, as regards the barriers in question, between the peoples dwelling in the valley of the Ganges and their contemporaries, Greek or Roman, dwelling on the shores of the Mediterranean Sea. The point of greatest weight in the establishment of the subsequent development, the supremacy in India of the priests, was still being hotly debated. All the new evidence tends to show that the struggle was being decided rather against than for the Brahmins. What we find in the Buddha's time is caste in the making. The great mass of the people were distinguished quite roughly into four classes, social strata, of which the boundary lines were vague and uncertain. At one end of the scale were certain outlying tribes and certain hereditary crafts of a dirty or despised kind. At the other end the nobles claimed the superiority. But Brahmins by birth (not necessarily sacrificial priests, for they followed all sorts of occupations) were trying to oust the nobles from the highest grade. They only succeeded, long afterwards, when the power of Buddhism had declined.

4. It had been supposed on the authority of late priestly texts, where boasts of persecution are put forth, that the cause of the decline of Buddhism in India had been Brahmin persecution. The now accessible older authorities, with one doubtful exception,[27] make no mention of persecution. On the other hand, the comparison we are now able to make between the canonical

books of the older Buddhism and the later texts of the following centuries, shows a continual decline from the old standpoint, a continual approximation of the Buddhist views to those of the other philosophies and religions of India. We can see now that the very event which seemed, in the eyes of the world, to be the most striking proof of the success of the new movement, the conversion and strenuous support, in the 3rd century B.C., of Asoka, the most powerful ruler India had had, only hastened the decline. The adhesion of large numbers of nominal converts, more especially from the newly incorporated and less advanced provinces, produced weakness rather than strength in the movement for reform. The day of compromise had come. Every relaxation of the old thoroughgoing position was welcomed and supported by converts only half converted. And so the margin of difference between the Buddhists and their opponents gradually faded almost entirely away. The soul theory, step by step, gained again the upper hand. The popular gods and the popular superstitions are once more favoured by Buddhists themselves. The philosophical basis of the old ethics is overshadowed by new speculations. And even the old ideal of life, the salvation of the Arahat to be won in this world and in this world only, by self-culture and self-mastery, is forgotten, or mentioned only to be condemned. The end was inevitable. The need of a separate organization became less and less apparent. The whole pantheon of the Vedic gods, with the ceremonies and the sacrifices associated with them, passed indeed away. But the ancient Buddhism, the party of reform, was overwhelmed also in its fall; and modern Hinduism arose on the ruins of both.

AUTHORITIES.—The attention of the few scholars at work on the subject being directed to the necessary first step of publishing the ancient authorities, the work of exploring them, of analysing and classifying the data they contain, has as yet been very imperfectly done. The annexed list contains only the most important works.

Texts.—*Pāli Text Society*, 57 vols.; *Jātaka*, 7 vols., ed. Fausböll, 1877-1897; *Vinaya*, 5 vols., ed. Oldenberg, 1879-1883; *Dhammapada*, ed. Fausböll, 2nd ed., 1900; *Divyāvadāna*, ed. Cowell and Neil, 1882; *Mahāvastu*, ed. Senart, 3 vols., 1882-1897; *Buddha Carita*, ed. Cowell, 1892; *Milinda-pañho*, ed. Trenckner, 1880.

Translations.—*Vinaya Texts*, by Rhys Davids and Oldenberg, 3 vols., 1881-1885; *Dhammapada*, by Max Müller, and *Sutta Nipata*, by Fausböll, 1881; *Questions of King Milinda*, by Rhys Davids, 2 vols., 1890-1894; *Buddhist Suttas,* by Rhys Davids, 1881; *Saddharma Pundarīka*, by Kern, 1884; *Buddhist Mahāyāna Texts*, by Cowell and Max Müller, 1894—all the above in the "Sacred Books of the East"; *Jātaka*, vol. i., by Rhys Davids, under the title *Buddhist Birth Stories*, 1880; vols. i.-vi., by Chalmers, Neil, Francis, and Rouse, 1895-1897; *Buddhism in Translations*, by Warren, 1896; *Buddhistische Anthologie*, by Neumann, 1892. *Lieder der Mönche und Nonnen*, 1899, by the same; *Dialogues of the Buddha*, by Rhys Davids, 1899; *Die Reden Gotamo Buddhas*, by Neumann, 3 vols., 1899-1903; *Buddhist Psychology*, by Mrs Rhys Davids, 1900.

Manuals, Monographs, &c.—*Buddhism*, by Rhys Davids, 12mo, 20th thousand, 1903; *Buddha, sein Leben, seine Lehre und seine Gemeinde*, by Oldenberg, 5th edition, 1906; *Der Buddhismus und seine Geschichte in Indien*, by Kern, 1882; *Der Buddhismus*, by Edmund Hardy, 1890; *American Lectures, Buddhism*, by Rhys Davids, 1896; *Inscriptions de Piyadasi*, by Senart, 2 vols., 1881-1886; *Mara und Buddha*, by Windisch, 1895; *Buddhist India*, by Rhys Davids, 1903.

(T. W. R. D.)

[1] That is by the Arahat, the title the Buddha always uses of himself. He does not call himself the Buddha, and his followers never address him as such.

[2] One very ancient commentary on the Path has been preserved in three places in the canon: *Dīgha*, ii. 305-307 and 311-313, *Majjhima*, iii. 251, and *Samyutta*, v. 8.

[3] *Mahāli Suttanta*; translated in Rhys Davids' *Dialogues of the Buddha*, vol. i. p. 201 (cf. p. 204).

[4] See *Iti-vuttaka*, p. 44; *Samyutta*, iii. 57.

[5] See *Dīgha*, ii. 28; *Jāt*. v. 48, ii. 80.

[6] Burnett, *Early Greek Philosophy*, p. 149.

[7] *Katha Up*. 2, 10; *Bhag. Gītā*, 2, 14; 9, 33.

[8] The *Anatta-lakkhana Sutta* (*Vinaya*, i. 13 = *Samyutta*, iii. 66 and iv. 34), translated in *Vinaya Texts*, i. 100-102.

[9] See article on "Buddhist Schools of Thought," by Rhys Davids, in the *J.R.A.S.* for 1892.

[10] *Questions of King Milinda*, translated by Rhys Davids (Oxford, 1890-1894), vol. i. pp. 40, 41, 85-87; vol. ii. pp. 21-25, 86-89.

[11] *Majjhima*, iii. 251, cf. *Samyutta*, v. 8.

[12] *Dīgha*, ii. 290-315. *Majjhima*, i. 55 et seq. Cf. Rhys Davids' *Dialogues of the Buddha*, i. 81.

[13] No. 8 in the *Sutta Nipata* (p. 26 of Fausböll's edition). It is translated by Fausböll in vol. x. of the *S.B.E.*, and by Rhys Davids, *Buddhism*, p. 109.

[14] *Dīgha*, ii. 186-187.

[15] *Majjhima*, i. 129.

[16] *Iti-vuttaka*, pp. 19-21.

[17] On the details of these see *Dīgha*, i. 71-73, translated by Rhys Davids in *Dialogues of the Buddha*, i. 82-84.

[18] *Dīgha*, i. 74.

[19] *Samyutta*, iv. 251, 261.

[20] *Phaedo*, 69 et seq. The idea is there also put forward in connexion with a belief in transmigration.

[21] *Samyutta*, iv. 302.

[22] *Majjhima*, iii. 99 et seq.

[23] The history of the Indian doctrine of Karma has yet to be written. On the Buddhist side see Rhys Davids' *Hibbert Lectures*, pp. 73-120, and Dahlke, *Aufsatze zum Verstandnis des Buddhismus* (Berlin, 1903), i. 92-106, and ii. l-11.

[24] For instance, *Majjhima*, i. 163-166

[25] *Anguttara*, iii. 119.

[26] *Dīgha*, i. 38.

[27] See *Journal of the Pāli Text Society*, 1896, pp. 87-92.

BUDÉ [BUDAEUS], **GUILLAUME** (1467-1540), French scholar, was born at Paris. He went to the university of Orleans to study law, but for several years, being possessed of ample means, he led an idle and dissipated life. When about twenty-four years of age he was seized with a sudden passion for study, and made rapid progress, particularly in the Latin and Greek languages. The work which gained him greatest reputation was his *De Asse et Partibus* (1514), a treatise on ancient coins and measures. He was held in high esteem by Francis I., who was persuaded by him, and by Jean du Bellay, bishop of Narbonne, to found the Collegium Trilingue, afterwards the Collège de France, and the library at Fontainebleau, which was removed to Paris and was the origin of the Bibliothèque Nationale. He also induced Francis to refrain from prohibiting printing in France, which had been advised by the Sorbonne in 1533. He was sent by Louis XII. to Rome as ambassador to Leo X., and in 1522 was appointed *maître des requêtes* and was several times *prévôt des marchands*. He died in Paris on the 23rd of August 1540.

Budé was also the author of *Annotationes in XXIV. libros Pandectarum* (1508), which, by the application of philology and history, had a great influence on the study of Roman law, and of *Commentarii linguae Graecae* (1529), an extensive collection of lexicographical notes, which contributed greatly to the study of Greek literature in France. Budé corresponded with the most learned men of his time, amongst them Erasmus, who called him the marvel of France, and Thomas More. He wrote with equal facility in Greek and Latin, although his Latin is inferior to his Greek, being somewhat harsh and full of Greek constructions. His request that he should be buried at night, and his widow's open profession of Protestantism at Geneva (where she retired after his death), caused him to be suspected of leanings towards Calvinism. At the time of the massacre of St Bartholomew, the members of his family were obliged to flee from France. Some took refuge in Switzerland, where they worthily upheld the traditions of their house, while others settled in Pomerania under the name Budde or Buddeus.

[v.04 p.0750] See Le Roy, *Vita G. Budaei* (1540); Rebitté, *G. Budé, restaurateur des études grecques en France* (1846); E. de Budé, *Vie de G. Budé* (1884), who refutes the idea of his ancestor's Protestant views; D'Hozier, *La Maison de Budé*; L. Delaruelle, *Études sur l'humanisme français* (1907).

BUDE, a small seaport and watering-place in the Launceston parliamentary division of Cornwall, England, on the north coast at the mouth of the river Bude. With the market town of Stratton, 1½ m. inland to the east, it forms the urban district of Stratton and Bude, with a population (1901) of 2308. Bude is served by a branch of the London & South-Western railway. Its only notable building is the Early English parish church of St Michael and All Angels. The climate is healthy and the coast scenery in the neighbourhood fine, especially towards the south. There the gigantic cliffs, with their banded strata, have been broken into fantastic forms by the waves. Many ships have been wrecked on the jagged reefs which fringe their base. The figure-head of one of these, the "Bencellon," lost in 1862, is preserved in the churchyard. The harbour, sheltered by a breakwater, will admit vessels of 300 tons at high water; and the river has been dammed to form a basin for the canal which runs to Launceston. Some fishing is carried on: but the staple trade is the export of sand, which, being highly charged with carbonate of lime, is much used for manure. There are golf links near the town. The currents in the bay make bathing dangerous.

BUDGELL, EUSTACE (1686-1737), English man of letters, the son of Dr Gilbert Budgell, was born on the 19th of August 1686 at St Thomas, near Exeter. He matriculated in 1705 at Trinity College, Oxford, and afterwards joined the Inner Temple, London; but instead of studying law he devoted his whole attention to literature. Addison, who was first cousin to his mother, befriended him, and, on being appointed secretary to Lord Wharton, lord-lieutenant of Ireland in 1710, took

Budgell with him as one of the clerks of his office. Budgell took part with Steele and Addison in writing the *Tatler*. He was also a contributor to the *Spectator* and the *Guardian*,—his papers being marked with an X in the former, and with an asterisk in the latter. He was subsequently made under-secretary to Addison, chief secretary to the lords justices of Ireland, and deputy-clerk of the council, and became a member of the Irish parliament. In 1717, when Addison became principal secretary of state in England, he procured for Budgell the place of accountant and comptroller-general of the revenue in Ireland. But the next year, the duke of Bolton being appointed lord-lieutenant, Budgell wrote a lampoon against E. Webster, his secretary. This led to his being removed from his post of accountant-general, upon which he returned to England, and, contrary to the advice of Addison, published his case in a pamphlet. In the year 1720 he lost £20,000 by the South Sea scheme, and afterwards spent £5000 more in unsuccessful attempts to get into parliament. He began to write pamphlets against the ministry, and published many papers in the *Craftsman*. In 1733 he started a weekly periodical called the *Bee*, which he continued for more than a hundred numbers. By the will of Matthew Tindal, the deist, who died in 1733, a legacy of 2000 guineas was left to Budgell; but the bequest (which had, it was alleged, been inserted in the will by Budgell himself) was successfully disputed by Tindal's nephew and nearest heir, Nicholas Tindal, who translated and wrote a *Continuation* of the *History of England* of Paul de Rapin-Thoyras. Hence Pope's lines—

> "Let Budgell charge low Grub Street on his quill,
> And write whate'er he pleased—except his will."[1]

Budgell is said to have sold the second volume of Tindal's *Christianity as Old as the Creation* to Bishop Gibson, by whom it was destroyed. The scandal caused by these transactions ruined him. On the 4th of May 1737, after filling his pockets with stones, he took a boat at Somerset-stairs, and while the boat was passing under the bridge threw himself into the river. On his desk was found a slip of paper with the words—"What Cato did, and Addison approved, cannot be wrong." Besides the works mentioned above, he wrote a translation (1714) of the *Characters* of Theophrastus. He never married, but left a natural daughter, Anne Eustace, who became an actress at Drury Lane.

See Cibber's *Lives of the Poets*, vol. v.

[1] *Epistle to Dr Arbuthnot*, lines 378-379.

BUDGET (originally from a Gallic word meaning sack, latinized as *bulga*, leather wallet or bag, thence in O. Fr. *bougette*, from which the Eng. form is derived), the name applied to an account of the ways and means by which the income and expenditure for a definite period are to be balanced, generally by a finance minister for his state, or by analogy for smaller bodies.[1] The term first came into use in England about 1760. In the United Kingdom the chancellor of the exchequer, usually in April, lays before the House of Commons a statement of the actual results of revenue and expenditure in the past finance year (now ending March 31), showing how far his estimates have been realized, and what surplus or deficit there has been in the income as compared with the expenditure. This is accompanied by another statement in which the chancellor gives an estimate of what the produce of the revenue may be in the year just entered upon, supposing the taxes and duties to remain as they were in the past year, and also an estimate of what the expenditure will be in the current year. If the estimated revenue, after allowing for normal increase of the principal sources of income, be less than the estimated expenditure, this is deemed a case for the imposition of some new, or the increase of some existing, tax or taxes. On the other hand, if the estimated revenue shows a large surplus over the estimated expenditure, there is room for remitting or reducing some tax or taxes, and the extent of this relief is generally limited to the amount of surplus realized in the previous year. The chancellor of the exchequer has to take parliament into confidence on his estimates, both as regards revenue and expenditure; and these estimates are prepared by the various departments of the administration. They are divided into two parts, the consolidated fund services and the supply services, the first comprising the civil list, debt charge, pensions and courts of justice, while the "supply" includes the remaining expenditure of the country, as the army, the navy, the civil service and revenue departments, the post-office and telegraph services. The consolidated fund services are an annual charge, fixed by statute, and alterable only by statute, but the supply services may be gone through in detail, item by item, by the House of Commons, which forms itself into a committee of supply for the purpose. These items can be criticized, and reduced (but not increased) by amendments proposed by private members. The committee of ways and means (also a committee of the whole House) votes the supplies when granted and originates all taxes. The resolutions of these committees are reported to the House, and when the taxation and expenditure obtain the assent of parliament, the results as thus adjusted become the final budget estimate for the year, and are passed as the Finance Act. This system of annual review and adjustment of the public finances obtains not only in the British colonies, but in British India. The Indian budget, giving the results of income and expenditure in the year ending 31st of December, and the prospective estimates, is laid before the imperial parliament in the course of the ensuing session.

The budget, though modified by different forms, has also long been practised in France, the United States, and other constitutional countries, and has in some cases been adopted by autocratic Powers. Russia began the publication of annual budgets in 1866; Egypt has followed the example; so also has Turkey, by an imperial decree of 1875. All countries agree in taking a yearly period, but the actual date of commencement varies considerably. The German and Danish

financial year, like that of the United Kingdom, begins on the 1st of April; in France, Belgium and Austria, it begins on the 1st of January; in Italy, Spain, the United States and Canada, on the 1st of July. Previously to 1832, however, the English financial year ran from the 1st of January to the 31st of December.

[v.04 p.0751]

It may be mentioned that Disraeli introduced a budget (on which he was defeated) in the autumn of 1852; and in 1860, owing to the ratification of the commercial treaty with France, the budget was introduced on the 10th of February. In 1859, through a change of administration, the budget was not introduced until the 18th of July, while in 1880 there were two budgets, one introduced in March under Disraeli's administration, and the other in June, under Gladstone's administration.

National budgets are to be discriminated (1) as budgets passing under parliamentary scrutiny and debate from year to year, and (2) budgets emitted on executive authority. In most constitutional countries the procedure is somewhat of a mean between the extremes of the United Kingdom and the United States. In the United Kingdom the budget is placed by the executive before the whole House, without any previous examination except by the cabinet, and it is scrutinized by the House sitting as a committee; in the majority of countries, however, the budget undergoes a preliminary examination by a specially selected committee, which has the power to make drastic changes in the proposals of the executive. In the United States, on the other hand, the budget practically emanates from Congress, for there is no connexion between the executive and the legislative departments. The estimates prepared by the various executive departments are submitted to the House of Representatives by the secretary of the treasury. With these estimates two separate committees deal. The committee on ways and means deals with taxation, and the committee on appropriations with expenditure. The latter committee is divided into various sub-committees, each of which brings in an appropriation bill for the department or subject with which it is charged.

There are also, in all the greater countries, local and municipal taxations and expenditures of only less account than the national. In federal governments such as the United States, the German empire, or the Argentine republic, the budgets of the several states of the federation have to be consulted, as well as the federal budgets, for a knowledge of the finances.

AUTHORITIES.—Stourm, *Le Budget, son histoire et son mécanisme* (1889), which gives a comparative study of the budgets of different countries, is the best book upon the subject. See also Siedler, *Budget und Budgetrecht*(1885); Sendel, *Über Budgetrecht*(1890); Besson, *Le Contrôle des budgets en France et à l'étranger* (1899); Bastable, *Public Finance* (3rd ed., 1903); Eugene E. Agger, *The Budget in American Commonwealths* (New York, 1907).

[1] It was a name applied also to a leather-covered case or small coffer. Cotgrave translates *bougette* "a little coffer or trunk ... covered with leather." It became a common word for a despatch box in which official papers were kept. The chancellor of the exchequer thus was said to "open his budget" when he made his annual statement.

BUDINI, an ancient nation in the N.E. of the Scythia (*q.v.*) of Herodotus (iv, 21, 108, 109), probably on the middle course of the Volga about Samara. They are described as light-eyed and red-haired, and lived by hunting in their thick forests. They were probably Finns of the branch now represented by the Votiaks and Permiaks, forced northwards by later immigrants. In their country was a wooden city inhabited by a distinct race, the Geloni, who seem to have spoken an Indo-European tongue. Later writers add nothing to our knowledge, and are chiefly interested in the tarandus, an animal which dwelt in the woods of the Budini and seems to have been the reindeer (Aristotle ap. Aelian, *Hist. Anim.* xv. 33).

(E. H. M.)

BUDWEIS (Czech *Budějovice*), a town of Bohemia, Austria, 80 m. S.S.W. of Prague by rail. Pop. (1900) 39,630. It is situated at the junction of the Maltsch with the Moldau, which here becomes navigable, and possesses a beautiful square, lined with fine arcaded buildings, the principal one being the town-hall, built in 1730 in Renaissance style. Other interesting buildings are the cathedral with its detached tower, dating from 1500, and the Marien-Kirche with fine cloisters. Budweis has a large, varied and growing industry, which comprises the manufacture of chemicals, matches, paper, machinery, bricks and tiles, corn and saw mills, boat-building, bell-founding and black-lead pencils. It is the principal commercial centre of South Bohemia, being an important railway junction, as well as a river port, and carries on a large trade in corn, timber, lignite, salt, industrial products and beer, the latter mostly exported to America. It is the see of a bishop since 1783, and is the centre of a German enclave in Czech Bohemia. But the Czech element is steadily increasing, and the population of the town was in 1908 60% Czech. The railway from Budweis to Linz, laid in 1827 for horse-cars, was the first line constructed in Austria. A little to the north, in the Moldau valley, stands the beautiful castle of Frauenberg, belonging to Prince Schwarzenberg. It stands on the site formerly occupied by a 13th-century castle, and was built in the middle of the 19th century, after the model of Windsor Castle.

The old town of Budweis was founded in the 13th century by Budivoj Vitkovec, father of Záviš of Falkenstein. In 1265 Ottokar II. founded the new town, which was soon afterwards created a royal city. Charles IV. and his son Wenceslaus granted the town many privileges. Although mainly Catholic, Budweis declared for King George Poděbrad, and in 1468 was taken by the crusaders under Zdenko of Stenberg. From this time the town remained faithful to the royal cause, and in 1547 was granted by the emperor Ferdinand the privilege of ranking at the diet next to Prague

and Pilsen. After the outbreak of the Thirty Years' War Budweis was confirmed in all its privileges.

BUELL, DON CARLOS (1818-1898), American soldier, was born near Marietta, Ohio, on the 23rd of March 1818. He graduated at West Point in 1841, and as a company officer of infantry took part in the Seminole War of 1841-42 and the Mexican War, during which he was present at almost all the battles fought by Generals Taylor and Scott, winning the brevet of captain at Monterey, and that of major at Contreras-Churubusco, where he was wounded. From 1848 to 1861 he performed various staff duties, chiefly as assistant-adjutant-general. On the outbreak of the Civil War he was appointed lieutenant-colonel on the 11th of May 1861, brigadier-general of volunteers a few days later, and major-general of volunteers in March 1862. He aided efficiently in organizing the Army of the Potomac, and, at the instance of General McClellan, was sent, in November 1861, to Kentucky to succeed General William T. Sherman in command. Here he employed himself in the organization and training of the Army of the Ohio (subsequently of the Cumberland), which to the end of its career retained a standard of discipline and efficiency only surpassed by that of the Army of the Potomac. In the spring of 1862 Buell followed the retiring Confederates under Sidney Johnston, and appeared on the field of Shiloh (*q.v.*) at the end of the first day's fighting. On the following day, aided by Buell's fresh and well-trained army, Grant carried all before him. Buell subsequently served under Halleck in the advance on Corinth, and in the autumn commanded in the campaign in Kentucky against Bragg. After a period of manœuvring in which Buell scarcely held his own, this virtually ended in the indecisive battle of Perryville. The alleged tardiness of his pursuit, and his objection to a plan of campaign ordered by the Washington authorities, brought about Buell's removal from command. With all his gifts as an organizer and disciplinarian, he was haughty in his dealings with the civil authorities, and, in high command, he showed, on the whole, unnecessary tardiness of movement and an utter disregard for the requirements of the political situation. Moreover, as McClellan's friend, holding similar views, adverse politically to the administration, he suffered by McClellan's displacement. The complaints made against him were investigated in 1862-1863, but the result of the investigation was not published. Subsequently he was offered military employment, which he declined. He resigned his volunteer commission in May, and his regular commission in June 1864. He was president of Green River ironworks (1865-1870), and subsequently engaged in various mining enterprises; he served (1885-1889) as pension agent at Louisville. He died near Rockport, Kentucky, on the 19th of November 1898.

BUENAVENTURA, a Pacific port of Colombia, in the department of Cauca, about 210 m. W.S.W. of Bogotá. Pop. about 1200. The town is situated on a small island, called Cascajal, at the head of a broad estuary or bay projecting inland from the Bay of Chocó and 10 m. from its mouth. Its geographical position is lat. 3° 48′ N., long. 77° 12′ W. The estuary is deep enough for vessels of 24 ft. draught and affords an excellent harbour. Buenaventura is a port of call for two lines of steamers (English and German), and is the Colombian landing-place of the West Coast cable. The town is mean in appearance, and has a very unhealthy climate, oppressively hot and humid. It is the port for the upper basin of the Cauca, an elevated and fertile region, with two large commercial centres, Popayan and Cali. In 1907 a railway was under construction to the latter, and an extension to Bogotá was also projected.

[v.04 p.0752]

BUENOS AIRES, a maritime province of Argentina, South America, bounded N. by the province of Santa Fé and Entre Rios, E. by the latter, the La Plata estuary, and the Atlantic, S. by the Atlantic, and W. by the territories (*gobernaciones*) of Rio Negro and Las Pampas, and the provinces of Córdoba and Santa Fé. Its area is 117,812 sq. m., making it the largest province of the republic. It is also the most populous, even excluding the federal district, an official estimate of 1903 giving it a population of 1,251,000. Although it has a frontage of over 900 m. on the La Plata and the Atlantic, the province has but few good natural ports, the best being Bahia Blanca, where the Argentine government has constructed a naval port, and Ensenada (La Plata), where extensive artificial basins have been constructed for the reception of ocean-going steamers. San Nicolas in the extreme north has a fairly good river port, while at Buenos Aires a costly artificial port has been constructed.

In its general aspect the province forms a part of the great treeless plain extending from the Atlantic and La Plata estuary westward to the Andes. A fringe of small tangled wood covers the low river banks and delta region of the Paraná between San Nicolas and Buenos Aires; thence southward to Bahia Blanca the sea-shore is low and sandy, with a zone of lagoons and partially submerged lands immediately behind. The south-eastern and central parts of the province are low and marshy, and their effective drainage has long been an urgent problem. Two ranges of low mountains extend partly across the southern part of the province—the first from Mar del Plata, on the coast, in a north-east direction, known at different points as the Sierra del Volcan (885 ft.), Sierra de Tandil (1476 ft.), and Sierra Baya, and the second and shorter range nearer Bahia Blanca, having the same general direction, known at different points as the Sierra Pillahuinco and Sierra de la Ventana (3543 ft.). The country is well watered with numerous lakes and small rivers, the largest river being the Rio Salado del Sud, which rises near the north-western boundary and flows entirely across the province in a south-easterly direction with a course of about 360 m. The Rio Colorado crosses the extreme southern extension of the province, a distance of about 80 m., but its mouth is obstructed, and its lower course is subject to occasional disastrous inundations.

Cattle-raising naturally became the principal industry of this region soon after its settlement by the Spaniards, and sheep-raising on a profitable basis was developed about the middle of the

19th century. Toward the end of that century the exports of wool, live-stock and dressed meats reached enormous proportions. There is a large export of jerked beef (*tasajo*) to Brazil and Cuba, and of live-stock to Europe, South Africa and neighbouring South American republics. Much attention also has been given to raising horses, asses, mules, swine and goats, all of which thrive on these grassy plains. Butter and cheese-making have gained considerable prominence in the province since 1890, and butter has become an article of export. Little attention had been given to cereals up to 1875, but subsequently energetic efforts were made to increase the production of wheat, Indian corn, linseed, barley, oats and alfalfa, so that by the end of the century the exports of wheat and flour had reached a considerable value. In 1895 there were 3,400,000 acres under cultivation in the province, and in 1900 the area devoted to wheat alone aggregated 1,960,000 acres. Fruit-growing also has made good progress, especially on the islands of the Paraná delta, and Argentine peaches, pears, strawberries, grapes and figs are highly appreciated.

The navigation of the Paraná is at all times difficult, and is impossible for the larger ocean-going steamers. The greater part of the trade of the northern and western provinces, therefore, must pass through the ports of Buenos Aires and Ensenada, at which an immense volume of business is concentrated. All the great trunk railways of the republic pass through the province and converge at these ports, and from them a number of transatlantic steamship lines carry away the products of its fertile soil. The province is also liberally supplied with branch railways. In the far south the new port of Bahia Blanca has become prominent in the export of wool and wheat.

The principal cities and towns of the province (apart from Buenos Aires and its suburbs of Belgrano and Flores) are its capital La Plata; Bahia Blanca, San Nicolas, a river port on the Paraná 150 m. by rail north-west of Buenos Aires, with a population (1901) of 13,000; Campana (pop. 5419 in 1895), the former river port of Buenos Aires on one of the channels of the Paraná, 51 m. by rail north-west of that city, and the site of the first factory in Argentina (1883) for freezing mutton for export; Chivilcoy, an important interior town, with a population (1901) of 15,000; Pergamino (9540 in 1895), a northern inland railway centre; Mar del Plata, a popular seaside resort 250 m. by rail south of Buenos Aires; Azul (9494), Tandil (7088), Chascomús (5667), Mercedes (9269), and Barracas al Sud (10,185), once the centre of the jerked beef industries.

The early history of the province of Buenos Aires was a struggle for supremacy over the other provinces for a period of two generations. Its large extent of territory was secured through successive additions by conquest of adjoining Indian territories south and west, the last additions being as late as 1879. Buenos Aires became a province of the Confederation in 1820, and adopted a constitution in 1854, which provides for its administration by a governor and legislature of two chambers, both chosen by popular vote. An unsuccessful revolt in 1880 against the national government led to the federalization of the city of Buenos Aires, and the selection of La Plata as the provincial capital, the republic assuming the public indebtedness of the provinces at that time as an indemnification. Before the new capital was finished, however, the province had incurred further liabilities of ten millions sterling, and has since then been greatly handicapped in its development in consequence.

(A. J. L.)

BUENOS AIRES, a city and port of Argentina, and capital of the republic, in 34° 36′ 21″ S. lat. and 58° 21′ 33″ W. long., on the west shore of the La Plata estuary, about 155 m. above its mouth, and 127 m. W. by N. from Montevideo. The estuary at this point is 34 m. wide, and so shallow that vessels can enter the docks only through artificial channels kept open by constant dredging. Previously to the construction of the new port, ocean-going vessels of over 15 ft. draught were compelled to anchor in the outer roads some 12 m. from the city, and communication with the shore was effected by means of steam tenders and small boats, connecting with long landing piers, or with carts driven out from the beach. The city is built upon an open grassy plain extending inland from the banks of the estuary, and north from the Riachuelo or Matanzas river where the "Boca" port is located. Its average elevation is about 65 ft. above sea-level. The federal district, which includes the city and its suburbs and covers an area of 72 sq. m., was detached from the province of Buenos Aires by an act of congress in 1880. With the construction of the new port and reclamation of considerable areas of the shallow water frontage, the area of the city has been greatly extended below the line of the original estuary banks. The streets of the old city, which are narrow and laid out to enclose rectangular blocks of uniform size, run nearly parallel with the cardinal points of the compass, but this plan is not closely followed in the new additions and suburbs. This uniformity in plan, combined with the level ground and the style of buildings first erected, gave to the city an extremely monotonous and uninteresting appearance, but with its growth in wealth and population, greater diversity and better taste in architecture have resulted.

The prevailing style of domestic architecture is that introduced from Spain and used throughout all the Spanish colonies—the grouping of one-storey buildings round one or two *patios*, which open on the street through a wide doorway. These residences have heavily barred windows on the street, and flat roofs with parapets admirably adapted for defence. The domiciliation of wealthy foreigners, and the introduction of foreign customs and foreign culture, have gradually modified the style of architecture, both public and domestic, and modern Buenos Aires is adorned with many costly and attractive public edifices and residences. French renaissance, lavishly decorated, has become the prevailing style. The Avenida Alvear is particularly noted for the elegance of its private residences, and the new Avenida de Mayo for its display of elaborately ornamented public and business edifices, while the suburban districts of Belgrano and Flores are

distinguished for the attractiveness of their country-houses and gardens. A part of the population is greatly overcrowded, one-fifth living in *conventillos*, or tenement-houses.

Among the city's many *plazas*, or squares, twelve are especially worthy of mention, viz.: 25 de Mayo (formerly Victoria) on which face the Government-House and Cathedral, San Martin (or Retiro), Lavalle, Libertad, Lorea, Belgrano, 6 de Junio, Once de Setiembre, Independencia (formerly Conceptión), Constitución, Caridad and 29 de Deciembre. These vary in size from one to three squares, or 4 to 12 acres each, and are handsomely laid out with flowers, shrubbery, walks and shade trees. There are also two elaborately laid out *alamedas*, the Recoleta and the Paseo de Julio, the latter on the river front and partially absorbed by the new port works, and the great park at Palermo, officially called 3 de Febrero, which contains 840 acres, beautifully laid out in drives, footpaths, lawns, gardens and artificial lakes. In all, the *plazas* and parks of Buenos Aires cover an area of 960 acres.

The cathedral, which is one of the largest in South America, dating from 1752, resembles the Madeleine of Paris in design, and its classical portico facing the Plaza 25 de Mayo has twelve stately Corinthian columns supporting an elaborately sculptured pediment. The archbishop's palace (Buenos Aires became an archiepiscopal see in 1866) adjoins the cathedral. There are about twenty-five Roman Catholic churches in the city, one of the richest and most popular of which is the Merced on Calle Reconquista, and four Protestant churches—English, Scottish Presbyterian, American Methodist and German Lutheran. Twenty asylums for orphans and indigent persons and one for lunatics are maintained at public expense and by private religious associations, while the demand for organized medical and surgical treatment is met by fifteen well-appointed hospitals, having an aggregate of 2600 beds, and treating 17,000 patients annually. Of these, five belong to foreign nationalities. The city has six cemeteries covering 230 acres.

Among the more noteworthy public buildings are the Casa Rosada (government-house), facing the Plaza 25 de Mayo and occupying in part the site of the fort built by Garay in 1580; the new congress hall on Calle Callao and Avenida de Mayo, finished in 1906 at a cost of about £1,300,000; the new municipal hall on Avenida de Mayo; the *bolsa* or exchange, distributing reservoir, mint, and some of the more modern educational buildings. Higher education is represented by the university of Buenos Aires, with its several faculties, including law and medicine, and 3562 students (1901), four national colleges, three normal schools and various technical schools. There are, also, a national library, a national museum, a zoological garden and an aquarium. The people are fond of music, the drama and amusements, and devote much time and expense to diversions of a widely varied character, from Italian opera to horse-racing and *pelota*. They have two or three large public baths, and a large number of social, sporting and athletic clubs. The Porteños, as the residents of Buenos Aires are called, are accustomed to call their city the "Paris of America," and not without reason. Buenos Aires has become the principal manufacturing centre of the republic, and its industrial establishments are numbered by thousands and their capital by hundreds of millions of dollars.

The growth of Buenos Aires since settled conditions have prevailed, and especially since its federalization, has been very rapid, and the city has finally outstripped all rivals and become the largest city of South America. At the time of its first authentic census in 1869, it had a population of 177,767. In 1887, when the suburbs of Belgrano and Flores with an aggregate population of 28,000 were annexed, its population without this increment was estimated at 404,000. In 1895 the national census gave the population as 663,854, and in 1904 a municipal census increased it to 950,891. At the close of 1905 the national statistical office estimated it at 1,025,653. The excess of births over deaths is unusually large (about 14 per thousand in 1905). The city has about one-fifth of the population of the whole republic. The government is vested in an *intendente municipal* (mayor) appointed by the national executive with the approval of the senate, and a *concejo deliberante* (legislative council) elected by the people and composed of two councillors from each parish. The police force is a military organization under the control of the national executive, and the higher municipal courts are subject to the same authority. Every ratepayer, whether foreigner or native, has the right to vote in municipal elections and to serve in the municipal council.

The water-supply is drawn from the estuary at Belgrano and conducted 3½ m. to the Recoleta, where three great settling basins, with an aggregate capacity of 12,000,000 gallons, and six acres of covered filters, are located. It is then pumped to the great distributing reservoir at Calles Córdoba and Viamonte, which covers four acres and has a capacity of 13,500,000 gallons. These works were begun in 1873. Up to 1873, when the water and drainage works were initiated by English engineers and contractors, there were no public sewers, and the sanitary state of the city was indescribably bad. The cholera epidemic of 1867-1868, with 15,000 victims, and the yellow fever epidemic of 1871, with 26,000 victims, were greatly intensified by these insanitary conditions. The construction of the sewers lasted about 19 years, when in 1892 the water and drainage works were taken over by the government, and are now administered at public expense and at a profit. The main sewer is 16 m. long and extends southward beyond Quilmes. The total cost of the two systems exceeded six millions sterling. Buenos Aires is now provided with a good water-supply, and its sanitary condition compares favourably with that of other great cities, the annual death-rate being about 18 per thousand, against 27 per thousand in 1887. Its mean annual temperature is 64° Fahr., and its annual rainfall 34 in.

The lighting includes both gas and electricity, the former dating from 1856. Previously to that time street lighting had been effected at first with lamps burning mares' grease, and then with

tallow candles. The streets were at first paved with cobble-stones, then with dressed granite paving-stones (parallelepipedons), and finally with wood and asphalt. The tram service is in the hands of nine private companies, operating 313 m. of track (31st of December 1905), on almost five-sevenths of which electric traction is employed. The city is the principal terminus and port for nearly all the trunk railway lines of the republic, which have large passenger stations at the Retiro, Once de Setiembre, and Constitución plazas, and are connected with the central produce market and the new Madero port. The great central produce market at Barracas al Sud (*Mercado Central de Frutos*), whose lands, buildings, railway sidings, machinery and mole cost £750,000, is designed to handle the pastoral and agricultural products of the country on a large scale, while 20 markets in the city meet the needs of local consumers.

The most important feature of the port of Buenos Aires is the "Madero docks," constructed to enlarge and improve its shipping facilities. Improvements had been, begun in 1872 at the "Boca," as the port on the Riachuelo is called, and nearly £1,500,000 was spent there in landing facilities and dredging a channel 12 m. in length, to deep water. These improvements were found insufficient, and in 1887 work was begun on plans executed by Sir John Hawkshaw for a series of four docks and two basins in front of the city, occupying 3 m. of reclaimed shore-line, and connected with deep water by two dredged channels. The north basin is provided with two dry docks, and the new quays are equipped with 24 warehouses, hydraulic cranes, and 28 m. of
[v.04 p.0754] railway sidings and connexions. The total cost of the new port works up to 1908 was about £8,000,000 sterling ($40,000,000 gold). In September of that year it was decided by congress to borrow £5,000,000 for still further extensions which were found to be required. The channels to deep water require constant dredging because of the great quantity of silt deposited by the river, and on this and allied purposes an expenditure of £560,000 was voted in 1908. In 1907 there were 29,178 shipping entries in the port, with an aggregate of 13,335,737 tons, the merchandise movement being 4,360,000 tons imports and 2,900,000 tons of produce exports. The revenues for 1907 were $5,452,000 gold, and working expenses, $2,213,000 gold, the profit ($3,229,000) being equal to about 8% on the cost of construction.

History.—Three attempts were made to establish a colony where the city of Buenos Aires stands. The first was in 1535 by Don Pedro de Mendoza with a large and well-equipped expedition from Spain, which, through mismanagement and the hostility of the Indians, resulted in complete failure. An expedition sent up the river by Mendoza founded Asunción, and thither went the colonists from his "Santa Maria de Buenos Ayres" when that settlement was abandoned. The second was in 1542 by a part of the expedition from Spain under Cabeza de Vaca, but with as little success. The third was in 1580 by Don Juan de Garay, governor of Paraguay, who had already established a half-way post at Santa Fé in 1573, and from this attempt dates the foundation of the city. The need of a port near the sea, where supplies from Spain could be received and ships provisioned, was keenly felt by the Spanish colonists at Asunción, and Garay's expedition down the Paraná in 1580 had that special object in view. Garay built a fort and laid out a town in the prescribed Spanish style above Mendoza's abandoned settlement, giving it the name of "Ciudad de la Santissima Trinidad," but retaining Mendoza's descriptive name for the port in appreciation of the agreeable and invigorating atmosphere of that locality. Buenos Aires remained a dependency of Asunción until 1620, when the Spanish settlements of the La Plata region were divided into three provinces, Paraguay, Tucuman and Buenos Aires, and Garay's "city" became the capital of the latter and also the seat of a new bishopric. The increasing population and trade of the La Plata settlements naturally contributed to the importance and prosperity of Buenos Aires, but Spain seems to have taken very little interest in the town at that time. Peru still dazzled the imagination with her stores of gold and silver, and the king and his councillors and merchants had no thought for the little trading station on the La Plata, for which one small shipment of supplies each year was at first thought sufficient. The proximity of the Portuguese settlements of Brazil and the unprotected state of the coast, however, made smuggling easy, and the colonists soon learned to supply their own needs in that way. The heavy seigniorage tax on gold and silver, and the costs of transportation by way of Panama, also sent a stream of contraband metal from Charcas to Buenos Aires, where it found eager buyers among the Portuguese traders from Brazil, who even founded the town of Colonia on the opposite bank of the estuary to facilitate their hazardous traffic. In time the magnitude of these operations attracted attention at Madrid and efforts were made to suppress them, but without complete success until more liberal provisions were made to promote trade between Spain and her colonies. In 1776 the Rio de la Plata provinces were erected into a vice-royalty, and Buenos Aires became its capital. Two years later the old commercial restrictions were abolished and a new code was promulgated, so liberal in character compared with the old that it was called the "free trade regulations." Under the old system all intercourse with foreign countries had been prohibited, with the exception of Great Britain and Portugal—the former having a contract (1715 to 1739) to introduce African slaves, and permission to send one shipload of merchandise each year to certain colonial ports, and the latter's Brazilian colonies having permission to import from Buenos Aires each year 2000 fanegas of wheat, 500 quintals of jerked beef and 500 of tallow. The African slaves introduced into Buenos Aires in this way were limited to 800 a year, and were the only slaves of that character ever received except some from Brazil after 1778, when greater commercial activity in the port created a sudden demand for labourers. Under the new regulations 9 ports in Spain and 24 in the colonies were declared *puertos habilitados*, or ports of entry, and trade between them was permitted, though under many restrictions. The effect of this change may be seen in the exportation of hides to the mother country, which had been only 150,000 a year before 1778, but rose to 700,000 and 800,000 a year after that date. (For the later history of the city see ARGENTINA.)

(A. J. L.)

BUFF (from Fr. *buffle*, a buffalo), a leather originally made from the skin of the buffalo, now also from the skins of other animals, of a dull pale yellow colour, used for making the buffcoat or jerkin, a leathern military coat. The old 3rd Foot regiment of the line in the British army (now the East Kent Regiment), and the old 78th Foot (now 2nd battalion Seaforth Highlanders), are called the "Buffs" and the "Ross-shire Buffs" respectively, from the yellow or buff-colour of their facings. The term is commonly used now of the colour alone.

BUFFALO, a city and port of entry, and the county-seat of Erie county, New York, U.S.A., the second city in population in the state, and the eighth in the United States, at the E. extremity of Lake Erie, and at the upper end of the Niagara river; distant by rail from New York City 423 m., from Boston 499 m., and from Chicago 540 m.

The site of the city, which has an area of 42 sq. m., is a broad, undulating tract, rising gradually from the lake to an elevation of from 50 to 80 ft., its altitude averaging somewhat less than 600 ft. above sea-level. The high land and temperate climate, and the excellent drainage and water-supply systems, make Buffalo one of the most healthy cities in the United States, its death-rate in 1900 being 14.8 per thousand, and in 1907 15.58. As originally platted by Joseph Ellicott, the plan of Buffalo somewhat resembled that of Washington, but the plan was much altered and even then not adhered to. Buffalo to-day has broad and spacious streets, most of which are lined by trees, and many small parks and squares. The municipal park system is one of unusual beauty, consisting of a chain of parks with a total area of about 1030 acres, encircling the city and connected by boulevards and driveways. The largest is Delaware Park, about 365 acres, including a lake of 46½ acres, in the north part of the city; the north part of the park was enclosed in the grounds of the Pan-American Exposition of 1901. Adjoining it is the Forest Lawn cemetery, in which are monuments to President Millard Fillmore, and to the famous Seneca chief Red Jacket (1751-1830), a friend of the whites, who was faithful when approached by Tecumseh and the Prophet, and warned the Americans of their danger; by many he has been considered the greatest orator of his race. Among the other parks are Cazenovia Park, Humboldt Park, South Park on the Lake Shore, and "The Front" on a bluff overlooking the source of the Niagara river; in the last is Fort Porter (named in honour of Peter B. Porter), where the United States government maintains a garrison.

Principal Buildings.—Buffalo is widely known for the beauty of its residential sections, the houses being for the most part detached, set well back from the street, and surrounded by attractive lawns. Among the principal buildings are the Federal building, erected at a cost of $2,000,000; the city and county hall, costing $1,500,000, with a clock tower 245 ft. high; the city convention hall, the chamber of commerce, the builders' exchange, the Masonic temple, two state armouries, the Prudential, Fidelity Trust, White and Mutual Life buildings, the Teck, Star and Shea's Park theatres, and the Ellicott Square building, one of the largest office structures in the world; and, in Delaware Park, the Albright art gallery, and the Buffalo Historical Society building, which was originally the New York state building erected for the Pan-American Exposition held in 1901. Among the social clubs the Buffalo, the University, the Park, the Saturn and the Country clubs, and among the hotels the Iroquois, Lafayette, Niagara and Genesee, may be especially mentioned. There are many handsome churches, including St Joseph's (Roman Catholic) and St Paul's (Protestant Episcopal) cathedrals, and Trinity (Protestant Episcopal), the Westminster Presbyterian, the Delaware Avenue Baptist, and the First Presbyterian churches.

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Education.—In addition to the usual high and grammar schools, the city itself supports a city training school for teachers, and a system of night schools and kindergartens. Here, too, is a state normal school. The university of Buffalo (organized in 1845) comprises schools of medicine (1845), law (1887), dentistry (1892), and pharmacy (1886). Canisius College is a Roman Catholic (Jesuit) institution for men (established in 1870 and chartered in 1883), having in 1907 a college department and an academic (or high school) department, and a library of about 26,000 volumes. Martin Luther Seminary, established in 1854, is a theological seminary of the Evangelical Lutheran Church. Among the best-known schools are the Academy of the Sacred Heart, Buffalo Seminary, the Franklin and the Heathcote schools, Holy Angels and St Mary's academies, St Joseph's Collegiate Institute, and St Margaret's school for girls. The Buffalo public library, founded in 1837, is housed in a fine building erected in 1887 (valued at $1,000,000), and contains about 300,000 books and pamphlets. Other important libraries, with the approximate number of their books, are the Grosvenor (founded in 1859), for reference (75,000 volumes and 7000 pamphlets); the John C. Lord, housed in the building of the Historical Society (10,620); the Law (8th judicial district) (17,000); the Catholic Institute (12,000); and the library of the Buffalo Historical Society (founded 1862) (26,600), now in the handsome building in Delaware Park used as the New York state building during the Pan-American Exposition of 1901. The Buffalo Society of Natural Sciences has a museum in the public library building.

Public Institutions.—The hospitals and the charitable and correctional institutions are numerous and are well administered. Many private institutions are richly endowed. Among the hospitals are a state hospital for the insane, the Erie county, the Buffalo general, the Children's, the United States marine (maintained by the Federal government), the German, the Homeopathic, the Women's, the German Deaconess and the Riverside hospitals, and the Buffalo hospital of the Sisters of Charity. Nurses' training schools are connected with most of these. Among the charitable institutions are the Home for the Friendless, the Buffalo, St Vincent's and St Joseph's orphan asylums, St John's orphan home, St Mary's asylum for widows and foundlings, and the Ingleside home for erring women. One of the most noteworthy institutions in the city is the

Charity Organisation Society, with headquarters in Fitch Institute. Founded in 1877, it was the first in the United States, and its manifold activities have not only contributed much to the amelioration of social conditions in Buffalo, but have caused it to be looked to as a model upon which similar institutions have been founded elsewhere.

The first newspaper, the *Gazette* (a weekly), was established in 1811 and became the *Commercial*, a daily, in 1835. The first daily was the *Courier*, established in 1831. There were in 1908 eleven daily papers published, three of which were in German and two in Polish. The weekly papers include several in German, three in Polish, and one in Italian.

Government and Population.—Buffalo is governed under an amended city charter of 1896 by which the government is vested in a bicameral city council, and a mayor elected for a term of four years. The mayor appoints the heads of the principal executive departments (health, civil service, parks, police and fire). The city clerk is elected by the city council. The municipality maintains several well-equipped public baths, and owns its water-supply system, the water being obtained from Lake Erie. The city is lighted by electricity generated by the water power of Niagara Falls, and by manufactured gas. Gas, obtained by pipe lines from the Ohio-Pennsylvania and the Canadian (Welland) natural gas fields, is also used extensively for lighting and heating purposes.

From the first census enumeration in 1820 the population has steadily and rapidly increased from about 2000 till it reached 352,387 inhabitants in 1900, and 423,715 (20% increase) in 1910. In 1900 there were 248,135 native-born and 104,252 foreign-born; 350,586 were white and only 1801 coloured, of whom 1698 were negroes. Of the native-born whites, 155,716 had either one or both parents foreign-born; and of the total population 93,256 were of unmixed German parentage. Of the foreign-born population 36,720 were German, the other large elements in their order of importance being Polish, Canadian, Irish, the British (other than Irish). Various sections of the poorer part of the city are occupied almost exclusively by the immigrants from Poland, Hungary and Italy.

Communications and Commerce.—Situated almost equidistant from Chicago, Boston and New York, Buffalo, by reason of its favourable location in respect to lake transportation and its position on the principal northern trade route between the East and West, has become one of the most important commercial and industrial centres in the Union. Some fourteen trunk lines have terminals at, or pass through, Buffalo. Tracks of a belt line transfer company encircle the city, and altogether there are more than 500 m. of track within the limits of Buffalo. Of great importance also is the lake commerce. Almost all the great steamship transportation lines of the Great Lakes have an eastern terminus at Buffalo, which thus has direct passenger and freight connexion with Cleveland, Detroit, Chicago, Milwaukee and the "Head of the Lakes" (Duluth-Superior). With the latter port it is connected by the Great Northern Steamship Company, a subsidiary line of the Great Northern railway, the passenger service of which is carried on by what are probably the largest and finest inland passenger steamships in existence. The tonnage of the port of Buffalo is considerably more than 5,000,000 tons annually. With a water front of approximately 20 m. and with 8 to 10 m. of wharfs, the shipping facilities have been greatly increased by the extensive harbour improvements undertaken by the Federal government. These improvements comprise a series of inner breakwaters and piers and an outer breakwater of stone and cement, 4 m. in length, constructed at a cost of more than $2,000,000. Another artery of trade of great importance is the Erie Canal, which here has its western terminus, and whose completion (1825) gave the first impetus to Buffalo's commercial growth. With the Canadian shore Buffalo is connected by ferry, and by the International bridge (from Squaw Island), which cost $1,500,000 and was completed in 1873.

It is as a distributing centre for the manufactured products of the East to the West, and for the raw products of the West to the East, and for the trans-shipment from lake to rail and vice versa, that Buffalo occupies a position of greatest importance. It is one of the principal grain and flour markets in the world. Here in 1843 Joseph Dart erected the first grain elevator ever constructed. In 1906 the grain elevators had a capacity of between twenty and thirty millions of bushels, and annual receipts of more than 200,000,000 bushels. The receipts of flour approximate 10,000,000 barrels yearly. More than 10,000,000 head of live stock are handled in a year in extensive stock-yards (75 acres) at East Buffalo; and the horse market is the largest in America. Other important articles of commerce are lumber, the receipts of which average 200,000,000 ft. per annum; fish (15,000,000 lb annually); and iron ore and coal, part of which, however, is handled at Tonawanda, really a part of the port of Buffalo. Buffalo is the port of entry of Buffalo Creek customs district; in 1908 its imports were valued at $6,708,919, and its exports at $26,192,563.

Manufactures.—As a manufacturing centre Buffalo ranks next to New York among the cities of the state. The manufactures were valued in 1900 at $122,230,061 (of which $105,627,182 was the value of the factory product), an increase of 22.2% over 1890; value of factory product in 1905, $147,377,873. The value of the principal products in 1900 was as follows: slaughtering and meat packing, $9,631,187 (in 1905 slaughtering and meat-packing $12,216,433, and slaughtering, not including meat-packing, $3,919,940); foundry and machine shop products, $6,816,057 (1905, $11,402,855); linseed oil, $6,271,170; cars and shop construction, $4,513,333 (1905, $3,609,471); malt liquors, $4,269,973 (1905, $5,187,216); soap and candles, $3,818,571 (in 1905, soap $4,792,915); flour and grist mill products, $3,263,697 (1905, $9,807,906); lumber and planing mill products, $3,095,760 (1905, $4,186,668); clothing, $3,246,723 (1905, $4,231,126); iron and steel products, $2,624,547. Other industrial establishments of importance include petroleum refineries, ship-yards, brick, stone and lime works, saddlery and harness

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factories, lithographing establishments, patent medicine works, chemical works, and copper smelters and refineries. Some of the plants are among the largest in existence, notably the Union and the Wagner Palace car works, the Union dry docks, the steel plants of the Lackawanna Iron and Steel Company, and the Larkin soap factory.

History.—The first white men to visit the site of Buffalo were undoubtedly the adventurous French trappers and various Jesuit missionaries. Near here, on the east bank of the Niagara river at the mouth of Cayuga Creek, La Salle in 1679 built his ship the "Griffin," and at the mouth of the river built Fort Conti, which, however, was burned in the same year. In 1687 marquis de Denonville built at the mouth of the river a fort which was named in his honour and was the predecessor of the fortifications on or near the same site successively called Fort Niagara; and the neighbourhood was the scene of military operations up to the close of the War of Independence. As early as 1784 the present site of the city of Buffalo came to be known as "the Buffalo Creek region" either from the herds of buffalo or bison which, according to Indian tradition, had frequented the salt licks of the creek, or more probably from an Indian chief. A little later, possibly in 1788-1789, Cornelius Winney, an Indian trader, built a cabin near the mouth of the creek and thus became the first permanent white resident. Slowly other settlers gathered. The land was a part of the original Phelps-Gorham Purchase, and subsequently (about 1793) came into the possession of the Holland Land Company, being part of the tract known as the Holland Purchase. Joseph Ellicott, the agent of the company, who has been called the "Father of Buffalo," laid out a town in 1801-1802, calling it New Amsterdam, and by this name it was known on the company's books until about 1810. The name of Buffalo Creek or Buffalo, however, proved more popular; the village became the county-seat of Niagara county in 1808, and two years later the town of Buffalo was erected. Upon the outbreak of the second war with Great Britain, Buffalo and the region about Niagara Falls became a centre of active military operations; directly across the Niagara river was the British Fort Erie. It was from Buffalo that Lieutenant Jesse D. Elliott (1782-1845) made his brilliant capture of the "Detroit" and "Caledonia" in October 1812; and on the 30th and 31st of December 1813 the settlement was attacked, captured, sacked, and almost completely destroyed by a force of British, Canadians and Indians under General Sir Phineas Riall (*c.* 1769-1851). After the cessation of hostilities, however, Buffalo, which had been incorporated as a village in 1813, was rapidly rebuilt. Its advantages as a commercial centre were early recognized, and its importance was enhanced on the opening up of the middle West to settlement, when Buffalo became the principal gateway for the lake routes. Here in 1818 was rebuilt the "Walk-in-the-Water," the first steamboat upon the Great Lakes, named in honour of a famous Wyandot Indian chief. In 1825 the completion of the Erie Canal with its western terminus at Buffalo greatly increased the importance of the place, which now rapidly outstripped and soon absorbed Black Rock, a village adjoining it on the N., which had at one time threatened to be a dangerous rival. In 1832 Buffalo obtained a city charter, and Dr Ebenezer Johnson (1786-1849) was chosen the first mayor. In that year, and again in 1834, a cholera epidemic caused considerable loss of life. At Buffalo in 1848 met the Free-Soil convention that nominated Martin van Buren for the presidency and Charles Francis Adams for the vice-presidency. Grover Cleveland lived in Buffalo from 1855 until 1884, when he was elected president, and was mayor of Buffalo in 1882, when he was elected governor of New York state. The Pan-American Exposition, in celebration of the progress of the Western hemisphere in the nineteenth century, was held there (May 1-November 2, 1901). It was during a reception in the Temple of Music on the Exposition grounds that President McKinley was assassinated (September 6th); he died at the home of John G. Milburn, the president of the Exposition. In the house of Ansley Wilcox here Vice-President Theodore Roosevelt took the oath of office as president. A marble shaft 80 ft. high, in memory of McKinley, has been erected in Niagara Square.

See William Ketchum, *History of Buffalo* (2 vols., Buffalo, 1864-1865); H.P. Smith, *History of Buffalo and Erie County* (Syracuse, 1884); *Publications of the Buffalo Historical Society* (Buffalo, 1879 et seq.); O. Turner, *History of the Holland Purchase* (Buffalo, 1850); T.H. Hotchkin, *History of Western New York* (New York, 1845); and the sketch in Lyman P. Powell's *Historic Towns of the Middle States* (New York, 1901).

BUFFALO, a name properly pertaining to an aberrant species of cattle which has been kept in a state of domestication in India and Egypt from time immemorial, and had been introduced from the latter country into southern Europe. It is now taken, however, to include not only this species, whose native home is India, but all more or less nearly related animals.[1] Buffaloes are heavily built oxen, with sparsely haired skin, large ears, long, tufted tails, broad muzzles and massive angulated horns. In having only 13 pairs of ribs they resemble the typical oxen. African buffaloes all have the hair of the back directed backwards.

In the Cape buffalo, *Bos (Bubalus) caffer*, the horns do not attain an excessive length, but in old bulls are so expanded and thickened at the base as to form a helmet-like mass protecting the whole forehead. Several more or less nearly allied local races have been named; and in Eastern Africa the buffaloes (*B. caffer aequinoctialis*) have smaller horns, which do not meet in the middle line. From this animal, which is brown instead of black, there seems to be a transition towards the red dwarf buffalo (*B. nanus*) of West Africa, an animal scarcely more than two-thirds the size of its gigantic southern cousin, with relatively small, much flattened, upwardly curved horns. In South Africa buffaloes frequent reedy swamps, where they associate in herds of from fifty to a hundred or more individuals. Old bulls may be met with either alone or in small parties of from two or three to eight or ten. This buffalo formerly roamed in herds over the plains of Central and Southern Africa, always in the near vicinity of water, but the numbers are greatly diminished. In

Cape Colony some herds are protected by the government in the eastern forest-districts. This species has never been domesticated, nor does there appear to have been any attempt to reduce it to service. Like its Indian ally it is fond of water, which it visits at regular intervals during the twenty-four hours; it also plasters itself with mud, which, when hardened by the sun, protects it from the bite of the gadflies which in spite of its thick hide seem to cause it considerable annoyance. It is relieved of a portion of the parasitic ticks, so common on the hides of thick-skinned animals, by means of the red-beaked rhinoceros birds, *Buphaga erythrorhynca*, a dozen or more of which may be seen partly perched on its horns and partly moving about on its back, and picking up the ticks on which they feed. The hunter is often guided by these birds in his search for the buffalo, but oftener still they give timely warning to their host of the dangerous proximity of the hunter, and have thus earned the title of "the buffalo's guardian birds."

In a wild state the typical Indian buffalo, *Bos (Bubalus) bubalis*, seems to be restricted to India and Ceylon, although some of the buffaloes found in the Malay Peninsula and Islands probably represent local races. The species has been introduced into Asia Minor, Egypt, Italy and elsewhere. The large size and wide separation of the horns, as well as the less thickly fringed ears, and the more elongated and narrow head, form marked points of distinction between the Asiatic and South African species. Moreover, all Asiatic buffaloes are distinguished from the African forms by having the hair on the fore-part of the back directed forwards; and these go far
[v.04 p.0757] to support the views of those who would make them the types of a distinct subgenus, or genus, *Buffelus*. In Assam there formerly existed a local race, *B. bubalis macrocercus*, characterized by the horns, which are of immense size, being directed mainly outwards, instead of curving upwards in a circular form. Another Assam race (*B. bubalis fulvus*) is characterized by the tawny, in place of black, colour of its hair and hide. The haunts of the Indian buffalo are the grass-jungles near swamps, in which the grass exceeds 20 ft. in height. Here the buffaloes—like the Indian rhinoceros—form covered pathways, in which they are completely concealed. The herds frequently include fifty or more individuals. These animals are fond of passing the day in marshes, where they love to wallow in the mud; they are by no means shy, and do much harm to the crops. The rutting-season occurs in autumn, when several females follow a single male, forming for the time a small herd. The period of gestation lasts for ten months, and the female produces one or two calves at a birth. The bull is capable, it is said, of overthrowing an elephant, and generally more than a match even for the tiger, which usually declines the combat when not impelled by hunger. The Indian driver of a herd of tame buffaloes does not shrink from entering a tiger-frequented jungle, his cattle, with their massive horns, making short work of any tiger that may come in their way. Buffalo fights and fights between buffaloes and tigers were recognized Indian sports in the old days. Domesticated buffaloes differ from their wild brethren merely by their inferior size and smaller horns; some of the latter being of the circular and others of the straight type. The milk is good and nourishing, but of a ropy consistency and a peculiar flavour.

The tamarao, or Philippine buffalo, *Bos (Bubalus) mindorensis*, is a smaller animal, in many respects intermediate between the Indian buffalo and the dwarf anoa, or Celebes buffalo (*B. depressicornis*).

(R. L.*)

[1] In America, it is worth noting, the term "buffalo" is almost universally taken, at all events in popular parlance, to designate the American bison, for which see Bison.

BUFFET, LOUIS JOSEPH (1818-1898), French statesman, was born at Mirecourt. After the revolution of February 1848 he was elected deputy for the department of the Vosges, and in the Assembly sat on the right, pronouncing for the repression of the insurrection of June 1848 and for Louis Napoleon Bonaparte. He was minister of agriculture from August to December 1849 and from August to October 1851. Re-elected deputy in 1863, he was one of the supporters of the "Liberal Empire" of Emile Ollivier, being finance minister in Ollivier's cabinet from January to the 10th of April 1870. He was president of the National Assembly from the 4th of April 1872 to the 10th of March 1875, and minister of the interior in 1875. Then, elected senator for life (1876), he pronounced himself in favour of the *coup d'état* of the 16th of May 1877. Buffet had some oratorical talent, but shone most in opposition.

BUFFET, a piece of furniture which may be open or closed, or partly open and partly closed, for the reception of dishes, china, glass and plate. The word may also signify a long counter at which one stands to eat and drink, as at a restaurant, or—which would appear to be the original meaning—the room in which the counter stands. The word, like the thing it represents, is French. The buffet is the descendant of the credence, and the ancestor of the sideboard, and consequently has a close affinity to the dresser. Few articles of furniture, while preserving their original purpose, have varied more widely in form. In the beginning the buffet was a tiny apartment, or recess, little larger than a cupboard, separated from the room which it served either by a breast-high balustrade or by pillars. It developed into a definite piece of furniture, varying from simplicity to splendour, but always provided with one or more flat spaces, or broad shelves, for the reception of such necessaries of the dining-room as were not placed upon the table. The early buffets were sometimes carved with the utmost elaboration; the Renaissance did much to vary their form and refine their ornament. Often the lower part contained receptacles as in the characteristic English court-cupboard. The rage for collecting china in the middle of the 18th century was responsible for a new form—the high glazed back, fitted with shelves, for the display of fine pieces of crockery-ware. This, however, was hardly a true buffet, and was the very antithesis of the primary arrangement, in which the huge goblets and beakers and fantastic pieces of plate, of which so extremely few examples are left, were displayed upon the open

"gradines." The tiers of shelves, with or without a glass front, which are still often found in Georgian houses, were sometimes called buffets—in short, any dining-room receptacle for articles that were not immediately wanted came at last to bear the name. In France the variations of type were even more numerous than in England, and it is sometimes difficult to distinguish a commode from a buffet. In the latter part of the 18th century the buffet occasionally took the form of a console table.

BUFFIER, CLAUDE (1661-1737), French philosopher, historian and educationalist, was born in Poland, on the 25th of May 1661, of French parents, who returned to France, and settled at Rouen, soon after his birth. He was educated at the Jesuit college there, and was received into the order at the age of nineteen. A dispute with the archbishop compelled him to leave Rouen, and after a short stay in Rome he returned to Paris to the college of the Jesuits, where he spent the rest of his life. He seems to have been an admirable teacher, with a great power of lucid exposition. His object in the *Traité des vérités premières* (1717), his best-known work, is to discover the ultimate principle of knowledge. This he finds in the sense we have of our own existence and of what we feel within ourselves. He thus takes substantially the same ground as Descartes, but he rejected the *a priori* method. In order to know what exists distinct from the self, "common sense" is necessary. Common sense he defined as "that disposition which nature has placed in all or most men, in order to enable them, when they have arrived at the age and use of reason, to form a common and uniform judgment with respect to objects different from the internal sentiment of their own perception, which judgment is not the consequence of any anterior judgment." The truths which this "disposition of nature" obliges us to accept can be neither proved nor disproved; they are practically followed even by those who reject them speculatively. But Buffier does not claim for these truths of "common sense" the absolute certainty which characterizes the knowledge we have of our own existence or the logical deductions we make from our thoughts; they possess merely the highest probability, and the man who rejects them is to be considered a fool, though he is not guilty of a contradiction. Buffier's aversion to scholastic refinements has given to his writings an appearance of shallowness and want of metaphysical insight, and unquestionably he failed entirely even to indicate the nature of that universality and necessity which he ascribed to his "eternal verities"; he was, however, one of the earliest to recognize the psychological as distinguished from the metaphysical side of Descartes's principle, and to use it, with no inconsiderable skill, as the basis of an analysis of the human mind, similar to that enjoined by Locke. In this he has anticipated the spirit and method as well as many of the results of Reid and the Scottish school. Voltaire described him as "the only Jesuit who has given a reasonable system of philosophy."

He wrote also *Éléments de métaphysique* (1724), a "French Grammar on a new plan," and a number of historical essays. Most of his works appeared in a collected form in 1732, and an English translation of the *Traité* was published in 1780.

BUFFON, GEORGE LOUIS LECLERC, Comte de (1707-1788), French naturalist, was born on the 7th of September 1707, at Montbard (Côte d'Or), his father, Benjamin François Leclerc de Buffon (1683-1775), being councillor of the Burgundian parlement. He studied law at the college of Jesuits at Dijon; but he soon exhibited a marked predilection for the study of the physical sciences, and more particularly for mathematics. Whilst at Dijon he made the acquaintance of a young Englishman, Lord Kingston, and with him travelled through Italy and then went to England. He published a French translation of Stephen Hales's *Vegetable Statics* in 1735, and of Sir I. Newton's *Fluxions* in 1740. At twenty-five years of age he succeeded to a considerable property, inherited from his mother, and from this time onward his life was devoted to regular
[v.04 p.0758] scientific labour. At first he directed his attention more especially to mathematics, physics, and agriculture, and his chief original papers are connected with these subjects. In the spring of 1739 he was elected an associate of the Academy of Sciences; and at a later period of the same year he was appointed keeper of the Jardin du Roi and of the Royal Museum. This appears to have finally determined him to devote himself to the biological sciences in particular, and he began to collect materials for his *Natural History*. In the preparation of this voluminous work he associated with himself L.J.M. Daubenton, to whom the descriptive and anatomical portions of the treaties were entrusted, and the first three volumes made their appearance in the year 1749. In 1752 (not in 1743 or 1760, as sometimes stated) he married Marie Françoise de Saint-Belin. He seems to have been fondly attached to her, and felt deeply her death at Montbard in 1769. The remainder of Buffon's life as a private individual presents nothing of special interest. He belonged to a very long-lived race, his father having attained the age of ninety-three, and his grandfather eighty-seven. He himself died at Paris on the 15th of April 1788, at the age of eighty-one, of vesical calculus, having refused to allow any operation for his relief. He left one son, George Louis Marie Leclerc Buffon, who was an officer in the French army, and who died by the guillotine, at the age of thirty, on the 10th of July 1793 (22 Messidor, An II.), having espoused the party of the duke of Orleans.

Buffon was a member of the French Academy (his inaugural address being the celebrated *Discours sur le style*, 1753), perpetual treasurer of the Academy of Sciences, fellow of the Royal Society of London, and member of the Academies of Berlin, St Petersburg, Dijon, and of most of the learned societies then existing in Europe. Of handsome person and noble presence, endowed with many of the external gifts of nature, and rejoicing in the social advantages of high rank and large possessions, he is mainly known by his published scientific writings. Without being a profound original investigator, he possessed the art of expressing his ideas in a clear and generally attractive form. His chief defects as a scientific writer are that he was given to excessive and hasty generalization, so that his hypotheses, however seemingly brilliant, are often

destitute of any sufficient basis in observed facts, whilst his literary style is not unfrequently theatrical and turgid, and a great want of method and order is commonly observable in his writings.

His great work is the *Histoire naturelle, générale et particulière*; and it can undoubtedly claim the merit of having been the first work to present the previously isolated and apparently disconnected facts of natural history in a popular and generally intelligible form. The sensation which was made by its appearance in successive parts was very great, and it certainly effected much good in its time by generally diffusing a taste for the study of nature. For a work so vast, however—aiming, as it did, at being little less than a general encyclopaedia of the sciences—Buffon's capacities may, without disparagement, be said to have been insufficient, as is shown by the great weakness of parts of the work (such as those relating to mineralogy). The *Histoire naturelle* passed through several editions, and was translated into various languages. The edition most highly prized by collectors, on account of the beauty of its plates, is the first, which was published in Paris (1749-1804) in forty-four quarto volumes, the publication extending over more than fifty years. In the preparation of the first fifteen volumes of this edition (1749-1767) Buffon was assisted by Daubenton, and subsequently by P. Guéneau de Montbéliard, the abbé G.L.C.A. Bexon, and C.N.S. Sonnini de Manoncourt. The following seven volumes form a supplement to the preceding, and appeared in 1774-1789, the famous *Époques de la nature* (1779) being the fifth of them. They were succeeded by nine volumes on the birds (1770-1783), and these again by five volumes on minerals (1783-1788). The remaining eight volumes, which complete this edition, appeared after Buffon's death, and comprise reptiles, fishes and cetaceans. They were executed by B.G.E. de Lacépède, and were published in successive volumes between 1788 and 1804. A second edition begun in 1774 and completed in 1804, in thirty-six volumes quarto, is in most respects similar to the first, except that the anatomical descriptions are suppressed and the supplement recast.

See Humbert-Bazile, *Buffon, sa famille, &c.* (1863); M.J.P. Flourens, *Hist. des travaux et des idées de Buffon* (1844, 3rd ed., 1870); H. Nadault de Buffon, *Correspondance de Buffon* (1860); A.S. Packard, *Lamarck* (1901).

BUG, the name of two rivers of Europe. (1) A stream of European Russia, distinguished sometimes as the Southern Bug, which rises in the S. of the government of Volhynia, and flows generally S.E. through the governments of Podolia and Kherson, and after picking up the Ingul from the left at Nikolayev, enters the *liman* or lagoon into which the Dnieper also discharges. Its length is 470 m. Its upper part is beset with rapids, and its lower is of little value for navigation on account of the numerous sandbanks and blocks of rock which choke its bed. (2) A river distinguished as the Western Don, which rises in the E. of Austrian Galicia between Tarnopol and Brody, and flows N.N.W. as far as Brest-Litovsk, separating the Polish provinces of Lublin and Siedlce from the Russian governments of Volhynia and Grodno; it then swings away almost due W., between the provinces of Warsaw and Lomza, and joins the Vistula, 23 m. below the city of Warsaw. Length, 470 m. It is navigable from Brest-Litovsk downwards.

BUG, the common name for hemipterous insects of the family *Cimicidae*, of which the best-known example is the house bug or bed bug (*Cimex lectularius*). This disgusting insect is of an oval shape, of a rusty red colour, and, in common with the whole tribe to which it belongs, gives off an offensive odour when touched; unlike the others, however, it is wingless. The bug is provided with a proboscis, which when at rest lies along the inferior side of the thorax, and through which it sucks the blood of man, the sole food of this species. It is nocturnal in its habits, remaining concealed by day in crevices of bed furniture, among the hangings, or behind the wall paper, and shows considerable activity in its nightly raids in search of food. The female deposits her eggs at the beginning of summer in crevices of wood and other retired situations, and in three weeks the young emerge as small, white, and almost transparent larvae. These change their skin very frequently during growth, and attain full development in about eleven weeks. Two centuries ago the bed bug was a rare insect in Britain, and probably owes its name, which is derived from a Celtic word signifying "ghost" or "goblin," to the terror which its attacks at first inspired. An allied species, the dove-cote bug (*Cimex columbaria*), attacks domestic fowls and pigeons.

BUGEAUD DE LA PICONNERIE, THOMAS ROBERT, DUKE OF ISLY (1784-1849), marshal of France, was born at Limoges on the 15th of October 1784. He came of a noble family of Périgord, and was the youngest of his parents' thirteen children. Harsh treatment led to his flight from home, and for some years about 1800 he lived in the country, engaged in agriculture, to which he was ever afterwards devoted. At the age of twenty he became a private soldier in the *Vélites* of the Imperial Guard (1804), with which he took part in the Austerlitz campaign of the following year. Early in 1806 he was given a commission, and as a sub-lieutenant he served in the Jena and Eylau campaigns, winning his promotion to the rank of lieutenant at Pultusk (December 1806). In 1808 he was in the first French corps which entered Spain, and was stationed in Madrid during the revolt of the *Dos Mayo*. At the second siege of Saragossa he won further promotion to the rank of captain, and in 1809-1810 found opportunities for winning distinction under General (Marshal) Suchet in the eastern theatre of the Peninsular War, in which he rose to the rank of major and the command of a full regiment. At the first restoration he was made a colonel, but he rejoined Napoleon during the Hundred Days, and under his old chief Suchet distinguished himself greatly in the war in the Alps. For fifteen years after the fall of Napoleon he was not re-employed, and during this time he displayed great activity in agriculture and in the general development of his district of Périgord. The July revolution of 1830 reopened his military career,

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and after a short tenure of a regimental command he was in 1831 made a *maréchal de camp*. In the chamber of deputies, to which he was elected in the same year, he showed himself to be an inflexible opponent of democracy, and in his military capacity he was noted for his severity in police work and the suppression of *émeutes*. His conduct as gaoler of the duchesse de Berry led to a duel between Bugeaud and the deputy Dulong, in which the latter was killed (1834); this affair and the incidents of another *émeute* exposed Bugeaud to ceaseless attacks in the Chamber and in the press, but his opinion was sought by all parties in matters connected with agriculture and industrial development. He was re-elected in 1834, 1837 and 1839.

About this time Bugeaud became much interested in the question of Algeria. At first he appears to have disapproved of the conquest, but his undeviating adherence to Louis Philippe brought him into agreement with the government, and with his customary decision he proposed to employ at once whatever forces were necessary for the swift, complete and lasting subjugation of Algeria. Later events proved the soundness of his views; in the meantime Bugeaud was sent to Africa in a subordinate capacity, and proceeded without delay to initiate his war of flying columns. He won his first victory on the 7th of July 1836, made a brilliant campaign of six weeks' duration, and returned home with the rank of lieutenant-general. In the following year he signed the treaty of Tafna (June 1st, 1837), with Abd-el-Kader, an act which, though justified by the military and political situation, led to a renewal of the attacks upon him in the chamber, to the refutation of which Bugeaud devoted himself in 1839. Finally, in 1840, he was nominated governor-general of Algeria, and early in 1841 he put into force his system of flying columns. His swiftness and energy drove back the forces of Abd-el-Kader from place to place, while the devotion of the rank and file to "Père Bugeaud" enabled him to carry all before him in action. In 1842 he secured the French positions by undertaking the construction of roads. In 1843 Bugeaud was made marshal of France, and in this and the following year he continued his operations with unvarying success. His great victory of Isly on the 14th of August 1844 won for him the title of duke. In 1845, however, he had to take the field again in consequence of the disaster of Sidi Brahim (22nd of September 1845), and up to his final retirement from Algeria (July 1846) he was almost constantly employed in the field. His resignation was due to differences with the home government on the question of the future government of the province. Amidst his other activities he had found time to study the agricultural characteristics of the conquered country, and under his régime the number of French colonists had grown from 17,000 to 100,000. In 1848 the marshal was in Paris during the revolution, but his orders prevented him from acting effectually to suppress it. He was asked, but eventually refused, to be a candidate for the presidency in opposition to Louis Napoleon. His last public service was the command of the army of the Alps, formed in 1848-1849 to observe events in Italy. He died in Paris on the 10th of June 1849.

Bugeaud's writings were numerous, including his *Œuvres militaires*, collected by Weil (Paris, 1883), many official reports on Algeria and the war there, and some works on economics and political science. See Comte d'Ideville, *Le Maréchal Bugeaud* (Paris, 1881-1882).

BUGENHAGEN, JOHANN (1485-1558), surnamed Pomeranus, German Protestant reformer, was born at Wollin near Stettin on the 24th of June 1485. At the university of Greifswald he gained much distinction as a humanist, and in 1504 was appointed by the abbot of the Praemonstratensian monastery at Belbuck rector of the town school at Treptow. In 1509 he was ordained priest and became a vicar in the collegiate *Marienkirche* at Treptow; in 1517 he was appointed lecturer on the Bible and Church Fathers at the abbey school at Belbuck. In 1520 Luther's *De Captivitate Babylonica* converted him into a zealous supporter of the Reformer's views, to which he won over the abbot among others. In 1521 he went to Wittenberg, where he formed a close friendship with Luther and Melanchthon, and in 1522 he married. He preached and lectured in the university, but his zeal and organizing skill soon spread his reforming influence far beyond its limits. In 1528 he arranged the church affairs of Brunswick and Hamburg; in 1530 those of Lübeck and Pomerania. In 1537 he was invited to Denmark by Christian III., and remained five years in that country, organizing the church (though only a presbyter, he consecrated the new Danish bishops) and schools. He passed the remainder of his life at Wittenberg, braving the perils of war and persecution rather than desert the place dear to him as the home of the Reformation. He died on the 20th of April 1558. Among his numerous works is a history of Pomerania, which remained unpublished till 1728. Perhaps his best book is the *Interpretatio in Librum Psalmorum* (1523), and he is also remembered as having helped Luther in his translation of the Bible.

See Life by H. Hering (Halle, 1888); Emil Görigk, *Bugenhagen und die Protestantisierung Pommerns* (1895). O. Vogt published a collection of Bugenhagen's correspondence in 1888, and a supplement in 1890.

BUGGE, SOPHUS (1833-1907), Norwegian philologist, was born at Laurvik, Norway, on the 5th of January 1833. He was educated at Christiania, Copenhagen and Berlin, and in 1866 he became professor of comparative philology and Old Norse at Christiania University. In addition to collecting Norwegian folk-songs and traditions, and writing on Runic inscriptions, he made considerable contributions to the study of the Celtic, Romance, Oscan, Umbrian and Etruscan languages. He was the author of a very large number of books on philology and folklore. His principal work, a critical edition of the elder Edda (*Norroen Fornkvoedi*), was published at Christiania in 1867. He maintained that the songs of the *Edda* and the earlier sagas were largely founded on Christian and Latin tradition imported into Scandinavian literature by way of England. His writings also include *Gamle Norske Folkeviser* (1858), a collection of Old Norse folk-songs; *Bidrag til den aeldste skaldedigtnings historie* (Christiania, 1894); *Helge-digtene i den*

Aeldre Edda (Copenhagen, 1896, Eng. trans., *The Home of the Eddic Poems*, 1899); *Norsk Sagafortaelling op Sagaskrivning i Island* (Christiania, 1901), and various books on Runic inscriptions. He died on the 8th of July 1907.

For a further list of his works see J.B. Halvorsen, *Norsk Forfatter-Lexikon*, vol. i. (Christiania, 1885).

BUGGY, a vehicle with either two (in England and India) or four wheels (in America). English buggies are generally hooded and for one horse. American buggies are for one horse or two, and either covered with a hood or open; among the varieties are the "Goddard" (the name of the inventor), the "box," so called from the shape of the body, the "cut under," i.e. cut out for the front wheels to cramp beneath and so turn in a narrow space, the "end-spring" and "side-bar," names referring to the style of hanging. A skeleton buggy, lightly constructed, is used on the American "speedways," built and maintained for fast driving. The word is of unknown origin; it may be connected with "bogie" (*q.v.*) a truck. The supposed Hindustani *baggī*, a gig, often given as the source, appears to be an invention or an adaptation into the vernacular of the English word.

BUGIS, or Bughis, a people of Malayan stock, originally occupying only the kingdom of Boni in the south-western peninsula of the island of Celebes. From this district they spread over the whole island, and founded settlements throughout the whole Malay Archipelago. They are of middle size and robust, of very active, enterprising nature and of a complexion slightly lighter than the average Malay. In disposition they are brave, haughty and fierce, and are said to be more predisposed towards "running amuck" than any other Malayans. They speak a language allied to that of the Macassars, and write it with similar characters. It has been studied, and its letters reproduced in type by Dr B.F. Mathes of the Netherlands Bible Society. The Bugis are industrious and ingenious; they practise agriculture more than the neighbouring tribes, and manufacture cotton-cloth not only for their own use but for export. They also carry on a considerable trade in the mineral and vegetable products of Boni, such as gold-dust, tortoise-shell, pearls, nut-megs and camphor. Thair love of the sea has given them almost a monopoly of
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trade around Celebes. Their towns are well built and they have schools of their own. The king is elected generally for life, and always from their own number, by the chiefs of the eight petty states that compose the confederation of Boni, and he cannot decide on any public measure without their consent. In some of the states the office of chief is hereditary; in others any member of the privileged classes may aspire to the dignity, and it not infrequently happens that the state is governed by a woman. The Bugis have been Mahommedans since the 17th century. Their original form of nature-worship had been much affected by Hindu influences, and even now they retain rites connected with the worship of Siva. See further Boni; Celebes.

BUGLE, Bugle-horn, Keyed Bugle, Kent Bugle or Regent's Bugle (Fr. *Bugle*, *Clairon*, *Cor à clefs*, *Bugle à clefs*; Ger. *Flügelhorn*, *Signalhorn*, *Bugelhorn*, *Klappenhorn*, *Kenthorn*; Ital. *Corna cromatica*), a treble brass wind instrument with cup-shaped mouthpiece and conical bore, used as a military duty and signal instrument. The bugle was originally, as its name denotes, a bull's horn,[1] of which it has preserved the characteristic conical bore of rapidly increasing diameter.

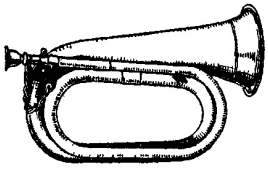
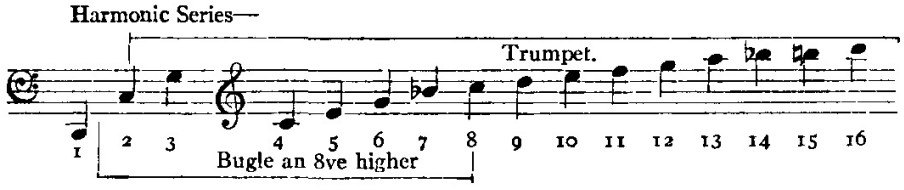


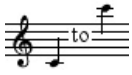
Fig. 1.—Modern Service Bugle, British Army (Charles Mahillon).

Those members of the brass wind such as the horns, bugle, trumpet and tubas, which, in their simplest form, consist of tubes without lateral openings, depend for their scale on the harmonic series obtained by overblowing, i.e. by greater pressure of breath and by the increased tension of the lips, acting as reeds, across the mouthpiece. The harmonic series thus produced, which depends on the acoustic principles of the tube itself, and is absolutely uninfluenced by the manner in which the tube is bent, forms a natural subdivision in classifying these instruments:—(1) Those in which the lower harmonics from the second to the sixth or eighth are employed, such as the bugle, post-horn, the cornet à pistons, the trombone. (2) Those in which the higher harmonics from the third or fourth to the twelfth or sixteenth are mostly used, such as the French horn and trumpet. (3) Those which give out the fundamental tone and harmonics up to the eighth, such as the tubas and ophicleide.

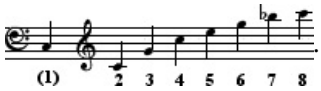


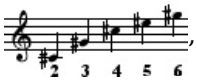
We thus find a fundamental difference between the trumpet and the bugle as regards the harmonic series. But although, to the casual beholder, these instruments may present a general similarity, there are other important structural distinctions. The tube of the trumpet is cylindrical, widening only at the bell, whereas that of the bugle, as stated above, is conical. Both instruments have cup-shaped mouthpieces outwardly similar. The peculiar shape of the basins, however, at the place where they open into the tube, angular in the trumpet and bevelled in the bugle, taken in conjunction with the bore of the main tube, gives to the trumpet its brilliant blaring tone, and to the bugle its more veiled but penetrating quality, characteristic of the whole

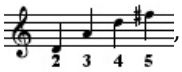
family.[2] Only five notes are required for the various bugle-calls, although the actual compass of the instrument consists of eight, of which the first or fundamental, however, being of poor quality, is never used. There are bugles in C and in E flat, but the bugle in B flat is most generally used; the key of C is used in notation.

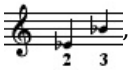
In order to increase the compass and musical possibilities of the bugle, two methods have been adopted, the use of (1) keys and (2) valves. The application of keys to the bugle produced the Kent bugle, and later the ophicleide. The application of valves produced the family of saxhorns. The use of keys for wood wind instruments was known early in the 15th century,[3] perhaps before. In 1438, the duke of Burgundy paid Hennequin Haulx, instrument-maker of Brussels, 4 *ridres* a piece for three tenor bombards with keys. In the 16th century we find a key applied to the bass flûte-à-bec[4] and later to the large tenor cornetto.[5] In 1770 a horn-player named Kölbel, belonging to the imperial Russian band, experimented with keys on the trumpet, and in 1795 Weidinger of Vienna produced a trumpet with five keys. In 1810 Joseph Halliday, the bandmaster of the Cavan militia, patented the keyed bugle, with five keys and a compass of twenty-five notes, calling it the "Royal Kent Bugle" out of compliment to the duke of Kent, who was at the time commander-in-chief, and encouraged the introduction of the instrument into the regimental bands. A Royal Kent bugle in C, stamped with Halliday's name as inventor, and made by P. Turton, 5 Wormwood Gate, Dublin, was exhibited by Col. Shaw-Hellier at the Royal Military Exhibition in 1890.[6] The instrument measures 17 in., and the total length of the tubing, including the mouthpiece, 50½ in. The diameter at the mouthpiece is ½ in. and at the bell 5¾ in. The instrument has a chromatic compass of two octaves, 

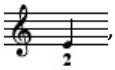
the open notes being

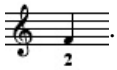


Mahillon (op. cit. p. 117) points out that the tonality of the key-bugle and kindred instruments is determined by the second harmonic given out by the open tube, the first key remaining open. To the original instrument specified in the patent, Halliday added a sixth key, which became the first and was in the normal position open; this key when closed gave B flat, with the same series of harmonics as the open tube. The series, however, becomes shorter with each successive key. Thus, on being opened, the second key gives 

, the third key 

, the fourth key 

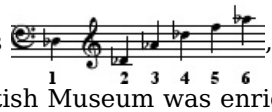
, the fifth key 

, the sixth key 

. The bore of the instrument is just wide enough in proportion to its length to make possible the playing of the fundamental tones in the first two series, but these notes are never used, and the harmonics above the sixth are also avoided, being of doubtful intonation. In the ophicleide, the bass of the key-bugle, the bore is sufficiently wide to produce the fundamentals of a satisfactory quality.

The keyed bugle was chiefly used in B flat, a crook for B flat being frequently added to the bugle in C; the soprano bugle in E flat was also much used in military bands.

The origin of the bugle, in common with that of the hunting horn, is of the highest antiquity. During the middle ages, the word "bugle" was applied to the ox and also to its horns, whether used as musical instruments or for drinking. The *New English Dictionary* quotes a definition of [v.04 p.0761] bugle dating from c. 1398: "The Bugle ... is lyke to an oxe and is a fyers beest."[7] In 1300 a romance[8] contains the word used in both acceptations, "A thousand bugles of Ynde," and "tweye bugle-hornes and a bowe." F. Godefroy[9] gives quotations from early French which show that, as in England, the word bugle was frequently used as an adjective, and as a verb:—"IIII cors buglieres fist soner de randon" (*Quatre fils Aymon*, ed. P. Tarbé, p. 32), and "I grant cor buglerenc fit en sa tor soner" (*Aiol*, 7457, *Société des anciens textes français*). Tubas, horns, cornets and bugles have as common archetype the horn of ram, bull or other animal, whose form was copied and modified in bronze, wood, brass, ivory, silver, &c. Of all these instruments, the bugle has in the highest degree retained the acoustic properties and the characteristic scale of the prototype, and is still put to the original use for giving military signals. The shofar of the ancient Hebrews, used at the siege of Jericho, was a cow's horn (Josh. vi. 4, 5, 8, 13, &c.), translated in the Vulgate *buccina*, in the paraphrase of the Chaldee *buccina ex cornu*. The directions given for sounding the trumpets of beaten silver described in Numbers x. form the earliest code of signals yet known; the narrative shows that the Israelites had metal wind instruments; if, therefore, they retained the more primitive cow's horn and ram's horn (shofar), it was from choice, because they attached special significance to them in connexion with their ritual. The trumpet of silver mentioned above was the *Khatsotsrah*, probably the long straight trumpet or tuba which also occurs among the instruments in the musical scenes of the ancient Egyptians and Assyrians. Gideon's use of a massed band of three hundred shofars to terrify and defeat the Midianites (Judges vii. 16), and Saul's call to arms (1 Sam. xiii. 3) show that the value of the shofar as a military instrument was well understood by the Jews. The cornu was used by the Roman infantry to sound the military calls, and Vegetius[10] states that the tuba and buccina were also used for the same purpose. Mahillon possesses a facsimile of an ancient Etruscan cornu, the length of which is 1.40 m.; he gives its scale,[11] pitched one tone below that of the

bugle in E flat, as that of D flat, of which the harmonics 

, from the second to the sixth are available. The same department of the British Museum was enriched in 1904 with a terra-cotta model (fig. 2) of a late Roman bugle (*c.* 4th century A.D.), bent completely round upon itself to form a coil between the mouthpiece and the bell-end (the latter has been broken off). This precious relic was found at Ventoux in France and has been acquired from the collection of M. Morel. This is precisely the form of bugle now used as a badge by the first battalion of the King's Own Light Infantry.[12] During the middle ages the use of the bugle-horn by knights and huntsmen, and perhaps also in naval warfare, was general in Europe, as the following additional quotations will show: "XXX cors bugleres, fait l'amirax soner" (*Conq. de Jérusalem*, 6811, Hippeau); "Two squyers blewe ... with ij grete bugles hornes" (Caxton, *Chron. Engl. ccix. 192*). The oliphant was a glorified bugle-horn made of rich material, such as ivory, carved and inlaid with designs in gold and silver.

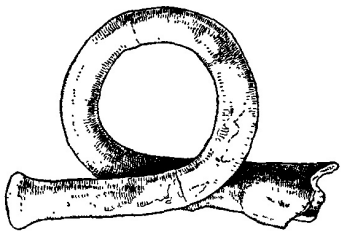


Fig. 2.—Terra Cotta Model of Roman Bugle, 4th cent. (British Museum).

The history of the bugle as a military instrument is in England closely connected with the creation of the light infantry, in which it gradually superseded the drum[13] as a duty and signal instrument. It was during the 17th century that the change was inaugurated; improvements in firearms brought about the gradual abandonment of armour by the infantry, and the formation of the light infantry and the adoption of the bugle followed by degrees. One of the oldest light infantry regiments, Prince Albert's 1st Somerset Light Infantry, formed in 1685 by the earl of Huntingdon, employed a drummer at that date at a shilling per day.[14] At the end of the 18th century we find the bugle the recognized signal instrument in the light infantry, while the trumpet remained that of the cavalry. The general order introducing the bugle as a minor badge for the light infantry is under date 28th of December 1814. In 1856 the popularity of the keyed or Royal Kent bugle in the army had reached its height. A bugle-band was formed in the Royal Artillery as a substitute for the drum and fife band.[15] The organization and training of this bugle-band were entrusted to Trumpet-major James Lawson, who raised it to a very high standard of excellence. Major Lawson was a fine cornet player, and finding the scale of the service bugle too restricted he obtained permission to add to it a valve attachment, which made the bugle a chromatic instrument like the cornet, in fact practically a saxhorn. Before long, horns in E flat, tenor horns in B flat, euphoniums and bass tubas were added, all made of copper, and in 1869 the name of "bugle band" was changed to R.A. Brass Band, and in 1877 it was merged in the Mounted Band. The bugle with its double development by means of keys into Royal Kent bugle and ophicleide, and by means of valves into saxhorns and tubas, formed the nucleus of brass bands of all countries during the greater part of the 19th century. The Flügelhorn, as its name denotes, became the signal instrument of the infantry in Germany as in England, and still holds it own with the keyed bugle in the fine military bands of Austro-Hungary.

There is in the department of prehistoric antiquities at the British Museum a fine bugle-horn belonging to the Bronze Age in Denmark; the tube, which has an accentuated conical bore, is bent in a semi-circle, and has on the inner bend a series of little rings from which were probably suspended ornaments or cords. An engraved design runs spirally round the whole length of the tube, which is in an excellent state of preservation.

Meyerbeer introduced the bugle in B flat in his opera *Robert-le-Diable* in the scene of the resurrection of the nuns, and a bugle in A in the fifth act.

See, for further information on the technique of the instrument, Logier's *Introduction to the Art of Playing on the Royal Kent Bugle* (London, Clementi, 1820); and for the use of the bugle in the French army, G. Kastner, *Le Manuel général de musique militaire* (with illustrations, Paris, 1848).

(K. S.)

[1] The word is derived from Lat. *buculus*, a young bull. "Bugle," meaning a long jet or black glass bead, used in trimming ladies' dresses, is possibly connected with the Ger. *Bugel*, a bent piece of metal. The English name "bugle" is also given to a common labiate plant, the *Ajuga reptans*, not to be confused with the "Bugloss" or *Anchusa officinalis*.

[2] For diagrams of these mouthpieces see V.C. Mahillon, *Éléments d'acoustique* (Brussels, 1874), p. 96.

[3] See E. van der Straeten, *La Musique aux Pays-bas*, vol. vii. p. 38, where the instrument is not mentioned as a novelty; also Léon, comte de Laborde, *Les Ducs de Bourgogne*, pt. ii. (*Preuves*), (Paris, 1849), tom. i. p. 365, No. 1266.

[4] Martin Agricola, *Musica Instrumentalis deudsch* (Wittenberg, 1528), f. viii^{b}.

[5] Michael Praetorius, *Syntagma Musicum* (Wolfenbüttel, 1618), pl. viii. No. 5.

[6] See Captain C.R. Day, *Descript. Catalogue* (London, 1891), pp. 168-169, and pl. xi. fig. D.

[7] Barthol. Trevisa, *De Propr. Rebus*, xviii., xv., 1495, 774.

[8] *King Alisaunder*, 5112 and 5282.

[9] *Dictionnaire de l'ancienne langue française du IXe an XVe siècle.*

[10] *De re militari*, bk. iii. ch. v.

[11] See *Catal. descriptif du musée instrumental du conservatoire de Bruxelles*, vol. i. (Ghent, 1880), p. 331. There are, in the department of Greek and Roman antiquities at the British Museum, two bronze Etruscan cornua, No. 2734, resembling the hunting horns of the middle ages and bent in a semicircular shape. They measure from end to end respectively 2 ft. 1 in. and 2 ft. 2 in.

[12] Maj. J.H.L. Archer, *The British Army Records* (London, 1888), p. 402.

[13] For the use of the drum in the 16th century, see Sir John Smyth, *Instructions and Observations for all Chieftaines, Captaines, &c.* (London, 1595), pp. 158-159.

[14] See Richard Cannon, *Historical Records* of the regiment (London, 1848), p. 3.

[15] See H.G. Farmer, *Memoirs of the Royal Artillery Band* (London, 1904), p. 183.

BUGTI, a Baluch tribe of Rind (Arab) origin, numbering about 15,500, who occupy the hills to the east of the Sind-Peshin railway, between Jacobabad and Sibi, with the Marris (a cognate tribe) to the north of them. Like the Marris, the Bugtis are physically a magnificent race of people, fine horsemen, good swordsmen and hereditary robbers. An expedition against them was organized by Sir C. Napier in 1845, but they were never brought under control till Sir Robert Sandeman ruled Baluchistan. Since the construction of the railway, which completely outflanks their country, they have been fairly orderly.

BUHLE, JOHANN GOTTLIEB (1763-1821), German scholar and philosopher, was born at Brunswick, and educated at Göttingen. He became professor of philosophy at Göttingen, Moscow (1840) and Brunswick. Of his numerous publications, the most important are the *Handbuch der Geschichte der Philosophie* (8 vols., 1796-1804), and *Geschichte der neueren Philosophie* (6 vols., 1800-1805). The latter, elaborate and well written, is lacking in critical appreciation and proportion; there are French and Italian translations. He edited Aratus (2 vols., 1793, 1801) and part of Aristotle (Bipontine edition, vols. i.-v., 1791-1904).

[v.04 p.0762]

BUHTURĪ [al-Walīd ibn 'Ubaid Allāh] (820-897), Arabian poet, was born at Manbij (Hierapolis) in Syria, between Aleppo and the Euphrates. Like Abū Tammām, he was of the tribe of Tāi. While still young, he went to visit Abū Tammām at Horns, and by him was commended to the authorities at Ma'arrat un-Nu'mān, who gave him a pension of 4000 dirhems (about £90) yearly. Later he went to Bagdad, where he wrote verses in praise of the caliph Motawakkil and of the members of his court. Although long resident in Bagdad he devoted much of his poetry to the praise of Aleppo, and much of his love-poetry is dedicated to Alwa, a maiden of that city. He died at Manbij Hierapolis in 897. His poetry was collected and edited twice in the 10th century, arranged in one edition alphabetically (i.e. according to the last consonant in each line); in the other according to subjects. It was published in Constantinople (A.D. 1883). Like Abū Tammām he made a collection of early poems, known as the Hamāsa (index of the poems contained in it, in the *Journal of the German Oriental Society*, vol. 47, pp. 418 ff., cf. vol. 45, pp. 470 ff.).

Biography in M^{c}G. de Slane's translation of Ibn Khallikān's *Biographical Dictionary* (Paris and London, 1842), vol. iii. pp. 657 ff.; and in the *Book of Songs* (see ABULFARAJ), vol. xviii. pp. 167-175.

(G. W. T.)

BUILDERS' RITES. Many people familiar with the ceremonies attendant on the laying of foundation stones, whether ecclesiastical, masonic or otherwise, may be at a loss to account for the actual origin of the custom in placing within a cavity beneath the stone, a few coins of the realm, newspapers, &c. The ordinary view that by such means particulars may be found of the event on the removal of the stone hereafter, may suffice as respects latter-day motives, but such memorials are deposited in the hope that they will never be disturbed, and so another reason must be found for such an ancient survival. Whilst old customs continue, the reasons for them are ever changing, and certainly this fact applies to laying foundation stones. Originally, it appears that living victims were selected as "a sacrifice to the gods," and especially to ensure the stability of the building. Grimm[1] remarks "It was often thought necessary to immure live animals and even men in the foundation, on which the structure was to be raised, to secure immovable stability." There is no lack of evidence as to this gruesome practice, both in savage and civilized communities. "The old pagan laid the foundation of his house and fortress in blood."[2] Under the walls of two round towers in Ireland (the only ones examined) human skeletons have been discovered. In the 15th century, the wall of Holsworthy church was built over a living human being, and when this became unlawful, images of living beings were substituted (*Folk-Lore Journal*, i. 23-24).

The best succinct account of these rites is to be obtained in G. W. Speth's *Builders' Rites and Ceremonies* (1893).

(W. J. H.*)

[1] *Teutonic Mythology* (1883-1884), (trans. Stalleybrass).

[2] Baring-Gould on "Foundations," *Murray's Mag.* (1887).

BUILDING.[1] The art of building comprises the practice of civil architecture, or the mechanical operations necessary to carry the designs of the architect into effect. It is not infrequently called "practical architecture," but the adoption of this form would lead only to confusion, by rendering it difficult to make the distinction generally understood between architecture (*q.v.*) as a fine or liberal art, and architecture as a mechanical art. The execution of works of architecture necessarily includes building, but building is frequently employed when the result is not architectural; a man may be a competent builder without being an architect, but no one can be an accomplished architect unless he be competent to specify and direct all the operations of building. An architect should have a scientific knowledge of the various soils he may meet with, such as clay, earth, silt, rock, gravel, chalk, &c., so that when the trial holes are dug out on the site, he can see the nature of the soil, and at once know what kind of a foundation to put to the building, and the depth to which he must go to get a good bottom. He should also have a good knowledge of chemistry, so that he may understand the effects of the various acids, gases, &c., that are contained in the materials he uses, and the objections to their presence. He must be acquainted with the principles of timbering in trenches, and excavations, shoring, brickwork, fireproof construction, stonework, carpentry and joinery, smiths' work, plumbing, heating, ventilation, bells, electric and gas lighting, water-supply, drainage, plastering, tiling to internal walls or pavings and roofs, slating of roofs, glazing, painting and decoration. He should be able to calculate the various strengths and strains to be placed on any portion of the structure, and have a general knowledge of the building trade, enabling him to deal with any difficulty or defects that may arise.

Relation of building to architecture.

An important feature in the qualification of the architect is that he should be thoroughly conversant with the by-laws of the different towns or districts, as to the requirements for the various classes of buildings, and the special features of portions of the different buildings. The following are examples of the various buildings which he may have to design, and the erection of which he may have to superintend:—dwelling-houses, domestic buildings, shops, dwellings for the working class, public buildings such as churches, schools, hospitals, libraries and hotels, factories of all kinds for all general trades, studios, electric power stations, cold storage buildings, stables and slaughterhouses. With regard to factories, places for the storage or making of different patent foods, and for slaughter of beasts intended for human consumption, stringent by-laws are in most countries laid down and enforced by the public health authorities. In England, the Public Health Acts and By-laws are carried out by the various borough or district authorities, who appoint inspectors especially to study the health of the public with regard to sanitary arrangements. The inspectors have special powers to deal with all improper or defective food, or with any defects in buildings that may affect its cleanly preparation.

Reasons for special type of plans.

In addition to meeting the requirements of the clients, the various buildings have to be constructed and planned on clearly defined lines, according to the rules of the various authorities that control their erection; thus the construction and planning of public schools are governed in England by the board of education, and churches are governed by the various societies that assist in financing the erection of these edifices; of these the Incorporated Church Building Society exercises the strongest control. Factories both in England and France must be planned and erected to meet the separate acts that deal with these buildings. The fire insurance companies lay down certain requirements according to the size of the building, and the special trade for which it is erected, and fix their rate of premium accordingly. Dwelling-houses in London must be erected in accordance with the many building acts which govern the materials to be used, and the methods by which they shall be employed, the thickness of walls, rates of inclination of roofs, means of escape from fire, drainage, space at rear, &c. &c.; these laws especially forbid the use of timber framed buildings. In sundry districts in England where the model by-laws are not in force, notably at Letchworth, Herts, it is possible to erect buildings with sound materials untrammelled by by-laws. With regard to premises used in a combined way, as shop and dwelling-house, if in London, and the building exceeds 10 squares, or 1000 sq. ft. super in area, the stairs and a large portion of the building must be built of fire-resisting materials. In the erection of London flats under certain conditions the stairs and corridors must be of fire-resisting materials, while in parts of New York timber buildings are allowed; for illustrations of these see the article Carpentry. In public buildings and theatres in London, Paris and New York not only the construction, but also the exits and seating accommodation and stage, including the scenery dock and flies, must conform to certain regulations.

[v.04 p.0763]

Conditions necessary for a successful building.

The conditions necessary for planning a successful building may be summarized as follows:—(1) Ease of access; (2) Good light (3) Good service; (4) Pleasing environment and approaches; (5) Minimum cost with true economy; in the case of office buildings, also ease of rearrangement to suit tenants. An architect should also be practically acquainted with all the modes of operation in all the trades or arts employed in building, and be able minutely to estimate beforehand the absolute cost involved in the execution of a proposed structure. The power to do this necessarily involves that of measuring work (usually done by the quantity surveyor at an advanced stage of the work), and of ascertaining the quantities to be done. In ordinary practice the architect usually cubes a building at a price per foot cube, as will be described hereafter, but an architect should know how to measure and prepare quantities, or he cannot be said to be

master of his profession.

Construction.

Building includes what is called construction, which is the branch of the science of architecture relating to the practical execution of the works required to produce any structure; it will therefore be necessary to explain the subject in a general manner before entering upon building in detail.

Although the styles of architecture have varied at different periods, buildings, wherever similar materials are employed, must be constructed on much the same principles. Scientific knowledge of the natures and properties of materials has, however, given to the modern workman immense advantages over his medieval brother-craftsman, and caused many changes in the details of the trade, or art of building, although stones, bricks, mortar, &c., then as now, formed the element of the more solid parts of all edifices.

General principles.

The object of constructions is to adapt, combine and fit materials in such a manner that they shall retain in use the forms and dispositions assigned to them. If an upright wall be properly constructed upon a sufficient foundation, the combined mass will retain its position and bear pressure acting in the direction of gravity to any extent that the ground on which it stands, and the compound materials of the wall, can sustain. But pressure acting laterally has a necessary tendency to overthrow a wall, and therefore it will be the aim of the constructor to compel, as far as possible, all forces that can act upon an upright wall, to act in the direction of gravity, or else to give it permanent means of resistance in the direction opposite to that in which a disturbing force may act. Thus when an arch is built to bear against an upright wall, a buttress or other counterfort is applied in a direction opposed to the pressure of the arch. In like manner the inclined roof of a building spanning from wall to wall tends to thrust out the walls, and hence a tie is applied to hold the opposite sides of the roof together at its base, where alone a tie can be fully efficient, and thus the roof is made to act upon the walls wholly in the direction of gravity; or where an efficient tie is inapplicable, as in the case of a hammer beam roof, buttresses or counterforts are added to the walls, to enable them to resist the pressure outwards. A beam laid horizontally from wall to wall, as a girder to carry a floor and its load, may sag or bend downwards, and tend thereby to force out the walls, or the beam itself may break. Both these contingencies are obviated by trussing, which renders the beam stiff enough to place its load on the walls in the direction of gravity, and strong enough to carry it safely. Or if the beam be rigid in its nature, or uncertain in its structure, or both (as cast-iron is), and will break without bending, the constructor by the smiths' art will supply a check and ensure it against the possible contingency.

Materials.

Perfect stability, however, is not to be obtained with materials which are subject to influences beyond the control of man, and all matter is subject to certain influences of that nature. The influences mostly to be contended against are heat and humidity, the former of which produces movement of some kind or to some extent in all bodies, the latter, in many kinds of matter; whilst the two acting together contribute to the disintegration or decay of materials available for the purposes of construction. These pervading influences the constructor seeks to counteract, by proper selection and disposition of his materials.

Stone.

Stone and brick, the principal materials in general construction, keep their places in combination by means of gravity. They may be merely packed together, but in general they are compacted by means of mortar or cement, so that although the main constituent materials are wholly incompressible, masses of either, or of both, combined in structures are compressible, until the setting medium has indurated to a like condition of hardness. That kind of stone is best fitted for the purposes of general construction which is least absorbent of moisture, and at the same time free to work. Absorbent stone exposed to the weather rapidly disintegrates, and for the most part non-absorbent stone is so hard that it cannot always be used with a due regard to economy. When, therefore, suitable stone of both qualities can be obtained, the harder stone can be exposed to the weather, or to the action which the softer stone cannot resist, and made to form the main body of the structure of the latter so protected. The hard and the soft should be made to bear alike, and should therefore be coursed and bonded together by the mason's art, whether the work be of stone wrought into blocks and gauged to thickness, or of rough dressed or otherwise unshaped rubble compacted with mortar.

Bricks.

Good bricks are less absorbent of moisture than any stone of the same degree of hardness, and are better non-conductors of heat than stone. As the basis of a stable structure, brickwork is more to be relied upon than stone in the form of rubble, when the constituents bear the relation to one another last above referred to, the setting material being the same in both; because the brick by its shaped form seats itself truly, and produces by bonding a more perfectly combined mass, whilst the imperfectly shaped and variously sized stone as dressed rubble can neither bed nor bond truly, the inequalities of the form having to be compensated for with mortar, and the irregularity of size of the main constituent accounted for by the introduction of larger and smaller stones. The most perfect stability is to be obtained, nevertheless, from truly wrought and accurately seated and bonded blocks of stone, mortar being used to no greater extent than may be necessary to exclude wind and water and prevent the disintegrating action of these agents upon even the most durable stone. When water alone is to be dealt with, and especially when it is liable to act with force, mortar is necessary for securing to every block in the structure its own full weight, and the aid of every other collateral and superimposed stone, in order to resist the loosening effect which water

in powerful action is bound to produce.

Particular objects of construction.

In the application of construction to any particular object, the nature of the object will naturally affect the character of the constructions and the materials of which they are to be formed. Every piece of construction should be complete in itself, and independent as such of everything beyond it. A door or a gate serves its purpose by an application wholly foreign to itself, but it is a good and effective, or a bad and ineffective, piece of construction, independently of the posts to which it may be hung, whilst the wheel of a wheelbarrow, comprising felloes, spokes and axletree, is a piece of construction complete in itself, and independent as such of everything beyond it. An arch of masonry, however large it may be, is not necessarily a piece of construction complete in itself, for it would fall to pieces without abutments. Thus a bridge consisting of a series of arches, however extensive, may be but one piece of construction, no arch being complete in itself without the collateral arches in the series to serve as its abutments, and the whole series being dependent thereby upon the ultimate abutments of the bridge, without which the structure would not stand. This illustration is not intended to apply to the older bridges with widely distended masses, which render each pier sufficient to abut the arches springing from it, but tend, in providing for a way over the river, to choke up the way by the river itself, or to compel the river either to throw down the structure or else to destroy its own banks.

[v.04 p.0764]

Foundations.

Some soils are liable to change in form, expanding and contracting under meteorological influences; such are clays which swell when wetted and shrink when dried. Concrete foundations are commonly interposed upon such soils to protect the building from derangement from this cause; or walls of the cheaper material, concrete, instead of the more expensive brick or stone structure, are brought up from a level sufficiently below the ordinary surface of the ground. When concrete is used to obviate the tendency of the soil to yield to pressure, expanse or extent of base is required, and the concrete being widely spread should therefore be deep or thick as a layer, only with reference to its own power of transmitting to the ground the weight of the wall to be built upon it, without breaking across or being crushed. But when concrete is used as a substitute for a wall, in carrying a wall down to a low level, it is in fact a wall in itself, wide only in proportion to its comparative weakness in the absence of manipulated bond in its construction, and encased by the soil within which it is placed. When a concrete wall is used in place of brick the London Building Act requires an extra thickness of one-third; on the question of reinforced concrete no regulations as to thickness have at present been made.

Footings to walls.

The foundation of a building of ordinary weight is for the most part sufficiently provided for by applying what are technically termed "footings" to the walls. The reason for a footing is, that the wall obtains thereby a bearing upon a breadth of ground so much greater than its own width or thickness above the footing as to compensate for the difference between the power of resisting pressure of the wall, and of the ground or ultimate foundation upon which the wall is to rest. It will be clear from this that if a building is to be erected upon rock as hard as the main constituent of the walls theoretically no expanded footings will be necessary; if upon chalk, upon strong or upon weak gravel, upon sand or upon clay, the footing must be expanded with reference to the power of resistance of the structure to be used as a foundation; whilst in or upon made ground or other loose and badly combined or imperfectly resisting soil, a solid platform bearing evenly over the ground, and wide enough not to sink into it, becomes necessary under the constructed footing. For this purpose the easiest, the most familiar, and for most purposes the most effectual and durable is a layer of concrete.

The English government, when it has legislated upon building matters, has generally confined itself to making provision that the enclosing walls of buildings should be formed of incombustible materials. In provisions regarding the least thicknesses of such walls, these were generally determined with reference to the height and length of the building.

Procedure for an intended building.

In the general and usual practice of developing land at the present day, the owner or freeholder of the land first consults an architect and states his intentions of building, the size of what he requires, what it is to be used for, if for trade how many hands he intends to employ, and the sub-buildings and departments, &c., that will be wanted. The architect gathers as much information as he can as to his client's requirements, and from this information prepares his sketches. This first step is usually done with rough sketches or outlines only, and when approved by the client as regards the planning and situation of rooms, &c., the architect prepares the plans, elevations, and sections on the lines of the approved rough sketches; at the same time he strictly observes the building acts, and makes every portion of the building comply with these acts as regards the thickness of walls, open spaces, light and air, distances from surrounding property, frontage lines, and a host of other points too numerous to mention, as far as he can interpret the meaning of the enactments. (The London and New York Building Acts are very extensive, with numerous amendments made as occasion requires.) An architect, whilst preparing the working drawings from the rough approved sketches, and endeavouring to conform with the Building Act requirements, often finds after consultation with the district surveyor, or the London County Council, or other local authorities, that the plans have to be altered; and when so altered the client may disapprove of them, and thus delay often occurs in settling them.

Another important point is that after the architect has obtained the consent of the building authorities, and also the approval of the client, then he may have to fight the adjoining owners

with regard to ancient lights, or air space, or party walls. In the city of London these last difficulties often mean the suspension of the work for a long time, and a great loss to the client.

If the site is a large one, or the nature of the soil uncertain, trial holes should be sunk directly the sketch plans are approved. (See FOUNDATIONS.)

Where the property is leasehold there are always at this stage negotiations as to obtaining the approval of the senior lessors and the freeholders; these having been obtained, the architect is then free to serve the various notices that may be required *re* party walls, &c.

The contract plans should be very carefully prepared, and sections, plans and elevations of all parts of the buildings and the levels from a datum line be given. In addition to the general set of drawings, larger scale details of the principal portions of the building should be given.

If there are any existing buildings on the site these should be carefully surveyed and accurate detail plans be made for reference; this is especially necessary with regard to easements and rights of adjoining owners. Also in the preparation of the site plan the various levels of the ground should be shown.

The plans having been approved by all parties concerned, the next operation is the preparation of the *specification*. This is a document which describes the materials to be used in the building, states how they are to be mixed, and how the various works are to be executed, and specifies every trade, and every portion of work in the building. The specification is necessary to enable the builder to erect the structure according to the architect's requirements, and is written by the architect; usually two copies of this document are made, one for the builder, the other for the architect, and the latter is signed as the contract copy in the same manner as the drawings.

From the specification and drawings usually an approximate estimate of the cost of the proposed building is prepared by the architect, and the most general method adopted is to cube the building by a multiplication of the length, breadth and height of the building, and to multiply the product or cubic contents by a price ranging from fivepence to three shillings per cubic foot. In the case of churches, chapels and schools, the cost may be roughly computed by taking the number of seats at a price per seat. In the case of churches and chapels, taking a minimum area of 8 ft. each, the cost varies from £10 upwards, the difference being due to the amount of architectural embellishment or the addition of a tower. Schools may be estimated as averaging £9 per scholar; we find that, taking schools of various sizes erected by the late London School Board, their cost varied from £7:12:4 to £10:1:10 per scholar. Hospitals vary from £100 per bed upwards, the lowest cost being taken from a cottage hospital type; while in the case of St Thomas's hospital, London, the cost per bed, including the proportion of the administrative block, was £650, and without this portion the wards alone cost £250. The Herbert hospital at Woolwich cost only £320 per bed.

The bills of quantities are prepared by the quantity surveyor, and are generally made to form part of the contract, and so mentioned in "the contract." The work of the quantity surveyor is to measure from the drawings the whole of the materials required for the structure, and state the amounts or quantities of the respective materials in the form of a bill usually made out on
[v.04 p.0765] foolscap paper specially ruled, so that the builders can price each item, together with the labour required to work and fix it, thus forming the building. The idea is to be able to arrive at a lump sum for which the builders will undertake to erect the building. It is of frequent occurrence, in fact it occurs in four-fifths of building contracts, that when a building is commenced, the client, or other interested person, will alter some portion, thereby causing deviations from the bills of quantities. By having the prices of the different materials before him, it is easy for the quantity surveyor to remeasure the portion altered, adding or deducting as the case may be, and thus to ascertain what difference the alteration makes. This method of bills of quantities and prices is absolutely necessary to any one about to build, and means a considerable saving to the client in the end. For example:—Suppose that bills of quantities are not prepared for a certain job by a quantity surveyor, and, as is often done, the drawings and specification are sent to several builders asking them for a quotation to build the house or factory or whatever it may be, according to the drawings and specification. The prices are duly sent in to the architect, and probably the lowest price is accepted and the successful builder starts the job. During the progress of the works certain alterations take place by the owner's instructions, and when the day of settlement comes, the builder puts in his claim for "extras," then owing to the alterations and to the architect having no prices to work upon, litigation often ensues.

Before the work of erecting a structure is entrusted to a builder he has to sign a contract in the same manner as the drawings and specification. This contract is an important document wherein the builder agrees to carry out the work for a stated sum of money, in accordance with the drawings and specification, and bills of quantities, and instructions of the architect, and to his entire satisfaction; and it also states the description of the materials and workmanship, and the manner of carrying out the work, responsibilities of the builder, particularly clauses indemnifying the employer against accidents to employees, and against numerous other risks, the time of completion of works under a penalty for non-completion (the usual allowance being made for bad weather, fire or strikes), and also how payments will be made to the builder as he proceeds with the building. This form of contract is generally prepared by the architect, and varies in part as may be necessary to meet the requirements of the case.

When the drawings have been approved by the owner or client, also by the district surveyor or local authorities, and by adjoining owners, one copy of them, made on linen, is usually deposited

(in London) either with the district surveyor, or with the London County Council, another is prepared for the freeholder if a lease of the land is granted, and a third is given to the builder. In addition, in complicated cases such as occur in the city of London, when a building is erected on land which has four or five distinct owners, an architect may have to prepare a large number of complete copies to be deposited with the various parties interested.

The builder's sphere.

The duties of the builder are very similar to those of the architect, except that he is not expected to be able to plan and design, but to carry out the plans and designs of the architect in the actual work of building. The builder should also know the various acts, and in particular the acts specially relating to the erection of scaffoldings, hoardings, gantries, shoring and pulling down of old buildings. He should have a thorough knowledge of all materials, their qualifying marks or brands, and the special features of good and bad in each class, their uses and method of use. He should be able to control and manage both the men and materials; and briefly, in a builder, as opposed to an architect, the constructive knowledge should predominate.

On large or important works it is usual to have a clerk of works or delegate from the architect; his duties are to be on the works while they are in progress and endeavour by constant attention to secure the use of the best materials and construction, and to report to the architect for his instruction any difficulties that may arise. He should be a thoroughly practical man as opposed to the architectural draughtsman. His salary is paid by the client, and is not included in the architect's remuneration.

American practice.

American building acts agree in a general manner with those enforced in London. But whereas New York allows the erection of frame or wood structures, while defining a certain portion of the city inside which no new frame or wood structures shall be erected, in London and the large cities of Great Britain the erection of wood frame buildings as dwellings is prohibited. In New York City provision is made for a space at the rear of domestic buildings at least 10 ft. deep, but such depth is increased when the building is over 60 ft. high, and is varied under special circumstances. In London this depth is the same, but the height of the building in relation to the space required in the rear thereof shall be constructed to keep within an angle of 63½ degrees, inclining from the rear boundary towards the building from the level of pavement in front of building; the position from which the angle is taken is varied under special circumstances. In the smaller English towns the building regulations are framed on the model by-laws, and these increase the depth of the yard or garden according to the height of the building.

With regard to the strength and proportion of materials, these are not dealt with in the London Building Act to the same extent as in the New York; for example, in the New York acts (parts 4 and 5)[2] it is prescribed that the bricks used shall be good, hard, well-burned bricks. The sand used for mortar shall be clean, sharp, grit sand, free from loam or dirt, and shall not be finer than the standard samples kept in the office of the department of buildings; also the quality of lime and mortar is fully described, and the strengths of steel and cast-iron, and tests of new materials. Also it is required that all excavations for buildings shall be properly guarded and protected so as to prevent them from becoming dangerous to life or limb, and shall be sheath-piled where necessary by the person or persons causing the excavations to be made, to prevent the adjoining earth from caving in. Plans filed in the department of buildings shall be accompanied by a statement of the character of the soil at the level of the footings. There are also requirements as to protecting adjoining property. The bearing capacity of soils, pressure under footings of foundations, and in part 6 the materials of walls and the methods to be observed in building them are defined. Part 23 deals with floor loads, and the strength of floors constructed of various materials, and requires that the temporary support shall be strong enough to carry the load placed upon them during the progress of any works to buildings. Part 24 deals with the calculations and strength of materials, and wind pressure. Parts 4 and 5 of the New York Building Code are not dealt with by the London Building Act, but the local by-laws of the various districts deal with these. Part 6 of the New York code is dealt with partly by the London Building Act, and partly by the local by-laws. Parts 23 and 24 of the New York code are not dealt with in the English acts at all. In America the standard quality for all materials is set out, but in no English acts do we find the definition of the quality of timber, new materials, steel, &c. Iron and steel construction is in its infancy in England as compared with America, and probably this accounts for no special regulations being in force; but part 22 of the New York Building Code, section 110 to 129 inclusive, deals very fully with iron and steel construction, and this is further supplemented by sections 137 to 140 inclusive.

Sanitary work is dealt with in London by section 39 of the Public Health (London) Act, and the drainage by-laws of the London County Council, in which every detail is very fully gone into with regard to the laying of drains, and fitting up of soil pipes, w.c.'s, &c., all of which is to be carried out and tested to the satisfaction of the local borough's sanitary inspector. The general requirements of New York with regard to sanitary work are very similar with a few more restrictions, and are carried out under "the rules and regulations for plumbing, drainage, water-supply, and ventilation of buildings." The noticeable feature of the New York regulations is that all master plumbers have to be registered, which is not so in England. The New York regulations have 183 sections relating to sanitary work, and the English regulations have 96 sections. Also by part 16 of the Amendments to Plumbing Rules 1903, the New York laws require that, before any construction of, or alterations to, any gas piping or fittings are commenced, permits must be obtained from the superintendent of buildings; these are only issued to a registered plumber. The

application must be accompanied by plans of the different floors showing each outlet, and the number of burners to each outlet; a statement must also be made of the quality of the pipes and fittings, all of which are to be tested by the inspector. In London there are no such laws; the gas companies control a small portion of the work as regards the connexion to meters, while the insurance companies require gas jets to be covered with a wire guard where liable to come in contact with inflammable goods. As to water, the various water companies in England have each their own set of regulations as to the kind of fittings and thickness and quality of pipe to be used, whether for service, wastes or main.

Fire-resisting construction.

The importance of fire-resisting construction is being more fully recognized now by all countries. In France the regulations for factories, shops and workshops relating to "exits" require that all doors should open outwardly when they open on to courts, vestibules, staircases or interior passages. When they give access to the open air, outward opening is not obligatory unless it has been judged necessary in the interests of safety. If the doors open on to a passage or staircase they must be fixed in such a manner as not to project into the passage or staircase when open. The exits must be numerous, and signs indicating the quickest way out are to be placed in conspicuous positions. The windows are to open outwardly. Staircases in offices or other buildings serving as places for work shall be constructed in incombustible materials, or shall be walled in fully in plaster. The number of staircases shall be in proportion to the number of employees, &c. It is prohibited to use any liquid emitting vapours inflammable under 35° C. for the purpose of lighting or heating, unless the apparatus containing the liquid is solidly closed during work, that part of the apparatus containing the liquid being so closed as to avoid any oozing out of the liquid, &c. &c. Instructions are added as to precautions to be taken in case of fire.

In London fire-resisting construction is dealt with in the London Building Act, and its second schedule, and in London County Council Theatre and Factory Acts, &c. In New York the building code (parts 19, 20 and 21) deals with fire appliances, escapes, and fire-proof shutters and doors, fire-proof buildings and fire-proof floors, and requires that all tenement houses shall have an iron ladder for escape. A section somewhat similar to the last came into force in London in 1907 under the London Building Act, being framed with a view to require all existing projecting one-storey shops to have a fire-resisting roof, and all existing buildings over 50 ft. in height to have means of escape to and from the roof in case of fire.

There are several patents now in use with which it would be possible to erect a fire-proof dwelling at small cost with walls 3 to 5 in. in thickness. One of these has been used where the building act does not apply, as in the case of the Newgate prison cells, London, where the outside walls were from 3 to 4 in. thick only, and were absolutely fire and burglar proof. This method consists in using steel dovetailed sheets fixed between small steel stanchions and plastered in cement on both sides. This form of construction was also used at the British pavilion, Paris Exhibition 1900, and has been employed in numerous other buildings in England, and also in South Africa, Venezuela, and India (Delhi durbar). The use of many of these convenient and sound forms of building construction for ordinary buildings in London, and in districts of England where the model by-laws are in force, is prohibited because they do not comply with some one or other of the various clauses relating to materials, or to the thickness of a wall.

The various details of construction are described and illustrated under separate headings. See Brickwork, Carpentry, Foundations, Glazing, Joinery, Masonry, Painter-Work, Plastering, Roofs, Scaffold, Shoring, Staircase, Steel Construction, Stone, Timber, Wall-Coverings, &c.

The principal publications for reference in connexion with this subject are: *The Building and Health Laws of the City of New York*, Brooklyn Eagle Library, No. 85; *Rules and Regulations affecting Building Operations in the administrative County of London*, compiled by Ellis Marsland; *Annotated By-Laws as to House Drainage, &c.*, by Jensen; *Metropolitan Sanitation*, by Herbert Daw.

(J. Bt.)

[1] The verb "to build" (O.E. *byldan*) is apparently connected with O.E. *bold*, a dwelling, of Scandinavian origin; cf. Danish *bol*, a farm, Icelandic *ból*, farm, abode. Skeat traces it eventually to Sanskrit *bhu*, to be, build meaning "to construct a place in which to be or dwell."

[2] *Building and Health Laws and Regulations affecting the City of New York, including the Building Code of New York City as amended to 1st May 1903.*

BUILDING SOCIETIES, the name given to societies "for the purpose of raising, by the subscriptions of the members, a stock or fund for making advances to members out of the funds of the society upon freehold, copyhold, or leasehold estate by way of mortgage," may be "either *terminating* or *permanent*" (Building Societies Act 1874, § 13). A "terminating" society is one "which by its rules is to terminate at a fixed date, or when a result specified in its rules is attained"; a "permanent" society is one "which has not by its rules any such fixed date or specified result, at which it shall terminate" (§ 5). A more popular description of these societies would be—societies by means of which every man may become "his own landlord," their main purpose being to collect together the small periodical subscriptions of a number of members, until each in his turn has been able to receive a sum sufficient to aid him materially in buying his dwelling-house. The origin and early history of these societies is not very clearly traceable. A mention of "building clubs" in Birmingham occurs in 1795; one is known to have been established

by deed in the year 1809 at Greenwich; another is said to have been founded in 1825, under the auspices of the earl of Selkirk at Kirkcudbright in Scotland, and we learn (Scratchley, *On Building Societies*, p. 5) that similar societies in that kingdom adopted the title of "menages."

United Kingdom.—When the Friendly Societies Act of 1834 gave effect to the wise and liberal policy of extending its benefits to societies for frugal investment, and generally to all associations having a similar legal object, several building societies were certified under it,—so many, indeed, that in 1836 a short act was passed confirming to them the privileges granted by the Friendly Societies Act, and according to them the additional privileges (very valuable at that time) of exemption from the usury laws, simplicity in forms of conveyance, power to reconvey by a mere endorsement under the hands of the trustees for the time being, and exemption from stamp duty. This act remained unaltered until 1874, when an act was passed at the instance of the building societies conferring upon them several other privileges, and relieving them of some disabilities and doubts, which had grown up from the judicial expositions of the act of 1836. It made future building societies incorporated bodies, and extended the privilege of incorporation to existing societies upon application, so that members and all who derive title through them were relieved from having to trace that title through the successive trustees of a society. It also gave a distinct declaration to the members of entire freedom from liability to pay anything beyond the arrears due from them at the time of winding up, or the amount actually secured by their mortgage deeds. Power to borrow money was also expressly given to the societies by the act, but upon two conditions: that the limitation of liability must be made known to the lender, by being printed on the acknowledgment for the loan, and that the borrowed money must not exceed two-thirds of the amount secured by mortgage from the members, or, in a terminating society, one year's income from subscriptions. Previous to the passing of the act (or rather to the judicial decision in *Laing* v. *Read*, which the clause of the act made statutory) there had been, on the one hand, grave doubts on high legal authority whether a society could borrow money at all; while, on the other hand, many societies in order to raise funds carried on the business of deposit banks to an extent far exceeding the amounts used by them for their legitimate purpose of investment on mortgage. It enacted, that if a society borrowed more than the statute authorizes, the directors accepting the loan should be personally responsible for the excess. By an act passed in 1894 all the Benefit Building Societies established under the act of 1836 after the year 1856 were required to become incorporated under the act of 1874.

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There are, therefore, three categories of building societies:—(1) Those established before 1856, which have not been incorporated under the act of 1874 and remain under the act of 1836. (2) Those established before 1874 under the act of 1836, which have been incorporated under the act of 1874. (3) Those which have been established since the act of 1874 was passed. The first class still act by means of trustees. Of these societies there are only 62 remaining in existence, and their number cannot be increased. The second and third classes exceed 2000 in number.

The early societies were all "terminating,"—consisting of a limited number of members, and coming to an end as soon as every member had received the amount agreed upon as the value of his shares. Take, as a simple typical example of the working of such a society, one the shares of which are £120 each, realizable by subscriptions of 10s. a month during 14 years. Fourteen years happens to be nearly the time in which, at 5% compound interest, a sum of money becomes doubled. Hence the present value, at the commencement of the society, of the £120 to be realized at its conclusion, or (what is the same thing) of the subscriptions of 10s. a month by which that £120 is to be raised, is £60. If such a society had issued 120 shares, the aggregate subscriptions for the first month of its existence would amount to exactly the sum required to pay one member the present value of one share. One member would accordingly receive a sum down of £60, and in order to protect the other members from loss, would execute a mortgage of his dwelling-house for ensuring the payment of the future subscription of 10s. per month until every member had in like manner obtained an advance upon his shares, or accumulated the £120 per share. As £60 is not of itself enough to buy a house, even of the most modest kind, every member desirous of using the society for its original purpose of obtaining a dwelling-house by its means would require to take more than one share. The act of 1836 limited the amount of each share to £150, and the amount of the monthly contributions on each share to £1, but did not limit the number of shares a member might hold.

The earlier formed societies (in London at least) did not usually adopt the title "Building Society"; or they added to it some further descriptive title, as "Accumulating Fund," "Savings Fund," or "Investment Association." Several are described as "Societies for obtaining freehold property," or simply as "Mutual Associations," or "Societies of Equality." The building societies in Scotland are mostly called "Property Investment," or "Economic." Although the term "Benefit Building Society" occurs in the title to the act of 1836, it was not till 1849 that it became in England the sole distinctive name of these societies; and it cannot be said to be a happy description of them, for as ordinarily constituted they undertake no building operations whatever, and merely advance money to their members to enable them to build or to buy dwelling-houses or land.

The name "Building Society," too, leaves wholly out of sight the important functions these societies fulfil as means of investment of small savings. The act of 1836 defined them as societies to enable every member to receive the amount or value of a share or shares to erect or purchase a dwelling-house, &c., but a member who did not desire to erect or purchase a dwelling-house might still receive out of the funds of the society the amount or value of his shares, improved by the payments of interest made by those to whom shares had been advanced.

About 1846 an important modification of the system of these societies was introduced, by the

invention of the "permanent" plan, which was adopted by a great number of the societies established after that date. It was seen that these societies really consist of two classes of members; that those who do not care to have, or have not yet received, an advance upon mortgage security are mere investors, and that it matters little when they commence investing, or to what amount; while those to whom advances have been made are really debtors to the society, and arrangements for enabling them to pay off their debt in various terms of years, according to their convenience, would be of advantage both to themselves and the society. By permitting members to enter at any time without back-payment, and by granting advances for any term of years agreed upon, a continuous inflow of funds, and a continuous means of profitable investment of them, would be secured. The interest of each member in the society would terminate when his share was realized, or his advance paid off, but the society would continue with the accruing subscriptions of other members employed in making other advances.

Under this system building societies largely increased and developed. The royal commissioners who inquired into the subject in 1872 estimated the total assets of the societies in 1870 at 17 millions, and their annual income at 11 millions. The more complete returns, afterwards obtained, indicate that this was an under-estimate.

A variety of the terminating class of societies met at one time with considerable favour under the name of "Starr Bowkett" or "mutual" societies, of which more than a thousand were established. They differed from the typical society above described, in the contribution of a member who had not received an advance being much smaller, while the amount of the advance was much larger, and it was made without any calculation of interest. Thus a society issued, say, 500 shares, on which the contributions were to be 1s. 3d. per week, and, as soon as a sum of £300 accumulated allotted it by ballot to one of the shareholders, on condition that he was to repay it without interest by instalments in 10 or 12½ years, and at the same time to keep up his share-contributions. The fortunate recipient of the appropriation was at liberty to sell it, and frequently did so at a profit; but (except from fines) no profit whatever was earned by those who did not succeed in getting an appropriation, and as the number of members successful in the ballot must necessarily be small in the earlier years of the society, the others frequently became discontented and retired. These societies could not borrow money, for as they received no interest they could not pay any. The plan was afterwards modified by granting the appropriations alternately by ballot and sale, so that by the premiums paid on the sales (which are the same in effect as payments of interest on the amount actually advanced) profits might be earned for the investing members. The formation of societies of this class ceased on the passing of the act of 1894, by which balloting for advances was prohibited in societies thereafter established. A further modification of the "mutual" plan was to make all the appropriations by sale. The effect of this was to bring the mutual society back to the ordinary form; for it amounts to precisely the same thing for a man to pay 10s. a month on a loan of £60 for 14 years, as for him to borrow a nominal sum of £84 for the same period, repayable in the same manner, but to allow £24 off the loan as a "bidding" at the sale. The only difference between the two classes of societies is that the interest which the member pays who bids for his advance depends on the amount of competition at the bidding, and is not fixed by a rule of the society.

For several years the progress of building societies in general was steady, but there were not wanting signs that their prosperity was unsubstantial. A practice of receiving deposits repayable at call had sprung up, which must lead to embarrassment where the funds are invested in loans repayable during a long term of years. It was surmised, if not actually known, that many societies had large amounts of property on their hands, which had been reduced into possession in consequence of the default of borrowers in paying their instalments. A practice had also grown up of establishing mushroom societies, which did little more than pay fees to the promoters. The vicious system of trafficking in advances that had been awarded by ballot, near akin to gambling, prevailed in many societies. These signs of weakness had been observed by the well-informed, and the disastrous failure of a large society incorporated under the act of 1874, the Liberator, which had in fact long ceased to do any genuine building society business, hastened the crisis.

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The "Liberator."

This society had drawn funds to the amount of more than a million sterling from provident people in all classes of the population and all parts of the country by specious representations, and had applied those funds not to the legitimate purpose of a building society, but to the support of other undertakings in which the same persons were concerned who were the active managers of the society. The consequence was that the whole group of concerns became insolvent (Oct. 1892), and the Liberator depositors and shareholders were defrauded of every penny of their investments. Many of them suffered great distress from the loss of their savings, and some were absolutely ruined. The result was to weaken confidence in building societies generally, and this was very marked in the rapid decline of the amount of the capital of the incorporated building societies. From its highest point (nearly 54 millions) reached in 1887, it fell to below 43 millions in 1895. On some societies, which had adopted the deposit system, a run was made, and several were unable to stand it. The Birkbeck Society was for two days besieged by an anxious crowd of depositors clamouring to withdraw their money; but luckily for that society, and for the building societies generally, a very large portion of its funds was invested in easily convertible securities, and it was enabled by that means to get sufficient assistance from the Bank of England to pay without a moment's hesitation every depositor who asked for his money. Its credit was so firmly established by this means that many persons sought to pay money in. Had this very large society succumbed, the results would have been disastrous to the whole body of building societies. As the case stood, the energetic means it adopted to save its own credit reacted in favour of the societies generally.

The Liberator disaster convinced everybody that something must be done towards avoiding such calamities in the future. The government of the day brought in a bill for that purpose, and several private members also prepared measures—most of them more stringent than the government bill. All the bills were referred to a select committee, of which Mr Herbert Gladstone was the chairman. As the result of the deliberations of the committee, the Building Societies Act of 1894 was passed. Meanwhile the Rt. Hon. W.L. Jackson (afterwards Lord Allerton), a member of the committee, moved for an address to the crown for a return of the property held in possession by building societies. This was the first time such a return had been called for, and the managers of the societies much resented it; there were no means of enforcing the return, and the consequence was that many large societies failed to make it, notwithstanding frequent applications by the registrar. The act provided that henceforth all incorporated societies should furnish returns in a prescribed form, including schedules showing respectively the mortgages for amounts exceeding £5000; the properties of which the societies had taken possession for more than twelve months through default of the mortgagors; and the mortgages which were more than twelve months in arrear of repayment subscription. The act did not come into operation till the 1st of January 1895, and the first complete return under it was not due till 1896, when it appeared that the properties in possession at the time of Mr Jackson's return must have been counted for at least seven and a half millions in the assets of the societies. In a few years after the passing of the act the societies reduced their properties in possession from 14% of the whole of the mortgages to 5%, or, in other words, reduced them to one-third of the original amount, from 7½ millions to 2½ millions. Though this operation must have been attended with some sacrifice in many societies, upon the whole the balance of profit has increased rather than diminished. Thus this provision of the act, though it greatly alarmed the managers of societies, was really a blessing in disguise. The act also gave power to the registrar, upon the application of ten members, to order an inspection of the books of a society, but it did not confer upon individual members the right to inspect the books, which would have been more effective. It empowered the registrar, upon the application of one-fifth of the members, to order an inspection upon oath into the affairs of a society, or to investigate its affairs with a view to dissolution, and even in certain cases to proceed without an application from members. It gave him ample powers to deal with a society which upon such investigation proved to be insolvent, and these were exercised so as to procure the cheap and speedy dissolution of such societies. It also prohibited the future establishment of societies making advances by ballot, or dependent on any chance or lot, and provided an easy method by which existing societies could discontinue the practice of balloting. This method has been adopted in a few instances only. The act, or the circumstances which led to it, has greatly diminished the number of new societies applying for registry.

The statistics of building societies belonging to all the three classes mentioned show that there were on the 31st of December 1904, 2118 societies in existence in the United Kingdom. Of these, 2075, having 609,785 members, made returns. Their gross receipts for the financial year were £38,729,009, and the amount advanced on mortgage during the year was £9,589,864. The capital belonging to their members was £39,408,430, and the undivided balance of profit £4,004,547. Their liabilities to depositors and other creditors were £24,838,290. To meet this they had mortgages on which £53,196,112 was due, but of this £2,443,255 was on properties which had been in possession more than a year, and £222,444 on mortgages which had fallen into arrear more than a year. Their other assets were £14,952,485, and certain societies showed a deficit balance which in the aggregate was £102,670. As compared with 1895, when first returns were obtained from unincorporated societies, these figures show an increase in income of 30%, in assets of 23%, and in profit balances of 46%, and a diminution of the properties in possession and mortgages in arrear of 14% in the nine years. The total assets and income are more than three times the amount of the conjectural estimate made for 1870 by the royal commission. It is not too much to say that a quarter of a million persons have been enabled by means of building societies to become the proprietors of their own homes.

In recent years, several rivals to building societies have sprung up. Friendly societies have largely taken to investing their surplus funds in loans to members on the building society principle. Industrial and provident land and building societies have been formed. The legislature has authorized local authorities to lend money to the working classes to enable them to buy their dwelling-houses. Bond and investment companies have been formed under the Companies Acts, and are under no restriction as to balloting for appropriation. All these have not yet had any perceptible effect in checking the growth of the building society movement, and it is not thought that they will permanently do so.

British Colonies.—In several of the British colonies, legislation similar to that of the mother country has been adopted. In Victoria, Australia, a crisis occurred, in which many building societies suffered severely. In the other Australian colonies the building society movement has made progress, but not to a very large extent. In the Dominion of Canada these societies are sometimes called "loan companies" and are not restricted in their investments to loans on real estates, but about 90% of their advances are on that security. At the close of the year 1904 their liabilities to stockholders exceeded £13,000,000, and to the public £21,000,000. The uncalled capital was £5,000,000. The balance of current loans was £28,000,000, and the property owned by the societies exceeded £7,000,000.

Belgium, &c.—In Belgium, the Government Savings Bank has power to make advances of money to societies of credit or of construction to enable their members to become owners of dwelling-houses. The advance is made to the society at 3 or sometimes at 2½% interest, and the borrower pays 4%. In the great majority of cases the borrower effects an insurance with the savings bank

so that his repayments terminate at his death. On the 31st of December 1903 nearly 25,000 advances were in course of repayment. In Germany, building societies are recognized as a form of societies for self-help, but are not many in number, being overshadowed by the great organization of credit societies founded by Schulze-Delitzsch. In other countries there has been no special legislation for building societies similar to that of the United Kingdom, and though societies with the same special object probably exist, separate information with regard to them is not available.

(E. W. B.)

United States.—"Building and loan association" is a general term applied in the United States to such institutions as mutual loan associations, homestead aid associations, savings fund and loan associations, co-operative banks, co-operative savings and loan associations, &c. They are private corporations, for the accumulation of savings, and for the loaning of money to build homes. The first association of this kind in the United States of which there is any record was organized at
[v.04 p.0769] Frankford, a suburb of Philadelphia, on the 3rd of January 1831, under the title of the Oxford Provident Building Association. Their permanent inception took place between 1840 and 1850. The receipts or capital of the building and loan association consists of periodical payments by the members, interest and premiums paid by borrowing members or others, fixed periodical instalments by borrowing members, fines for failures to pay such fixed instalments, forfeitures, fees for transferring stock, entrance fees, and any other revenues or payments,—all of which go into the common treasury. When the instalment payments and profits of all kinds equal the face value of all the shares issued, the assets, over and above expenses and losses, are apportioned among members, and this apportionment cancels the borrower's debt, while the non-borrower is given the amount of his stock. A man who wishes to borrow, let us say, $1000 for the erection of a house ordinarily takes five shares in an association, each of which, when he has paid all the successive instalments on it, will be worth $200, and he must offer suitable security for his loan, usually the lot on which he is to build. The money is not lent to him at regular rates of interest, as in the case of a savings bank or other financial institution, but is put up at auction usually in open meeting at the time of the payment of dues, and is awarded to the member bidding the highest premium. To secure the $1000 borrowed, the member gives the association a mortgage on his property and pledges his five shares of stock. Some associations, when the demand for money from the shareholders does not exhaust the surplus, lend their funds to persons not shareholders, upon such terms and conditions as may be approved by their directors. Herein lies a danger, for such loans are sometimes made in a speculative way, or on insufficient land value. Some associations make stock loans, or loans on the shares held by a stockholder without real estate security; these vary in different associations, some applying the same rules as to real estate loans. To cancel his debt the stockholder is constantly paying his monthly or semi-monthly dues, until such time as these payments, plus the accumulation of profits through compound interest, mature the shares at $200 each, when he surrenders his shares, and the debt upon his property is cancelled.

Shares.

Every member of a building and loan association must be a stockholder, and the amount of interest which a member has in a building and loan association is indicated by the number of shares he holds, the age of the shares, and their maturing value. The difference between a stockholder in such an association and one in an ordinary corporation for usual business purposes lies in the fact that in the latter the member or stockholder buys his stock and pays for it at once, and as a rule is not called upon for further payment; all profits on such stocks are received through dividends, the value of shares depending upon the successful operation of the business. In the former the stockholder or member pays a stipulated minimum sum, say $1, when he takes his membership and buys a share of stock. He continues to pay a like sum each month until the aggregate of sums paid, increased by the profits and all other sources of income, amounts to the maturing value of the stock, usually $200, when the stockholder is entitled to the full maturing value of the share and surrenders the same. Shares are usually issued in series. When a second series is issued the issue of the stock of the first series ceases. Profits are distributed and losses apportioned before a new series can be issued. The term during which a series is open for subscription differs, but it usually extends over three or six months, and sometimes a year. Some associations, usually known as perpetual associations, issue a new series of stock without regard to the time of maturity of previous issues. It is the practice in such associations to issue a new series of stock every year. Instead of shares that are paid in instalments, some associations issue prepaid shares and paid-up shares. *Prepaid shares*, known also as partly paid-up shares, are issued at a fixed price per share in advance. They usually participate as fully in the profits as the regular instalment shares, and when the amount originally paid for such shares, together with the dividends accrued thereon, reaches the maturing or par value, they are disposed of in the same manner as regular instalment shares. Some associations, instead of crediting all the profits made on this class of shares, allow a fixed rate of interest on the amount paid therefor at each dividend period, which is paid in cash to the holder thereof. This interest is then deducted from the profits to which the shares are entitled, and the remainder is credited to the shares until such unpaid portion of the profits, added to the amount originally paid, equals the maturing or par value. *Paid-up shares* are issued upon the payment of the full maturity or par value, when a certificate of paid-up stock is issued, the owners being entitled to receive in cash the amount of all dividends declared thereon, subject to such conditions or limitations as may be agreed upon. These shares sometimes participate as fully in the profits as the regular instalment shares, but in most cases a fixed rate of interest only is allowed, the holders of the shares usually assigning to the association all right to profits above that amount. Certificates of matured shares are also issued to holders of regular instalment

shares, who prefer to leave their money with the association as an investment.

Prior to the maturing of a share it has two values, the holding or book value and the withdrawal value. The book value is ascertained by adding all the dues that have been paid to the profits that have accrued; that is to say, it is the actual value of a share at any particular time. The withdrawal value is that amount of the book value which the association is willing to pay to a shareholder who desires to sever his connexion with the association before his share is matured. Some associations do not permit their members to withdraw prior to the maturing of their shares. Then the only way a shareholder can realize upon his shares is by selling them to some other person at whatever price he can obtain. There are twelve or more plans for the withdrawal of funds. Every association has full regulations on all such matters.

Variations in methods.

The purchase of a share binds the shareholder to the necessity of keeping up his dues, and thus secures to him not only the benefits of a savings bank, but the benefit of constantly accruing compound interest. This accomplishes the first feature of the motive of a building and loan association. The second is accomplished by enabling a man to borrow money for building purposes. It is a moot question whether this method of obtaining money for the building of homes is more or less economical than that of obtaining it from the ordinary savings banks or from other sources. Sometimes the premium which must be paid to secure a loan increases the regular interest to such an amount as to make the building and loan method more expensive than the ordinary method of borrowing money, but a building and loan association has a moral influence upon its members, in that it encourages a regular payment of instalments. Some associations have a fixed or established premium rate, and under such circumstances loans are awarded to the members in the order of their applications or by lot. The premium may consist of the amount which the borrower pays in excess of the legal interest, or it may consist of a certain number of payments of dues or of interest to be made in advance. There are very many plans for the payment of premiums, nearly seventy relating to real estate loans being in vogue in different associations in different parts of the United States; but in nearly all cases the borrower makes his regular payments of dues and interest until the shares pledged have reached maturing value. There is also a great variety of plans for the distribution of profits, something like twenty-five such plans being in existence. The methods of calculating interest and profits are somewhat complicated, but they are all found in the books to which reference will be made. The various plans for the payment of premiums, distribution of profits, and withdrawals, and the calculations under each, are given in full in the ninth annual report of the U.S. commissioner of labour.

Most building and loan associations confine their operations to a small community, usually to the county in which they are situated; but some of them operate on a large scale, extending their business enterprises even beyond the borders of their own state. These national associations are ready to make loans on property anywhere, and sell their shares to any person without reference to his residence. In local associations the total amount of dues paid in by the shareholders forms the basis for the distribution of profits, while in most national associations only a portion of the dues paid in by the shareholders is considered in the distribution. For instance, in a national association the dues are generally 60 cents a share per month, out of which either 8 or 10 cents are carried to an expense fund, the remainder being credited on the loan fund. The expense fund thus created is lost to the shareholders, except in the case of a few associations which carry the unexpended balances to the profit and loss account, and whatever profits are made are apportioned on the amount of dues credited to the loan fund only. The creation of an expense fund in the nationals has sometimes been the source of disaster. Safety or security in both local and national associations depends principally upon the integrity with which their affairs are conducted, and not so much upon the form of organization or the method of distribution. Some of the states—New York, Massachusetts, New Jersey, Ohio, Illinois, California and others—bring building and loan associations under the same general supervision of law thrown around savings banks. In some states nothing is officially known of them beyond the formalities of their incorporation. Though the business of the associations is conducted by men not trained as bankers, it yet meets with rare success. Associations disband when not successful, but when they disband great loss does not occur because the whole business of the association consists of its loans, and these loans are to its own shareholders, as a rule, who hold the securities in their associated forms. The amount of money on hand is always small, because it is sold or lent as fast as paid in. A disbanded association, therefore, simply returns to its own members their own property, and but few real losses occur. Investment in a building and loan association is as nearly absolutely safe as it can be, for the monthly dues and the accumulated profits, which give the actual capital of the association, are lent or sold, as it is termed, by the association as fast as they accumulate, and upon real estate or upon the stock of the association itself. The opportunities for embezzlement, therefore, or for shrinkage of securities, are reduced to the minimum, and an almost absolute safety of the investment is secured.

[v.04 p.0770]

The growth of these associations has been very rapid since 1840, and at the opening of the 20th century they numbered nearly 6000. The Federal government, through the department of labour, made an investigation of building and loan associations, and published its report in 1893. The total dues paid in on instalment shares amounted then to $450,667,594. The business represented by this great sum, conducted quietly, with little or no advertising, and without the experienced banker in charge, shows that the common people, in their own ways, are quite competent to take care of their savings, especially when it was shown that but thirty-five of the associations then in existence met with a net loss at the end of their latest fiscal year, and that this loss amounted to only a little over $23,000. Bulletin No. 10 (May 1897) of the U.S.

department of labour contained a calculation of the business at that date, based upon such states' reports as were available. That calculation showed a growth in almost every item. During the years of depression ending with 1899 the growth of building and loan associations was naturally slower than in prosperous periods.

See *Ninth Annual Report of U.S.A. Commissioner of Labour* (1893); *Bulletin*, No. 10 (May 1897), of the Department of Labour; Edmund Rigley, *How to manage Building Associations* (1873); Seymour Dexter, *A Treatise on Co-operation Savings and Loan Associations* (New York, 1891); Charles N. Thompson, *A Treatise on Building Associations* (Chicago, 1892).

(C. D. W.)

BUILTH, or Builth Wells, a market town of Brecknockshire, Wales. Pop. of urban district (1901), 1805. It has a station on the Cambrian line between Moat Lane and Brecon, and two others (high and low levels) at Builth Road about 1¾ m. distant where the London & North-Western and the Cambrian cross one another. It is pleasantly situated in the upper valley of the Wye, in a bend of the river on its right bank below the confluence of its tributary the Irfon. During the summer it is a place of considerable resort for the sake of its waters—saline, chalybeate and sulphur—and it possesses the usual accessories of pump-rooms, baths and a recreation ground. The scenery of the Wye valley, including a succession of rapids just above the town, also attracts many tourists. The town is an important agricultural centre, its fairs for sheep and ponies in particular being well attended.

The town, called in Welsh Llanfair (yn) Muallt, i.e. St Mary's in Builth, took its name from the ancient territorial division of Buallt in which it is situated, which was, according to Nennius, an independent principality in the beginning of the 9th century, and later a cantrev, corresponding to the modern hundred of Builth. Towards the end of the 11th century, when the tide of Norman invasion swept upwards along the Wye valley, the district became a lordship marcher annexed to that of Brecknock, but was again severed from it on the death of William de Breos, when his daughter Matilda brought it to her husband, Roger Mortimer of Wigmore. Its castle, built probably in Newmarch's time, or shortly after, was the most advanced outpost of the invaders in a wild part of Wales where the tendency to revolt was always strong. It was destroyed in 1260 by Llewellyn ab Gruffydd, prince of Wales, with the supposed connivance of Mortimer, but its site was reoccupied by the earl of Lincoln in 1277, and a new castle at once erected. It was with the expectation that he might, with local aid, seize the castle, that Llewellyn invaded this district in December 1282, when he was surprised and killed by Stephen de Frankton in a ravine called Cwm Llewellyn on the left bank of the Irfon, 2½ m. from the town. According to local tradition he was buried at Cefn-y-bedd ("the ridge of the grave") close by, but it is more likely that his headless trunk was taken to Abbey Cwmhir. No other important event was associated with the castle, of which not a stone is now standing. The lordship remained in the marches till the Act of Union 1536, when it was grouped with a number of others so as to form the shire of Brecknock. The town was governed by a local board from 1866 until the establishment of an urban district council in 1894; the urban district was then made conterminous with the civil parish, and in 1898 it was re-named Builth Wells.

BUISSON, FERDINAND (1841-), French educationalist, was born at Paris on the 20th of December 1841. In 1868, when attached to the teaching staff of the Academy of Geneva, he obtained a philosophical fellowship. In 1870 he settled in Paris, and in the following year was nominated an inspector of primary education. His appointment was, however, strongly opposed by the bishop of Orleans (who saw danger to clerical influence over the schools), and the nomination was cancelled. But the bishop's action only served to draw attention to Buisson's abilities. He was appointed secretary of the statistical commission on primary education, and sent as a delegate to the Vienna exhibition of 1873, and the Philadelphia exhibition of 1876. In 1878 he was instructed to report on the educational section of the Paris exhibition, and in the same year was appointed inspector-general of primary education. In 1879 he was promoted to the directorship of primary education, a post which he occupied until 1896, when he became professor of education at the Sorbonne. At the general election of 1902 he was returned to the chamber of deputies as a radical socialist by the XIII^{me} arrondissement of Paris. He supported the policy of M. Combes, and presided over the commission for the separation of church and state.

BUITENZORG, a hill station in the residency of Batavia, island of Java, Dutch East Indies. It is beautifully situated among the hills at the foot of the Salak volcano, about 860 ft. above sea-level, and has a cool and healthy climate. Buitenzorg is the usual residence of the governor-general of the Dutch East Indies, and is further remarkable on account of its splendid botanical garden and for its popularity as a health resort. The botanic gardens are among the finest in the world; they originally formed a part of the park attached to the palace of the governor-general, and were established in 1817. Under J.S. Teysmann, who became *hortulanus* in 1830, the collection was extended, and in 1868 was recognized as a government institution with a director. Between this and 1880 a museum, a school of agriculture, and a culture garden were added, and since then library, botanical, chemical, and pharmacological laboratories, and a herbarium have been established. The palace of the governor-general was founded by Governor-General van Imhoff in 1744, and rebuilt after being destroyed by an earthquake in 1834. Buitenzorg is also the seat of the general secretary of the state railway and of the department of mines. Buitenzorg, which is called Bogor by the natives, was once the capital of the princess of Pajajaram. Close by, at *Bata Tulis* ("inscribed stone"), are some Hindu remains. The district of Buitenzorg (till 1866 an

assistant residency) forms the southern part of the residency of Batavia, with an area of 1447 sq. m. It occupies the northern slopes of a range of hills separating it from Preanger, and has a fertile soil. Tea, coffee, cinchona, sugar-cane, rice, nutmegs, cloves and pepper are cultivated.

BUJNŪRD, a town of Persia, in the province of Khorasan, in a fertile plain encompassed by hills, in 37° 29′ N., 57° 21′ E., at an elevation of 3600 ft. Pop. about 8000. Its old name was Buzinjird, and thus it still appears in official registers. It is the chief place of the district of same name, which extends in the west to the borders of Shahrud and Astarabad; in the north it is bounded by Russian Transcaspia, in the east by Kuchan, and in the south by Jovain. The greater part of the population consists of Shadillu Kurds, the remainder being Zafranlu Kurds, Garaili Turks, Goklan Turkomans and Persians.

BUKHĀRĪ [Mahommed ibn Ismā'īl al-Bukhārī] (810-872), Arabic author of the most generally accepted collection of traditions (*ḥadīth*) from Mahomet, was born at Bokhara (*Bukhārā*), of an Iranian family, in A.H. 194 (A.D. 810). He early distinguished himself in the learning of traditions by heart, and when, in his sixteenth year, his family made the pilgrimage to Mecca, he gathered additions to his store from the authorities along the route. Already, in his eighteenth year, he had devoted himself to the collecting, sifting, testing and arranging of traditions. For that purpose he travelled over the Moslem world, from Egypt to Samarkand, and learned (as the story goes) from over a thousand men three hundred thousand traditions, true and false. He certainly became the
[v.04 p.0771] acknowledged authority on the subject, and developed a power and speed of memory which seemed miraculous, even to his contemporaries. His theological position was conservative and anti-rationalistic; he enjoyed the friendship and respect of Aḥmad Ibn Ḥanbal. In law, he appears to have been a Shāfi'ite. After sixteen years' absence he returned to Bokhara, and there drew up his *Ṣaḥīḥ*, a collection of 7275 tested traditions, arranged in chapters so as to afford bases for a complete system of jurisprudence without the use of speculative law, the first book of its kind (see MAHOMMEDAN LAW). He died in A.H. 256, in banishment at Kartank, a suburb of Samarkand. His book has attained a quasi-canonicity in Islām, being treated almost like the Koran, and to his grave solemn pilgrimages are made, and prayers are believed to be heard there.

See F. Wüstenfeld, *Schāfi'iten*, 78 ff.; M^{c}G. de Slane's transl. of Ibn Khallikan, i. 594 ff.; I. Goldziher, *Mohammedanische Studien*, ii. 157 ff.; Nawawi, *Biogr. Dict.* 86 ff.

(D. B. MA.)

BUKOVINA, a duchy and crownland of Austria, bounded E. by Russia and Rumania, S. by Rumania, W. by Transylvania and Hungary, and N. by Galicia. Area, 4035 sq. m. The country, especially in its southern parts, is occupied by the offshoots of the Carpathians, which attain in the Giumaleu an altitude of 6100 ft. The principal passes are the Radna Pass and the Borgo Pass. With the exception of the Dniester, which skirts its northern border, Bukovina belongs to the watershed of the Danube. The principal rivers are the Pruth, and the Sereth with its affluents the Suczawa, the Moldava and the Bistritza. The climate of Bukovina is healthy but severe, especially in winter; but it is generally milder than that of Galicia, the mean annual temperature at Czernowitz being 46.9° F. No less than 43.17% of the total area is occupied by woodland, and the very name of the country is derived from the abundance of beech trees. Of the remainder 27.59% is occupied by arable land, 12.68% by meadows, 10.09% by pastures and 0.78% by gardens. The soil of Bukovina is fertile, and agriculture has made great progress, the principal products being wheat, maize, rye, oats, barley, potatoes, flax and hemp. Cattle-rearing constitutes another important source of revenue. The principal mineral is salt, which is extracted at the mine of Kaczyka, belonging to the government. Brewing, distilling and milling are the chief industries. Commerce is mostly in the hands of the Jews and Armenians, and chiefly confined to raw products, such as agricultural produce, cattle, wool and wood. Bukovina had in 1900 a population of 729,921, which is equivalent to 181 inhabitants per sq. m. According to nationality, over 40% were Ruthenians, 35% Rumanians, 13% Jews, and the remainder was composed of Germans, Poles, Hungarians, Russians and Armenians. The official language of the administration, of the law-courts, and of instruction in the university is German. Nearly 70% of the population belong to the Greek Orthodox Church, and stand under the ecclesiastical jurisdiction of the archbishop or metropolitan of Czernowitz. To the Roman Catholic Church belong 11%, to the Greek United Church 3.25%, while 2.5% are Protestants. Elementary education is improving, but, after Dalmatia, Bukovina still shows the largest number of illiterates in Austria. The local diet, of which the archbishop of Czernowitz and the rector of the university are members *ex officio*, is composed of 31 members, and Bukovina sends 14 deputies to the Reichsrat at Vienna. For administrative purposes, the country is divided into 9 districts and an autonomous municipality, Czernowitz (pop. 69,619), the capital. Other towns are Radautz (14,343), Suczawa (10,946), Kuczurmare (9417), Kimpolung (8024) and Sereth (7610).

Bukovina was originally a part of the principality of Moldavia, whose ancient capital Suczawa was situated in this province. It was occupied by the Russians in 1769, and by the Austrians in 1774. In 1777 the Porte, under whose suzerainty Moldavia was, ceded this province to Austria. It was incorporated with Galicia in a single province in 1786, but was separated from it in 1849, and made a separate crownland.

See Bidermann, *Die Bukowina unter der osterreichischen Verwaltung, 1775-1875* (Lemberg, 1876).

BULACÁN, a town of the province of Bulacán, Luzon, Philippine Islands, on an arm of the Pampanga delta, 22 m. N.N.W. of Manila. Pop. (1903) 11,589; after the census enumeration, the

town of Guiguintó (pop. 3948) was annexed. Bulacán is served by the Manila-Dagupan railway. Sugar, rice, indigo and tropical fruits are the chief products of the fertile district in which the town lies; it is widely known for its fish-ponds and its excellent fish, and its principal manufactures are jusi, piña, ilang ilang perfume and sugar. With the exception of the churches and a few stone buildings, Bulacán was completely destroyed by fire in 1898.

BULANDSHAHR, a town and district of British India in the Meerut division of the United Provinces. The town is situated on a height on the right bank of the Kali-Nadi, whence the substitution of the names Unchanagar and Bulandshahr (high town) for its earlier name of Baran, by which it is still sometimes called. The population in 1901 was 18,959. Its present handsome appearance is due to several successive collectors, notably F.S. Growse, who was active in erecting public buildings, and in encouraging the local gentry to beautify their own houses. In particular, it boasts a fine bathing-ghat, a town-hall, a market-place, a tank to supply water, and a public garden.

The DISTRICT OF BULANDSHAHR has an area of 1899 sq. m. The district stretches out in a level plain, with a gentle slope from N.W. to S.E., and a gradual but very slight elevation about midway between the Ganges and Jumna. Principal rivers are the Ganges and Jumna—the former navigable all the year round, the latter only during the rains. The Ganges canal intersects the district, and serves both for irrigation and navigation. The Lower Ganges canal has its headworks at Narora. The climate of the district is liable to extremes, being very cold in the winter and excessively hot in the summer. In 1901 the population was 1,138,101, showing an increase of 20% in the decade. The district is very highly cultivated and thickly populated. There are several indigo factories, and mills for pressing and cleaning cotton, but the former have greatly suffered by the decline in indigo of recent years. The main line of the East Indian railway and the Oudh and Rohilkhand railway cross the district. The chief centre of trade is Khurja.

Nothing certain is known of the history of the district before A.D. 1018, when Mahmud of Ghazni appeared before Baran and received the submission of the Hindu raja and his followers to Islam. In 1193 the city was captured by Kutb-ud-din. In the 14th century the district was subject to invasions of Rajput and Mongol clans who left permanent settlements in the country. With the firm establishment of the Mogul empire peace was restored, the most permanent effect of this period being the large proportion of Mussulmans among the population, due to the zeal of Aurangzeb. The decline of the Mogul empire gave free play to the turbulent spirit of the Jats and Gujars, many of whose chieftains succeeded in carving out petty principalities for themselves at the expense of their neighbours. During this period, however, Baran had properly no separate history, being a dependency of Koil, whence it continued to be administered under the Mahratta domination. After Koil and the fort of Aligarh had been captured by the British in 1803, Bulandshahr and the surrounding country were at first incorporated in the newly created district of Aligarh (1805). Bulandshahr enjoyed an evil reputation in the Mutiny of 1857, when the Gujar peasantry plundered the towns. The Jats took the side of the government, while the Gujars and Mussulman Rajputs were most actively hostile.

See *Imperial Gazetteer of India* (Oxford, ed. 1908); F.S. Growse, *Bulandshahr* (Benares, 1884).

BULAWAYO, the capital of Matabeleland, the western province of southern Rhodesia, South Africa. White population (1904) 3840. It occupies a central position on the tableland between the Limpopo and Zambezi rivers, is 4469 ft. above the sea and 1362 m. north-east of Cape Town by rail. Beira, the nearest port, is 398 m. east in a direct line, but distant 675 m. by railway. Another railway, part of the Cape to Cairo connexion, runs north-west from Bulawayo, crossing the Zambezi just below the Victoria Falls. In the centre of the town is a large market square to which [v.04 p.0772] roads lead in regular lines north, south, east and west. Those going east and west are called avenues and are numbered, those running north and south are called streets and are named. Through the centre of Market Square runs Rhodes Street. There are many handsome public and private buildings. In front of the stock exchange is a monument in memory of the 257 settlers killed in the Matabele rebellion of 1896, and at the junction of two of the principal streets is a colossal bronze statue of Cecil Rhodes. East of the town is a large park and botanical gardens, beyond which is a residential suburb. The railway station and water and electric supply works are in the south-west quarter. An avenue 130 ft. broad and nearly 1½ m. long, planted throughout its length with trees, leads from the town to Government House, which is built on the site of Lobengula's royal kraal. The tree under which that chieftain sat when giving judgment has been preserved. A number of gold reefs intersect the surrounding district and in some of the reefs gold is mined. South-south-east of the town are the Matoppo Hills. In a grave in one of these hills, 33 m. from Bulawayo, Rhodes is buried.

The "Place of Slaughter," as the Zulu word Bulawayo is interpreted, was founded about 1838 by Lobengula's father, Mosilikatze, some distance south of the present town, and continued to be the royal residence till its occupation by the British South Africa Company's forces in November 1893, when a new town was founded. Four years later the railway connecting it with Cape Town was completed (see RHODESIA).

BULDANA, a town and district of India, in Berar. The town had a population in 1901 of 4137. The district has an area of 3662 sq. m. The southern part forms a portion of Berar Balaghat or Berar—above the Ghats. Here the general contour of the country may be described as a succession of small plateaus decreasing in elevation to the extreme south. Towards the eastern side of the district the country assumes more the character of undulating high lands, favoured with soil of a good quality. A succession of plateaus descends from the highest ridges on the

north to the south, where a series of small ghats march with the nizam's territory. The small fertile valleys between the plateaus are watered by streams during the greater portion of the year, while wells of particularly good and pure water are numerous. These valleys are favourite village sites. The north portion of the district occupies the rich valley of the Purna. The district is rich in agricultural produce; in a seasonable year a many-coloured sheet of cultivation, almost without a break, covers the valley of the Purna. In the Balaghat also the crops are very fine. Situated as the district is in the neighbourhood of the great cotton market of Khamgaon, and nearer to Bombay than the other Berar districts, markets for its agricultural produce on favourable terms are easily found. In 1901 the population was 423,616, showing a decrease of 12% in the decade due to the effects of famine. The district was reconstituted, and given an additional area of 853 sq. m. in 1905; the population on the enlarged area in 1901 was 613,756. The only manufacture is cotton cloth. Cotton, wheat and oil-seeds are largely exported. The Nagpur line of the Great Indian Peninsula railway runs through the north of the district. The most important place of trade is Malkapur—pop. (1901) 13,112—with several factories for ginning and pressing cotton.

BULDUR, or BURDUR, chief town of a sanjak of the Konia vilayet in Asia Minor. It is called by the Christians *Polydorion*. Its altitude is 3150 ft. and it is situated in the midst of gardens, about 2 m. from the brackish lake, Buldur Geul (anc. *Ascania Limne*). Linen-weaving and leather-tanning are the principal industries. There is a good carriage road to Dineir, by which much grain is sent from the Buldur plain, and a railway connects it with Dineir and Egirdir. Pop. 12,000.

BULFINCH, CHARLES (1763-1844), American architect, was born in Boston, Massachusetts, on the 8th of August 1763, the son of Thomas Bulfinch, a prominent and wealthy physician. He was educated at the Boston Latin school and at Harvard, where he graduated in 1781, and after several years of travel and study in Europe, settled in 1787 in Boston, where he was the first to practise as a professional architect. Among his early works were the old Federal Street theatre (1793), the first play-house in New England, and the "new" State House (1798). For more than twenty-five years he was the most active architect in Boston, and at the same time took a leading part in the public life of the city. As chairman of the board of selectmen for twenty-one years (1797-1818), an important position which made him practically chief magistrate, he exerted a strong influence in modernizing Boston, in providing for new systems of drainage and street-lighting, in reorganizing the police and fire departments, and in straightening and widening the streets. He was one of the promoters in 1787 of the voyage of the ship "Columbia," which under command of Captain Robert Gray (1755-1806) was the first to carry the American flag round the world. In 1818 Bulfinch succeeded B.H. Latrobe (1764-1820) as architect of the National Capitol at Washington. He completed the unfinished wings and central portion, constructing the rotunda from plans of his own after suggestions of his predecessor, and designed the new western approach and portico. In 1830 he returned to Boston, where he died on the 15th of April 1844. Bulfinch's work was marked by sincerity, simplicity, refinement of taste and an entire freedom from affectation, and it greatly influenced American architecture in the early formative period. His son, Stephen Greenleaf Bulfinch (1809-1870), was a well-known Unitarian clergyman and author.

See *The Life and Letters of Charles Bulfinch* (Boston, 1896), edited by his grand-daughter, and "The Architects of the American Capitol," by James Q. Howard, in *The International Review*, vol. i. (New York, 1874).

BULGARIA, a kingdom of south-eastern Europe, situated in the north-east of the Balkan Peninsula, and on the Black Sea. From 1878 until the 5th of October 1908, Bulgaria was an autonomous and tributary principality, under the suzerainty of the sultan of Turkey. The area of the kingdom amounts to 37,240 sq. m., and comprises the territories between the Balkan chain and the river Danube; the province of Eastern Rumelia, lying south of the Balkans; and the western highlands of Kiustendil, Samakov, Sofia and Trn. Bulgaria is bounded on the N. by the Danube, from its confluence with the Timok to the eastern suburbs of Silistria whence a line, forming the Rumanian frontier, is drawn to a point on the Black Sea coast 10 m. S. of Mangalia. On the E. it is washed by the Black Sea; on the S. the Turkish frontier, starting from a point on the coast about 12 m. S. of Sozopolis, runs in a south-westerly direction, crossing the river Maritza at Mustafa Pasha, and reaching the Arda at Adakali. The line laid down by the Berlin Treaty (1878) ascended the Arda to Ishiklar, thence following the crest of Rhodope to the westwards, but the cantons of Krjali and Rupchus included in this boundary were restored to Turkey in 1886. The present frontier, passing to the north of these districts, reaches the watershed of Rhodope a little north of the Dospat valley, and then follows the crest of the Rilska Planina to the summit of Tchrni Vrkh, where the Servian, Turkish and Bulgarian territories meet. From this point the western or Servian frontier passes northwards, leaving Trn to the east and Pirot to the west, reaching the Timok near Kula, and following the course of that river to its junction with the Danube. The Berlin Treaty boundary was far from corresponding with the ethnological limits of the Bulgarian race, which were more accurately defined by the abrogated treaty of San Stefano (see below, under *History*). A considerable portion of Macedonia, the districts of Pirot and Vranya belonging to Servia, the northern half of the vilayet of Adrianople, and large tracts of the Dobrudja, are, according to the best and most impartial authorities, mainly inhabited by a Bulgarian population.

Physical Features.—The most striking physical features are two mountain-chains; the Balkans, which run east and west through the heart of the country; and Rhodope, which, for a considerable distance, forms its southern boundary. The Balkans constitute the southern half of

the great semicircular range known as the anti-Dacian system, of which the Carpathians form the northern portion. This great chain is sundered at the Iron Gates by the passage of the Danube; its two component parts present many points of resemblance in their aspect and outline, geological formation and flora. The Balkans (ancient *Haemus*) run almost parallel to the Danube, ...

(continued in part 4)

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