Bourke, tn., Cowper co., New South Wales, on S. bk. of Darling R., 500 m. by rail N.W. of Sydney; has meat-preserving works. Pop. 2,600.

Bourke, RICHARD SOUTHWELL. See MAYO, EARL OF.

Bourmont, LOUIS AUGUSTE VICTOR DE GHAISNES, COMTE DE (1773–1846), and marshal of France, was born in the department of Maine-et-Loire. He became an officer of the French Guards, and in 1791 fought on the side of the royalists. He took a prominent part in the civil war in La Vendée, but on his return to Paris in 1799 incurred Napoleon's suspicion, and was imprisoned. After his escape he became reconciled to Napoleon, and served (1808–15) with distinction in Naples, Russia, and Germany. On Napoleon's flight from Elba he was appointed to a division, but subsequently joined the Bourbons, and in 1823 was appointed commander of the army sent into Spain. On his return to France he was created a peer. In 1829 he became minister of war. He commanded in the invasion of Algeria (1830), for which service he was promoted to the rank of marshal. But he declined to take the oath of allegiance to Louis Philippe (1830), and lived for some time in England.

Bourne, par. and tn., Lincolnshire, England, near the Fens, 9 m. W. of Spalding. The house in which the Gunpowder Plot was hatched is preserved in its old condition. It was the birthplace of Lord Burghley. Pop. 4,400.

Bourne, EDWARD GAYLORD (1860), American historian, was born at Strykersville, New York; lectured on political science at Yale (1886–8); was professor of history at Cleveland (1888–95), and at Yale (from 1895). He has written *Essays in Historical Criticism* (1901); *Spain in America* (1904); *Life* of J. L. Motley (1905); *The Voyages of Champlain* (1905); and *Narratives of Columbus and Cabot* (1906).

Bourne, FRANCIS (1861), Roman Catholic archbishop of Westminster, head of the Roman Catholic Church in England. Successively priest at Blackheath, Mortlake, and W. Grinstead, in 1889 he founded and became head of an ecclesiastical seminary for the diocese of Southwark. In 1895 he was made domestic chaplain to the Pope, and in 1897 bishop of Southwark. In August 1903, on the death of Cardinal Vaughan, he succeeded to his present office.

Bourne, HUGH (1772–1852), founder of the Primitive Methodists, was a carpenter and builder; became local preacher among the Wesleyan Methodists, and in 1802 built a chapel at Harriseahead, near Newcastle-under-Lyme. In 1807 he began to hold large camp meetings for the revival of religion; and though conference the same year passed a resolution condemning such meetings, Bourne continued to hold them, the result being his summary expulsion from the society (1808). Only when convinced that his expulsion was final did Bourne proceed to establish a new denomination. The first general meeting of the new society was held at Tunstall, July 26, 1811; the name, 'Primitive Methodists,' was adopted, February 13, 1812; and the first annual conference was held at Hull, May 1820. Before Bourne's death the Connexion had developed into a membership of 110,000. See J. Walford's *Memoirs of H. Bourne* (1855); J. Petty's *Primitive Methodist Connexion* (new ed. 1864).

Bourne, VINCENT (1695–1747), Latin poet, became a master at Westminster, where Cowper was one of his pupils, and in 1734 was appointed deputy serjeant-

at-arms to the House of Commons. His *Poëmata* appeared in 1734. Translations from his verse appear in Cowper and Lamb. See his *Poëmata*, ed. by Mitford, with Memoir (1840).

Bournemouth, wat.-pl., munic. and co. bor. on the S. coast of England, on Poole Bay, with four stations on the L. & S.W.R., 4 m. W. of Christchurch, Hampshire. Originally a small fishing village, it was not until the middle of the 19th century that it came into notice as a health resort. It was incorporated in November 1890. Its position on the coast and in the pine-sheltered valley traversed by the Bourne, its equable climate, its fine stretch of sand, its magnificent views, especially from W. Cliff, and its public parks and pleasure grounds, make it an ideal seaside resort. Within recent years it has inaugurated carnivals similar to those on the Riviera. It is beneficial to consumptive patients, and there are numerous hospitals and homes. Pop. 75,000.

Bournville, model vil., England, 4 m. S.W. of Birmingham, formed in 1895 by Mr. George Cadbury of cocoa fame. The area of the vil. is over 500 acres, and it has a pop. of 3,000.

Bourrée, a dance said to be of French or Spanish origin. As a musical form the *bourrée* is always in alla-breve time, and is frequently found in the works of the older composers, such as the *suites* of Bach.

Bourrienne, LOUIS ANTOINE FAUVELET DE (1769–1834), French diplomatist, born at Sens, was a fellow-student of Napoleon at Brienne, and in 1797 became confidential secretary to Napoleon. He was dismissed in 1802 by Bonaparte, on a charge of peculation; and in 1814 he deserted the cause of his former patron for that of Louis XVIII., by whom, in 1815, after Waterloo, he was appointed minister of state. The loss of his fortune at the time of the revolution of 1830 affected his reason, and he spent the last two years of his life in an asylum at Caen. His *Mémoires* appeared in 1829–31 (new ed. 1899–1900), and caused a sensation for their Napoleonic details. But they are unreliable, and their mistakes were exposed by Boulay de la Meurthe in *Bourrienne et ses Erreurs Volontairs et Involontairs* (1830).

Bourrit, MARC THÉODORE (1735–1815), Swiss artist and author; born at Genoa. His life was devoted to the Alps. He was the first to attempt the ascent of Mont Blanc (1784), but failed to reach the summit; and did much to make Chamonix known. His chief works are *Description des Glacières* (1773; Eng. trans. 1776), *Description des Alpes Pennines et Rhétiennes* (1781), and *Description des Cols ou Passages des Alpes* (1803). See Durier's *Le Mont Blanc* (4th ed. 1897); and Mr. Douglas Freshfield in the *Alpine Journal*, vol. ix. 1879, pp. 11–24.

Bourse, the continental name for a stock exchange or money market, of which the most important are those at Paris, Berlin, and Vienna. The Paris Bourse is a handsome Grecian building with Corinthian pillars, designed by Alex. Théod. Brongniart (1813), and completed by Labarre in 1827. See STOCK EXCHANGE.

Bousa, Abyssinian millet beer.

Bouscat, LE, tn., dep. Gironde, France, 3 m. N.W. of Bordeaux, of which it is a suburb; has a hydropathic establishment. Pop. 10,500.

Boussa, BUSSA, or BUSSANG, tn., N. Nigeria, on the Niger, 55 m. W.N.W. of Zungeru. Here, in 1806, Mungo Park met his death. Pop. 12,000.

Boussingault, JEAN BAPTISTE JOSEPH DIEUDONNÉ (1802–87), French chemist, who, after trav-

elling in company with Bolivar the Liberator through Colombia, Peru, and Venezuela, became professor of chemistry at the Sorbonne in Paris (1839). He carried on investigations into the composition of the atmosphere, and studied poisons; but his most important work was in agricultural chemistry. See his *Economie Rurale* (1844; Eng. trans. 1845; newer ed. in 8 vols. 1860–91).

Boussu, tn., prov. Hainault, Belgium, 7 m. by rail w. of Mons; has coal mines, copper and iron foundries, engineering and boatbuilding works. Pop. 11,500.

Boutell, CHARLES (1812–77), British archæologist, was born at St. Mary Pulham, Norfolk; successively rector of Downham Market (1847–50), and vicar of St. Mary Magdalen, Wiggenshall, Norfolk (1850–5). He was a founder (1855) of the London and Middlesex Archæological Society, and published *Monumental Brasses and Slabs of the Middle Ages* (1847), *A Manual of British Archæology* (1858), *Heraldry, Historical and Popular* (1863), and other cognate works.

Bouterwek, FRIEDRICH (1765–1828), German philosopher, poet, and critic, was appointed professor of philosophy at Göttingen in 1797. He wrote *Ideen zu einer allgemeinen Apodiktik* (1799), and *Aesthetik* (1806), but is remembered chiefly for his *Geschichte der neuern Poesie u. Beredsamkeit* (1801–19).

Bouts, DIERICK (d. 1475), also called STUERBOUDT and THIERRY DE HAARLEM, Dutch painter, was probably Van der Weyden's pupil. He was appointed municipal painter at Louvain about 1468. His manner is rather stiff; his personages are imposing, with long heads and fixed expressions. Among his works are *The Judgment of the Emperor Otho* (Brussels), *Martyrdom of St. Erasmus*, and *Last Supper* (St. Pierre, Louvain—the wings of this are in the Berlin and Munich galleries); Vienna and Bruges also have pictures by him. The *Exhumation of Bishop Hubert*, in the National Gallery, London, has been ascribed to him. See F. T. Kugler's *Handbook of Painting: Dutch, German, and Flemish Schools* (new ed. 1879).

Bouts-rimés (Fr. 'rhymed ends'), a poetical amusement, very popular in French literary circles in the 17th and 18th centuries, in which the rhymes of a poetical composition are prescribed in their due order, and the contestants are required to compose verses to suit them. Alex. Dumas published a collection of *bouts-rimés* in 1865. See Addison's *Spectator*, No. 60.

Boutwell, GEORGE SEWALL (1818–1905), American lawyer and statesman, was born at Brookline, Massachusetts; governor of Massachusetts (1851–3); organized the new department of internal revenue (1862); was a member of Congress (1863–9); and was one of the seven who conducted the impeachment of President Johnson (1868). During Grant's presidency he was secretary of the Treasury (1869–73), and a senator for Massachusetts (1873–7). He was the author of *Educational Topics and Institutions* (1858); *Manual of the United States Direct and Revenue Tax* (1863); *Why I am a Republican: History of the Republican Party* (1884); *The Lawyer, the Statesman, and the Soldier* (1887); and *Reminiscences of Sixty Years* (1902).

Bouvardia (named after Bouvard, physician of Louis XIII.), a genus of plants of the Rubiaceæ. They are natives of Mexico; possess a tubular, four-lobed corolla with four stamens; and the fruit consists of a two-celled

capsule. They are half hardy in Britain, where they are cultivated for their showy, mostly orange or red, flowers.

Bouvines, vil., dep. Nord, France, 6 m. S.E. of Lille. Here in 1214 Philip Augustus of France defeated the combined forces of the Emperor Otho IV., the Count of Flanders, and John, king of England. Pop. 600.

Bouzas, seapt., Pontevedra prov., Spain, 7 m. S.W. of Vigo. Pop. 8,000.

Bovate, or OXGANG, an early English measure of land, was equal to half a 'virgate' or 'husband-land,' and to one-eighth of the 'hide' or 'carucate.' The extent, as much as an ox could plough in a year, varied from 8 to 24 acres. A carucate was the plough-land of a team of eight. Eight carucates made a knight's fee. See F. Seebohm's *English Village Community* (1883).

Boves, tn., Italy, prov. of and 4 m. S. of Cuneo; with iron mines and marble quarries. Pop. comm. 10,000.

Bovey Tracey Beds, at Bovey Tracey in Devonshire, England, are known for their lignite or brown coal, which has been worked for nearly two centuries. These beds contain occasional traces of plant remains, but there are no marine fossils in this series, which was evidently deposited in a fresh-water lake. The flora resembles that of the Bournemouth leaf-beds. The Bovey Tracey beds are in all about 400 ft. thick, and are ascribed by some geologists to the Eocene, by others to the Oligocene system. See Gardner's *Q. J. Geol. Soc.*, 35 and 38; H. B. Woodward's *Geol. of Eng. and Wales* (1887); and Jukes-Browne's *Stratigraphical Geol.* (1902); also the same author in *Geol. Mag.* (1910).

Bovidæ (forms 'like oxen'), a family of mammals which includes all the hollow-horned ruminants, and therefore the most specialized types of the artiodactyle ungulates. The members of the family are commonly known as antelopes, sheep, goats, and oxen, but the different types are not very sharply separated from one another. They show their specialization in the development of horns, in the complex stomach which makes the act of rumination possible, in the nature of the teeth, and in the structure of the limbs. The family is widely distributed, but it is a remarkable fact that no hollow-horned ruminant is indigenous to S. America, though those introduced by Europeans have thriven amazingly, and become half wild. See CATTLE.

Bovill, SIR WILLIAM (1814-1873), English judge, specially noted for his decisions in commercial cases. He was Solicitor-General in 1866, and appointed Chief Justice of the Common Pleas in the same year. The Partnership Law Amendment Act (1865), which he helped to pass, is often known as Bovill's Act.

Bovino, tn. and episc. see, prov. Foggia, Italy; stands on a spur of the Apennines, 21 m. S.W. of Foggia. Pop. 7,800.

Bow. See ARCHERY.

Bow. See VIOLIN.

Bow, or STRATFORD-LE-BOW, suburb of London. See LONDON.

Bowden, S. Australia, a suburb of Adelaide. Pop. 2,600.

Bowdich, THOMAS EDWARD (1791–1824), African traveller; born at Bristol, England; conducted a mission to Ashanti (1816), and was the first to open up that part of the interior of Africa. He set out on a second expedition in 1822, but died of fever at Bathurst, on the Gambia. Of his works we may mention his *Mission from Cape Coast Castle to Ashanti* (1819), *Discoveries of the Portuguese in Angola and Mozambique* (1824), and the *Description of the Is-*

land of Madeira, published in 1825 by his wife.

Bowditch, NATHANIEL (1773–1838), American astronomer and mathematician, was born at Salem, Massachusetts; and during a strenuous youth, in which he was a cooper, ship-chandler, clerk, supercargo, and shipmaster, he devoted himself to the study of practical mathematics. Refusing the offer of a professorship at Harvard, he became actuary (1823) to an insurance company. He published a *New American Practical Navigator* (1802), and a translation of Laplace's *Mécanique Céleste* (1829–38). See *Life* by his son, Henry I. Bowditch (1839).

Bowdler, THOMAS (1754–1825), editor of the expurgated Shakespeare, practised as a physician, and devoted himself subsequently to philanthropic work in London, the Isle of Wight (1800–10), and Rhyddings, near Swansea. Bowdler's reputation depends on his '*Family Shakespeare in ten volumes; in which nothing is added to the original text; but those words and expressions are omitted which cannot with propriety be read aloud in a family*' (1818)—a work whose method has given us the term 'to bowdlerize' (first used in General Perronet Thompson's *Letters of a Representative to his Constituents*, 1836).

Bowel. See INTESTINES.

Bowell, HON. SIR MACKENZIE (1823), sometime prime minister of Canada, was born at Rickinghall, Suffolk, England, and emigrated with his parents to Canada in 1833. He was member for N. Hastings, Ontario, at Ottawa for twenty-five years from 1867, and was then called to the Senate, having served as minister of customs for thirteen years, and afterwards as minister of militia. On the death of Sir John Thompson (1894) he became premier, but, failing to settle the Manitoba school question, resigned in April 1896. After the defeat of the Conservatives in that year he led the opposition in the Senate. In later days he declared himself independent. He received a K.C.M.G. in 1895.

Bowen, CHARLES SYNGE CHRISTOPHER, BARON (1835–94), English lawyer and judge, was born at Wollastone, Gloucestershire, and called to the bar at Lincoln's Inn in 1861. He was appointed junior standing counsel to the Treasury in 1872, and appeared in the 'Tichborne case;' a judge of the Queen's Bench (1879); a judge of the Court of Appeal (1882); and a lord of appeal in ordinary (1893). He was a great lawyer, but an even more brilliant wit. He published *The Alabama Claim and Arbitration considered from a Legal Point of View* (1868); *Virgil in English Verse: Eclogues and Æneid i.–vi.* (1887). See Sir Henry Stewart Cunningham's *Lord Bowen* (1896).

Bowen, FRANCIS (1811–90), American philosophic writer; born at Charlestown, Massachusetts; was lecturer on philosophy and political economy at Harvard, and afterwards (1854) professor of natural religion there; editor of the *N. American Review* (1843–54); and author of *American Political Economy* (1870), *Modern Philosophy* (1877), *Gleanings from a Literary Life* (1880), etc.

Bowen, SIR GEORGE FERGUSON (1821–99), British colonial governor, was born in Ireland. He was chief-secretary to the government in the Ionian Islands (1854–9), and was successively governor of Queensland (1859–67), New Zealand (1868–72), Victoria (1873–9), Mauritius (1879–82), and Hongkong (1883–7). He was knighted in 1856. His works include *Ithaca in 1850* (1850; 3rd ed. 1854), which he identified with the Ithaca of the *Odyssey; Mount Athos, Thessaly, and Epirus* (1852); *Imperial Federation* (1886); and

Murray's *Handbook for Travellers in Greece* (1854; 7th ed. 1900). See his *Thirty Years of Colonial Government* (1889).

Bowen, RICHARD (1761–97), British naval officer, was born at Ilfracombe; in 1781, on board the *Foudroyant*, he participated in the capture of the *Lively* and the *Pégase*. He distinguished himself in the attack on Port Royal, Martinique, by leading the boats which captured the *Bienvenu* on February 17, 1794. He was consequently made commander, and within another month was posted. As captain of the *Terpsichore* he relieved the garrison of Fort Mathilde in the Guadéloupe operations in 1794, and received a wound. In 1798, still in the *Terpsichore*, he captured the *Mahonesa* and several other prizes, and later in the year took the *Vestale*, a frigate in all respects more formidable than his own. After the battle off Cape St. Vincent in 1797, Bowen and the *Terpsichore* gained further glory by engaging single-handed the huge Spanish four-decker *Santisima Trinidad*, which had escaped from that action. Bowen then joined Nelson for the bombardment of Cadiz and the ill-starred attack on Santa Cruz, where he was shot dead.

Bower, ARCHIBALD (1686–1766), British ecclesiastical historian; born near Dundee; was educated at Douay and at Rome, where he joined (1706) the Society of Jesus. He then served (1723–6) in the Inquisition, but returned to England in 1726 and became Protestant, though later he rejoined (1745) the Catholic communion. He edited the *Universal History* (1735–44), and wrote a *History of the Popes* (1748–66).

Bower, or BOWMAKER, WALTER (1385–1449), 'the continuator of Fordun's *Scotichronicon*,' was born at Haddington, Scotland. At the age of eighteen he assumed the religious habit, and went to Paris to study the civil and canon law. On his return to Scotland in 1418 he was elected abbot of Inchcolm, in the Firth of Forth. On the death of Fordun he was asked by Sir David Stewart to complete the *Scotichronicon*. This he did, also inserting large interpolations in Fordun's work, and continued the narrative to the death of James I. (1437). On the *Scotichronicon*, which was written in Latin, nearly all the early histories of Scotland are founded. The only complete edition of the text is that of Goodall (1759); there is no complete translation.

Bowerbank, JAMES SCOTT (1797–1877), English geologist, born in London; was one of the founders of the London Clay Club (1836), and of the Palæontological Society (1847). He made an exhaustive study of fossil and living British sponges, and published *A Monograph of British Spongiadæ* (Ray Society, 1864–82), and *Fossil Fruits of the London Clay* (1840). His fine collection was purchased (1864) by the British Museum.

Bowerbankia, a genus of ascidioid Polyzoa, of the family Vesiculariadæ, named after Bowerbank. (See above.) The stem of *B. imbricata* is a long, slender thread, irregularly branched, the zoœcia occurring at intervals. It is common in the Menai Strait and in Jersey, and adheres in numbers to the chains of the steam ferries at Portsmouth and Southampton.

Bower-bird, a name applied to several different birds inhabiting the Australian region. They all possess the habit of constructing bowers or runs, which have nothing to do with nesting, but are apparently built only for sport and æsthetic satisfaction. Certain species—*e.g. Scenopœetes dentirostris*—make clearings in

the forest, and decorate these with leaves, berries, and flowers. The species of *Prionodura* build bowers or huts between trees, the main hut being decorated with ferns and moss, and surrounded by smaller structures. Most remarkable of all is the 'garden' and hut of *Amblyornis inornata*. The hut is of elaborate structure, with a central cone of moss, and a surrounding gallery built of orchid stems, open in front to the lawn or 'garden,' which is some nine feet in diameter, and consists of a bed of bright green moss, decked with brilliant flowers and berries. As these decorations wither they are removed and replaced by fresh material. It appears probable that it is the males alone which construct the bowers, and these are apparently used as places in which they may display themselves before their mates. The bowers are constructed in captivity, and may be seen in the Zoological Gardens at London. The bower-birds are now usually included, with the birds of paradise, in the family Paradiseidæ. See Gould's *Birds of Australia* (1848).

Bowfin, or MUD-FISH (*Amia calva*), a ganoid fish found in still water in the United States. Like its allies, it has a well-developed swim-bladder, which functions as a lung, the animal rising to the surface to gulp in air. The length does not exceed two feet.

Bowie-knife, the heavy sheath knife of the western states, U.S.A.; is called after a Colonel James Bowie (1790–1836), who wrought the blade from a worn-out file with which he had already killed his man. The blade is about a foot long.

Bow-legs, or GENU-VARUM, may occur in one leg only, following on accident or operation; but it is usually found in both legs, and the trouble starts when the child begins to walk. The usual cause is rickets, which renders the lower limbs unfit to bear the weight of the body, so that the bones curve both in the thigh and below the knee, which becomes the most prominent point of the convexity. Bow-legs are also induced by certain occupations, as that of postillion or jockey, followed before the bones have attained full growth and hardness. A very active and heavy child may tend to become bow-legged, though perfectly healthy, by being too much upon its feet. Bow-leg may be restricted to the part below the knee, the bones having a forward or outward convexity, or a double curve, when rickets is the cause. Treatment depends upon the cause of the deformity and the age of the patient. In a rickety case diet and general hygiene are even more important than local treatment, which, however, must not be neglected. Full rest, on the back, must be ensured; and the nurse can do a great deal by systematic straightening and stretching of the limbs, and by daily massage. The bending of the long bones depends on the amount and direction of the pressure to which they are subjected. It does not occur to any extent in infants who are kept lying flat. In more pronounced cases, treated while the bones are still soft, the legs are often bandaged together, or to iron splints on the inner side of the curvature. Later still, osteoclasm, or the breaking of the bone and setting it straight in splints, is performed. In the case of strong, fully-grown bones osteotomy is practised—an operation involving the removal of wedge-shaped portions of bone.

Bowles, CAROLINE. See SOUTHEY.

Bowles, THOMAS GIBSON (1844), M.P. for King's Lynn from 1892 to 1906; contested unsuccessfully the City of London against

Mr. A. J. Balfour, after the resignation of the Hon. A. G. H. Gibbs in 1906. In January 1910 he was elected again for King's Lynn, but defeated in the December election of that year. He began life as an official of the Inland Revenue department (1860–8). Upon leaving the civil service Mr. Bowles started *Vanity Fair*, but subsequently sold it, and now owns *The Lady*. During the siege of Paris he acted as correspondent for the *Morning Post;* was in Turkey in 1878, and in the same year assisted the Duke of Sutherland in starting the Stafford House committee for the relief of the distressed and suffering Turks. Mr. Bowles also has a considerable knowledge of maritime law. He has been immortalized in *Punch* as 'Cap'en Tommy Bowles.' It was he who dubbed the Marquis of Salisbury's last administration the 'Hotel Cecil,' because of the number of his relatives it contained. He has written *The Defence of Paris* (1871), *Maritime Warfare* (1878), *Flotsam and Jetsam* (1882), *Log of the Nereid* (1889), *The Declaration of Paris of 1856* (1900), and a work upon the Declaration of London (1910).

Bowles, WILLIAM LISLE (1762–1850), English poet and antiquary, was rector of Bremhill in Wiltshire from 1804 to his death, and (from 1828) canon residentiary of Salisbury Cathedral and (1818) chaplain to the prince regent. Bowles's first and best work, *Fourteen Sonnets on Picturesque Spots* (1789), influenced Coleridge, then a boy of seventeen. His poetical works are very numerous, but not of great merit. Among them are *Verses to John Howard* (1789), *The Spirit of Discovery* (1805), *The Missionary of the Andes* (1815), and *St. John in Patmos* (1833). In 1807 appeared his edition of Pope; and his strictures on the classical theory of verse gave rise to a long discussion, in which his chief opponents were Lord Byron, Campbell, and the *Quarterly Review.* Bowles was the propagandist of the revolt against the classical school. See autobiographical introduction to W. L. Bowles's *Scenes and Shadows* (1837), also in vol. ii. of his *Poetical Works* (ed. Gilfillan, 1855).

Bowling. See CRICKET.

Bowling Green. (1.) City, Kentucky, U.S.A., the co. seat of Warren co., situated in the S.W. part of the state, 93 m. S.S.W. of Louisville, at the head of navigation on the Barren R. It has an extensive commerce in horses, lumber, and tobacco. It is the seat of Ogden College (1877), Potter College for Women (1889), and St. Columba's Academy. Pop. 8,500. (2.) Co. seat of Wood co., Ohio, U.S.A., 20 m. S.S.W. of Toledo; has natural gas and oil wells, foundries, canneries, and glass factories. Pop. 5,000.

Bowls, or BOWLING, a game played on a specially kept lawn of certain dimensions, with large biassed balls of hard wood. According to William Fitzstephen (d. *c.* 1191), the biographer of Thomas Becket, the youth of London took their pleasure *in jactu lapidum;* and from the fact that balls of stone were used in the earlier forms of the game, this allusion has been held to refer to bowls. At a later period bowls was forbidden by several Parliaments grown anxious about the decay of archery; and the evil reputation of the bowling alleys, which were usually associated with taverns, led to further restrictions. Henry VIII. broke his own laws when he played bowls at Hampton Court Palace to amuse fair Anne Boleyn; and the famous incident of Sir Francis Drake playing at Plymouth Hoe after the Armada had been sighted is probably authentic. Charles I. was an

ardent bowler, and tradition has it that he was engaged in a game when Cornet Joyce arrested him. During the Georgian *régime* the bowling green was the favourite rendezvous of the wits. In course of time the game was taken more seriously, especially in Scotland, where many greens were laid with sea turf, the accurate smoothness of which enabled the game to be played scientifically. It was long ago felt that the game should be made the subject of uniform laws, and rules were formulated in 1893 by the Scottish Bowling Association, a society which bears to bowls much the same relation that the M.C.C. bears to cricket, and the Royal and Ancient Club of St. Andrews to golf. The first year of the 20th century saw a visit to the mother country of a team of bowlers from Australia and New Zealand, who played with varying success the strongest clubs in the British Isles. In order to adjust the points of difference betwen the colonial and the British games, the Imperial Bowling Association (founded 1899) undertook to codify the laws, and their 'new code' was issued in 1901.

There are two varieties of the game—the crown-green and the flat-green game. The latter is the real game, crown greens being almost entirely confined to the northern and the midland counties of England. In the crown green there is a fall from the centre to the ditch of eighteen inches, more or less, according to the dimensions of the lawn. The jack may be thrown in any direction, and the players use bowls of little or no bias. No doubt a sporting game may be enjoyed; but pot-hunting, betting, and gate-money have fastened upon the crown-green game, which therefore lies under a ban.

The flat-green game is very simple. Standing at the 'footer,' or mat, the player rolls the jack (a white ball) straight in front of him to a distance the limits of which are prescribed by rule, and then tries to place his bowls as close to it as possible, and nearer than the nearest of his adversary, the opponents playing each one bowl alternately. The bowler must measure the distance with his eye, allow for bias, judge of strength, circumvent his opponent's bowl if it lies in his path, promote a short bowl of his own side, run a hostile bowl off the jack; upon occasion he must fire with great force, in order to scatter the enemy; and often he must be content with laying a block or guard. Always, if he is a sportsman, he must be prepared to efface himself; for bowls, more than most games, suffers when an individualist appears in a rink.

The ideal green is a sheet of perfectly level turf forty yards square (though no particular dimensions are defined), and is divided into rinks twenty feet wide. Thus, a green of the size indicated affords space for six rinks; and as there are eight players to the rink (*i.e.* four a side), forty-eight players may be engaged on a green simultaneously. The bowls are made of lignum vitæ, are round to oval in shape, and have one side more 'biassed' than the other, bias being imparted by the lathe. Usually a side is composed of four players, each with a distinct function. The first is called the 'leader,' and should be a good all-round man. It is his business to throw the jack and to 'lead' to it; he must be well up to it, the ideal position being immediately behind the jack. The second has to do as he is told. A captain will play his weakest man here (hence the phrase, the 'soft second'). He is sometimes called the 'scorer,' because he keeps the score of the game. The third

man, who also has to do as he is bidden, is the 'measurer,' for he takes charge of one end of the cord when it is necessary to measure opposing bowls. The fourth is the 'skip,' 'driver,' or 'captain,' and must be a player of great resource and judgment, for upon his play often rests victory or defeat. He directs the play of his first three men, and his instructions are implicitly followed. When he takes his place at the mat, he is supposed to know the lie of the wood around the jack; but he may appoint one of his men to instruct him if required. A game ordinarily consists of twenty-five (more or less) 'heads' or 'ends' (*i.e.* full rounds from each end of the green—for play is first from one end, then from the other, and so on alternately), the side holding the highest aggregate at the close of the twenty-fifth head winning. Or, less frequently, it may be agreed to play a game of twenty-one (more or less) points up. On a really good green a rink of four a side is necessary; but on coarser greens players are often limited to two or three a side. Such greens as these, however, are being replaced by lawns worthier of the game.

The so-called 'points' game is a competition to encourage excellence in particular feats. Diagrams to suit the different positions are marked on the turf; and skill in guarding a well-lying bowl, or in drawing close to the jack past certain obstacles, or in trailing the jack from between definite objects, or in driving the jack into the ditch, is rewarded by appropriate scores.

Bowls is in favour wherever an English-speaking community can find a suitable sheet of turf. Clubs in Scotland are counted by the hundred. In England they are growing rapidly; even in London, notwithstanding the costliness of sites, there are no fewer than forty. In Ireland the game shows an upward tendency, as well as in Australia, Canada, S. Africa, the United States, and elsewhere. Following the example of several of the leading Scottish towns, the London County Council has constructed greens in some of their public parks upon which play is free of charge; though on Scottish public greens a trifling fee is levied per hour or game.

See articles in the *Field* for 1900–3 over the signature of 'Jack High.' For the laws, Mitchell's *Manual of Bowl-playing* (1864; new ed. 1880), and the *Laws* of the Scottish Bowling Association (1893) and of the Imperial Bowling Association (1901), should be consulted. For historical references, see Dingley's *Touchers and Rubs* (1893); Macgregor's *Pastimes and Players*, ch. ix. (1881); and Fittis's *Sports and Pastimes of Scotland*, ch. xii. (1891).

Bowman, Sir William (1816–92), English ophthalmic surgeon, was born at Nantwich. From 1845–55 he was professor of physiology and anatomy at King's College, London, and from 1846–76 resident surgeon in the Royal Ophthalmic Hospital, London. His works include *The Anatomy and Physiology of Man* (1843–56) and *Lectures on Operations on the Eye* (1849). His *Collected Papers*, with a Life by H. Power, appeared in 1892.

Bowness, picturesque tn., Westmorland, England, on E. shore of Windermere, 8 m. N.W. of Kendal. Much frequented in the summer months by tourists. Pop. 2,700.

Bowral, tn., co. Camden, New South Wales, 80 m. by rail S. of Sydney. The celebrated Gibraltar Tunnel (572 yards) and the Gib (a cliff 2,800 ft. high) are within the municipality. Macquarie Pass, the Belmore Fitzroy and other waterfalls, are within easy access.

The town is a fashionable resort in summer. Alt. 2,230 ft. Pop. 1,800.

Bowring, SIR JOHN (1792–1872), linguist and British civil servant, born at Exeter. It is said that he acquired a competent knowledge of one hundred languages. Up to 1824 he engaged in commercial pursuits, but found leisure to issue several works. In 1824 he became editor of the *Westminster Review*, and during the next few years published various anthologies of foreign poetry. In 1831 he was sent to France as commissioner to examine and report on the public accounts, and subsequently to Belgium, Italy, Turkey, Egypt, Syria, and the German states. He entered Parliament as an active free-trader in 1835, but lost his seat in 1837; from 1841–9 he was member for Bolton. Financial losses caused his resignation, and in 1854 he was knighted and made governor of Hong-kong, and chief superintendent of trade in China. In 1856 occurred the well-known affair of the lorcha *Arrow*. To punish the insult to the British flag, Bowring ordered the bombardment of Canton. Votes of censure were moved on Bowring in Parliament, and the Palmerston ministry was defeated in the Commons, but on appeal to the country returned to power. He retired in 1859, and gave himself up to literary pursuits. Among his works may be mentioned *The Kingdom and People of Siam* (1857), *A Visit to the Philippine Islands* (1859), *Ancient Poetry and Romances of Spain* (1824), *Poetry of the Magyars* (1830), *The Decimal System* (1854), and *Servian Popular Poetry* (1827). See also his *Autobiographical Recollections* (1877).

Bowstring Hemp, the fibre of the *Sanseviera zeylanica*, a plant of the order Hæmodoraceæ. It is a native of the E. Indies, where it is called *moorva*. The fibre—white, silky, and elastic—is of use in making strings for bows. A similar variety yields the almost identical African hemp.

Bow Window. See BAY WINDOW.

Bowyer, SIR GEORGE (1811–83), English jurist and Catholic controversial writer, was called to the bar of the Middle Temple (1839); became reader in law there (1850); M.P. for Dundalk (1852–68), and for Co. Wexford as a Home Ruler (1874–80). Converted to Catholicism in 1850, he became the authorized defender of the Pope's distribution of England into Catholic sees. His legal works include *English Constitution* (1841), *Commentaries on the Modern Civil Law* (1848), and *Commentaries on Universal Public Law* (1854).

Bowyer, WILLIAM (1699–1777), 'the learned printer,' was appointed (1729) to print the votes of the House of Commons, and became printer for the Society of Antiquaries (1736) and for the Royal Society (1761). In 1763 he published his *Conjectural Emendations* of the Greek Testament, and in 1774 (anonymously) his *Origin of Printing*. Most of his learned pamphlets, prefaces, etc., are reprinted in *Miscellaneous Tracts*, by J. Nichols (1785). See Hansard's *Typographia* (new ed. 1869).

Box. The common box tree (*Buxus sempervirens*) is best known in Britain by its variety *suffruticosa*, largely employed as a garden edging. It is a native of the countries bordering the Mediterranean, as well as of China. The species is an evergreen shrub, growing, under good treatment, to twenty or thirty feet in height, and was formerly much used as a hedge plant in formal gardens. It enjoys partial shade and liberal feeding. It is propagated by cuttings

taken in August and inserted under a glass in a shady spot. The dwarf variety is best increased by division. Other hardy species are *B. japonica*, which grows to about five feet in height; and *B. microphylla*, a small-leaved, dwarf-growing shrub. *B. balearica*, on the other hand, requires a little winter protection, except in the warmer parts of Britain. It is an attractive shrub, and often reaches a height of twenty feet. Male and female flowers are borne on the same tree. The box belongs to the order Euphorbiaceæ. The value of the wood of the box tree has long been recognized—*cf.* Isa. 41:19, and again in 60:13. Virgil refers to boxwood inlaid with ivory. Wood engravings are executed on boxwood; it is also used for the handles of many tools, and for the manufacture of flutes and clarionets.

Boxall, Sir William (1800–79), English portrait painter, studied at the Royal Academy, London, and in Italy (1827–9). He was elected R.A. (1863), director of the National Gallery, London (1865–74), and was knighted (1867). At the Royal Academy he exhibited *Jupiter and Latona* (1823), *The Contention of Michael and Satan for the Body of Moses* (1824), *Milton's Reconciliation with his Wife* (1829), *Lear and Cordelia* (1831), and other historical and dramatic subjects, as well as scenes from the 'Waverley Novels.' In later life he devoted himself almost entirely to portraiture, and painted, for Trinity House, the Prince Consort, wearing his robes as Master.

Box-days, two days in the spring and two in the autumn vacations, and one day in the Christmas recess, fixed by the Scottish judges for lodging defences, pleadings, and other papers ordered by the court towards the close of the session.

Boxers, The, the name given by Europeans to a Chinese society, which early in 1900 organized a widespread anti-missionary rising in Shantung and other provinces of N. China, and murdered many European missionaries and native Christians. The movement was at the same time strongly anti-foreign, and had been to a great extent fostered by the grasping demands of the Western powers for concessions and the opening up of the country. The Manchu element at court, headed by the dowager-empress, at first opposed, but afterwards encouraged, the movement—a course which culminated in the assassination of Baron von Ketteler, the German minister at Peking, the destruction of several of the legations, and the siege of upwards of two hundred foreign refugees within the walls of the British legation at Peking. A relief expedition, in which British, French, Germans, Russians, Americans, and Japanese took part, was at once organized. The allies' ships bombarded and destroyed the Taku forts, and an unsuccessful advance on Peking was made under Admiral Seymour. The allied troops again advanced, and after heavy fighting at Tientsin, Pei-tsang, and Yang-tsun, succeeded in relieving the besieged on Aug. 14, 1900. The court fled from the capital. and the allies remained in possession until peace was signed on Sept. 7, 1901, one of the conditions of which was that China should pay £64,000,000 as indemnity to the foreign powers. See Sir R. Hart's *These from the Land of Sinim* (1901), and *China under the Empress-Dowager*, by Bland and Backhouse (1910).

Boxhagen-Rummelsburg, comm., prov. Brandenburg, Prussia, immediately E. of Berlin. Pop. 35,000.

Box-hauling, the method adopted of working a ship from

one tack to another, by means of bracing the headyards aback, either after luffing or wearing short round, instead of making a long sweep. To 'box off' is to box the vessel's head away from the wind after she has missed stays.

Boxing. GLOVE-FIGHTING, as distinct from pugilism, fighting with the bare knuckles, has gained immensely in popularity of late years since the 'old' style went out of fashion, and in the present century all contests for the championship of the world have been decided with the gloves. The old style has been modified to suit new conditions, and though modern boxers may possibly be more scientific, some bad practices have been introduced, the worst of which is that of stopping a blow with the open glove, as an attempt to parry a naked fist in this manner must result in injury to the hand. Another vicious innovation is the giving of huge purses and awarding a disproportionate amount to the loser, thereby encouraging a man who is getting the worst of a bout either to pretend he cannot come up to time, or to lay himself open to a disabling blow which will knock him out for ten seconds and certainly not hurt him ten hours, for doing which he receives some five or six hundred pounds. The best heavy-weight boxers of recent years have been J. L. Sullivan, Jem Corbett, Jem Jeffries (Americans), Bob Fitzsimmons (a Cornishman resident in America), Frank Slavin (Australian), Tom Sharkey (a sailor), and Peter Jackson, Jack Johnson, champion 1910, and Sam Langford (negroes), etc.

The rules for boxing competitions are all based on those framed by the Marquis of Queensberry (1867), a distinguished patron of the art. They are, generally speaking:—The ring shall be roped, and twenty-four feet square. Competitors to box in light boots or shoes (without spikes) or in socks, with knickerbockers, breeches, or trousers, and wear jerseys. The result shall be decided by two judges, with a referee, or by a referee only. In three-round contests the duration of the first two rounds shall be three minutes, and the final round four minutes, and the interval between each round shall be one minute; in longer contests the usual duration is three minutes. Any competitor failing to come up when 'Time' is called, either at the end of the interval or within ten seconds of being knocked down, shall be declared the loser. Where a competitor draws a bye, he shall be bound to spar such bye for the specified time, and with such opponent as the judges or referee may approve. Each competitor shall be entitled to the assistance of one attendant only, and no advice or coaching shall be given to any competitor by his second, or by any other person, during the progress of any round. The referee shall have power to give his casting vote when the judges disagree, or to stop the contest in either the second or third round in the event of its being very one-sided; and in three-round contests he can, further, order a fourth round, limited to two minutes, in the event of the judges disagreeing. The decision of the judges or the referee, as the case may be, shall be final and without appeal. The referee may, after cautioning the offender, disqualify a competitor who is boxing unfairly by flicking or hitting with the open glove, by hitting with the inside or butt of the hand, the wrist or elbow, holding, or by wrestling or roughing at the ropes. In the event of any question arising not provided for in the rules or articles, the referee to have full power to

decide such question, and his decision to be final.

The ordinary terms in boxing, with their explanations, are:—

Break away, the order given by the referee to the combatants to separate when they have clinched or closed, as in wrestling; the act of breaking away.

Breaking ground, moving swiftly to the right or left with a view of disconcerting your adversary and opening an attack.

Counter hit, to hit your adversary whilst he is in the act of hitting at you. It is the most punishing of all blows, as, if properly timed, your adversary suffers from the impact of his own weight as well as yours.

Cross-counter, to hit your adversary with your right hand on the head when he is in the act of striking at you with the left.

Draw, to induce your adversary to make an effort towards you in response to a feint.

Draw back, to draw your head or body out of reach of a blow without shifting your ground.

Duck, to avoid a blow by moving your head out of the way.

Feint, to pretend to strike.

Form, attitude and motion.

Hit, a blow struck with the knuckles of either hand on the head or any part of the body (except the arms) above the belt.

In-fighting, fighting within arm's length.

Knock-out, a blow which disables a competitor, and prevents him from resuming the fight after ten seconds have been counted.

Lead off, to open an attack with either hand on the head or body.

Out-fighting, fighting farther off than at arm's length.

Parry, or *guard*, to ward off a blow with the arm or glove.

Rally, a rapid exchange of blows without intermission.

Return, a blow delivered immediately after your adversary has struck at you.

Slip, or *side step*, to bend down and step quickly to the right or left of an attacking adversary by changing your feet.

Time, to strike your adversary at the time your blow will punish him most.

Upper cut, a blow delivered with either hand upwards on the face of an adversary attacking with his head down.

See Allanson-Winn's *Boxing* ('The Isthmian Series,' 1896); Trotter's *Boxing* ('The Oval Series,' 1893); Mitchell's *Boxing* ('Badminton Library,' 1889); and Johnstone's *Modern System of Glove-Fighting* (1906).

Pugilism.—The rules of prize-fighting—*i.e.* contests for a money stake with the naked fists—differ somewhat from those of boxing with the gloves. The rounds are of unlimited duration, and are terminated by one or other combatant falling on giving or receiving a blow, or by being thrown. Wrestling and holding are allowed, provided the hold is above the waist. The usual interval between the rounds is half a minute. The combatant who is unable to stand up to his adversary when 'Time' is called at the expiration of the interval loses the fight. He may also be disqualified for violation of the rules.

This sport was first brought into prominence by James Figg in London, in 1719. The boxing boom reached its height in 1734–50, when Jack Broughton flourished. To this famous boxer we are indebted for the invention of the boxing-glove, or muffler as it was then called, as well as for the first code of rules, from which those at present in force have been developed. After Broughton's death pugilism declined in favour for a time; but Tom Johnson restored its popularity. Then

Boxing: Postures in Attack and Defence.

1. Counter. 2. Cross-counter. 3. Draw back. 4. Duck. 5. Right upper cut. 6. Parry.

began the period of highest prosperity for the ring, which lasted until the retirement of Tom Spring in 1824, during which time Humphreys, Mendoza, 'Gentleman' Jackson, Belcher, Pearce ('the Game Chicken'), Gully (who became an M.P.), Cribb, Spring, Bendigo (who afterwards turned revivalist preacher, and is said, in case of an unsatisfactory collection, to have stimulated the charity of his audience by the threat of applied muscular Christianity), Ward (of earlier date), Randall, Curtis, and Dutch Sam attained celebrity. It was resuscitated for a time by the splendid battles of heavy-weights such as Heenan, Tom King, Tom Sayers, and Jem Mace (a smaller man) from 1851 to 1860; and a host of light and middle weights, the most celebrated perhaps of whom was the undefeated Johnny Broome. Another undefeated light-weight, with whom many now alive were acquainted, was Bat Mullins, who died recently. For the most part the men fought honestly, though 'sold' fights were never unknown. The baneful influence of gambling, however, almost from the first, cast its evil shadow over the ring. The law also, almost from the first, discountenanced such contests, and, after the fight between King and Heenan in 1863, very definitely pronounced against them. Towards the end of the 19th century interest in prize-fighting revived spasmodically, chiefly owing to the discovery of a moderate heavy-weight, Jem Smith, and there were a few prize-fights, most notable of which was a game contest in France between Smith and another second-rater, Kilrain, from America; but the revival, which was ruined by journalistic panegyrics and unscrupulous gambling, quickly died away, and is not likely to be resuscitated.

See Godfrey's *A Treatise on the Useful Art of Self-Defence* (1740); Donnelly's *Boxing Handbook* (1801); Bee's *Lives of the Boxers* (1811); Egan's *Boxiana* (1818–24); Miles's *Pugilistica* (1880–1); 'Philopugilist's' *Life of Tom Sayers* (1864); Dowling's *Fistiana* (1864); Henning's *Fights for the Championship* (2 vols. 1902).

Boxing Day, the day after Christmas Day, on which Christmas boxes or presents are given to employés or messengers. It is a bank holiday in England.

Boxtel, tn., prov. N. Brabant, Netherlands, 7 m. s. of 's Hertogenbosch (Bois-le-Duc). Here, in 1794, the French defeated the allied Dutch and English. Pop. of comm. 7,000.

Box-thorn, the English name of ornamental plants of the genus Lycium, of the order Solanaceæ, or nightshades. There are two common species—the *Lycium barbarum*, used extensively for decorating walls or arbours, and the spiny *Lycium europæum*, adopted as a hedge plant. The smaller shoots are eaten in Spain.

Boyaca, tn., Colombia, 20 m. s. of Tunja, scene of Bolivar's victory over the Spanish forces, August 7, 1819. Pop. 7,000.

Boyar, the highest rank, military and civil, next to *knyaz* (prince), in the old Russian aristocracy. Before the organization of the empire under Peter the Great, the boyars, at first a nobility of office, had considerable independence in the separate principalities, and might withhold consent to any ukase of the Czars. Since Peter's time the title has been honorary, the boyars being incorporated with the Russian nobility. The conservative section of the Roumanian Parliament is called the Boyar party. See Sir D. M. Wallace's *Russia*, ch. xvii. (new ed. 1887).

Boy-bishop. In the mediæval church it was the custom to allow

choristers of cathedrals on St. Nicholas's Day (Dec. 6) to choose one of their number to act as bishop till Innocents' Day (Dec. 28). The practice was finally abolished in England in the reign of Elizabeth, and on the Continent by the Council of Basel (1431).

Boyce, WILLIAM (1710–79), English musical composer, was born in London. In 1736 he became composer to the Chapel Royal, and (1758) organist. Dr. Greene, whose pupil he was, left him to complete and publish his *English Cathedral Music* (1760), important as being the earliest collection of 16th and 17th century church music in score. It was reprinted, with additions, in 1849. Boyce is remembered chiefly for the tune of the patriotic song *Hearts of Oak.*

Boycotting, a conspiracy to prevent social or commercial intercourse with any objectionable person. The word was derived from a Captain Charles Cunningham Boycott (1832–97) who, in 1880, was land agent to Lord Erne in Mayo, Ireland, and had evicted a large number of tenants. His neighbours organized a system of unlawful intimidation by which they restrained the tenantry and others from all intercourse with Boycott and his family. About sixty Orangemen from the north of Ireland visited the estate and gathered in the crops, protected by government forces and constabulary. This was called 'the Boycott relief expedition.' Eventually the severe measures adopted (1887) by government gave the death-blow to this iniquitous system of 'exclusive dealing.'

Boyd, ANDREW KENNEDY HUTCHISON (1825–99), commonly referred to as A.K.H.B., Scottish divine, was born at Auchinleck, Ayrshire. He was parish minister, successively, of Newton-on-Ayr (1851–4); Kirkpatrick-Irongray, Dumfries (1854–9); St. Bernard's, Edinburgh (1859–65); and St. Andrews (1865–99). He laboured successfully to improve the church ritual. Through *Fraser's Magazine* Boyd achieved fame with *Recreations of a Country Parson,* published in three series (1859–78). Similar work is in *Graver Thoughts and Critical Essays of a Country Parson,* published in three series (1862–75), and his many books of homilies and sermons issued between 1862 and 1889. *Twenty-five Years of St. Andrews* (1892), *St. Andrews and Elsewhere* (1894), and *Last Years of St. Andrews* (1896), observant, humorous, sparkling with anecdotes, and trenchantly plain-spoken, constitute a valuable contemporary record.

Boyd, MARK ALEXANDER (1563–1601), Scottish author, a younger son of Robert Boyd, Penkill, Ayrshire; studied law at Paris, Orleans, and Bourges, securing at the last-named centre the friendship of Cujacius. In 1587 he took service with the Catholics in the League war, but resumed his studies next year at Toulouse, whence he escaped as a suspect to Bordeaux during a Catholic insurrection. After his elder brother's death, in 1595, he returned to Scotland, and was for a time travelling tutor to the Earl of Cassillis. He died at Penkill, and was buried in the church of Dailly, Ayrshire. Boyd published at Amsterdam, in 1592, a volume of Latin poems with a stilted dedication to James VI. In the *Deliciæ Poetarum Scotorum* (1637) he is represented by *Epistolæ Heroidum* and *Hymni,* which display ready scholarship and ingenuity, though deficient in taste and grace of style. See Sir David Dalrymple's (Lord Hailes) *Sketch of the Life of Mark Alexander Boyd* (1787); Sir R. Sibbald's *Scotia Illustrata* (1683); D. Irving's *Lives of Scottish Writers,* i. 182 (1839); Grub's *Eccles. Hist. of Scot.,* ii. 191, 225 (1861).

Boyd, ZACHARY (? 1585-1653), Scottish theologian, descended from the Boyds of Penkill, completed his education at Saumur College, France, where he became regent in 1611. After his return to Scotland in 1621, he was appointed incumbent of Barony parish, Glasgow, in 1623. In 1633, at Holyrood Palace, he addressed Charles I. in a eulogistic Latin oration. He was lord rector of Glasgow University in 1634–5, and again in 1645, and was also for a time its dean of faculty and vice-chancellor. On October 13, 1650, he soundly rated Cromwell, who was present, in a sermon preached in Glasgow Cathedral; but the Puritan leader in private gained his respect. Boyd left his books and MSS., besides a handsome legacy, to Glasgow University. His *Last Battell of the Soule in Death* (2 vols. 1629) is in dialogue, with a certain dramatic force. It was edited, with Life of Boyd, by Gabriel Neil (1831). A poem on Leslie's victory at Newburn appeared *c.* 1640. *Four Letters of Comfort for the Deaths of the Earl of Haddington and Lord Boyd* (1640) were reprinted in 1878. In 1643 appeared *Crosses, Comforts, and Councells.* The General Assembly declined to adopt for service Boyd's *Psalmes of David in Meeter* (1646). The *Zion's Flowers* —metrical versions of Scripture, known as 'Boyd's Bible'—remained in MS. till 1855, when four of the poems were edited by Gabriel Neil. See R. Baillie's *Letters and Journals*, i. 411 (1841); *Acts of the General Assemblies, 1682*, pp. 353, 428, 479; M'Ure's *View of the City of Glasgow*, p. 228 (1736); Pinkerton's *Iconographia Scotica* (1797); Irving's *Hist. of Scottish Poetry*, p. 517 (1861).

Boydell, JOHN (1719–1804), English engraver and print publisher. In the latter capacity he built up (*c.* 1751) a large continental trade, his first important engraving being Woollett's plate after Wilson's *Niobe.* In 1786 he commenced the publication of a series of prints on Shakespeare, after pictures specially painted by English artists, and built the Shakespeare Gallery in Pall Mall for their exhibition; but the French Revolution having destroyed his foreign trade, in 1804 he applied to Parliament for permission to sell his pictures by lottery. In 1790 he was elected lord mayor of London. He was the first to make English art known to the Continent.

Boyer, ABEL (1667–1729), miscellaneous writer, translator and adapter of Racine and Fénélon, and author of the long popular *Dictionnaire Royal* (French and English). He was born at Castres, in France, but went to England in 1689. In 1703 he began to issue a *History of the Reign of Queen Anne*, an annual register of events; and in 1711 a monthly *Political State of Great Britain*, the first regular parliamentary reports of tolerable accuracy (38 vols. 1711–29).

Boyer, ALEXIS (1757–1833), surgeon to Napoleon, qualified (1787) as a surgeon in the face of great difficulties, and was called to the chair of operative medicine in the Ecole de Santé, Paris (1792), and appointed (1794) second surgeon in the Hôtel Dieu. The emperor created him premier surgeon (1805) and a baron of the empire (1807). He was one of the first members of the new academy of medicine, and in 1823 became consulting surgeon to Louis XVIII., a post which he held under the two succeeding monarchs. He published two standard works—*Traité Complet de l'Anatomie* (1797–9), and *Traité des Maladies Chirurgicales* (11 vols. 1814–26; new ed. in 7 vols. 1844–53).

Boyer, JEAN PIERRE (1776–1850), general, and president of

the republic of Hayti, took part in the revolution of 1793, and in the internal wars which followed it. On the death of Pétion (1818) he was selected president, and soon ruled over the whole island. His agreement to indemnify the ruined French settlers, and his refusal to concede certain commercial concessions to France as the sovereign country, caused his downfall, and he had to flee (1843) to Jamaica. He died in Paris.

Boyesen, HJALMAR HJORTH (1848–95), author, born in Norway, emigrated to the United States in 1868; became professor of German at Cornell University (1874), and professor at Columbia University, New York (1880–95). In addition to novels (*Gunnar*, 1874; *Ilka on the Hilltop*, 1881; etc.) and poems (*Idylls of Norway*, 1882), he wrote *Goethe and Schiller* (1878; 3rd ed. 1885), *History of Norway* (1886), *Essays on German Literature* (1892), a monograph on *Ibsen* (1894), and *Essays on Scandinavian Literature* (1895).

Boyle, par. (19,618 ac.) and mrkt. tn., Co. Roscommon, Connaught, Ireland, on river Boyle, 24 m. S.S.E. of Sligo. The town grew up round a Cistercian abbey established in 1161; in 1235 it was occupied by the English. Pop. 2,500.

Boyle, Earls of Orrery. See ORRERY.

Boyle, RICHARD, Earl of Cork. See CORK, EARL OF.

Boyle, THE HON. ROBERT (1627–91), physicist and chemist, was the seventh son of the first Earl of Cork, and was born at Lismore Castle, Ireland. He lived successively at Stalbridge in Dorsetshire, Oxford (1654–68), and London. Devoting himself to chemistry, he published, in 1660, *New Experiments, Physico-Mechanical*—in an appendix to the second edition of which (1662) he enunciated and roughly proved the statement, now known as 'Boyle's law,' that 'the volume of a given mass of gas is inversely proportional to its pressure.' He was closely connected with the Royal Society. Boyle's greatness lies rather in his exhibition of the analytic method over the whole field of science of his day, than in his positive contributions to knowledge. Yet he was the first to distinguish a mixture from a compound, and to define an element accurately. He invented a compressed air-pump, superintended the construction of the first British-made hermetically-sealed thermometer, and made a multitude of observations on atmospheric pressure, expansion of liquids, and on electricity and magnetism. At the same time he was interested in alchemy. Boyle was a director of the East India Company, and was identified with many philanthropic works. He also founded the 'Boyle Lectures.' See his *Philosophical Works Abridged* (1725); Dugald Stewart's 'First Dissertation,' in *Encyc. Brit.* (6th ed. 1824); Birch's Life in the folio ed. of the *Works* (1744); Crum Brown's *Development of the Idea of Chemical Composition* (1869); and *Asclepiad*, x., for portrait and sketch of medical work.

Boyle Lectures, a series of lectures instituted by Robert Boyle 'to prove the truth of the Christian religion against atheists, deists, pagans, Jews, and Mohammedans, not descending to any controversies among Christians themselves.' Richard Bentley was the first who gave these lectures. From 1691 to 1902 the published lectures comprised no fewer than 212 volumes.

Boyne, river rising near village of Carbery, Kildare, on borders of King's Co., Ireland; flows then through Meath in N.E. direction, passing Trim, Navan, and Slane; separates Meath from Louth, and

enters the Irish Sea a little below Drogheda, after a course of about 70 m. The Grand Canal crosses the upper course. The river is navigable for vessels to Drogheda, and for barges to Slane. About 3 m. from Drogheda, an obelisk, erected in 1763, marks the spot where the battle of the Boyne was fought, in 1690, between James II. and William of Orange. 'Boyne Water' is the slogan of the Orange party. See Wilde's *The Beauties of the Boyne and Blackwater* (1850).

Boyne, LEONARD (1852), Irish actor, entered the dramatic profession in 1869. He first appeared in London as Ozias Midwinter in Wilkie Collins's *Miss Gwilt*, at the Globe Theatre (1876). In 1884 he joined Wilson Barrett's company, and played the title rôle of Claudian. In 1892 he appeared at Drury Lane as Captain Vernon in *The Prodigal Daughter*. He visited the United States in 1893, and on his return to England played David Remon in *The Masqueraders*, Jack Allingham in *The Benefit of the Doubt*, and Captain Trefusis in *The Late Mr. Castello*. As actor-manager at the Shaftesbury he produced *Sporting Life*, in which his impersonation of Lord Woodstock was much appreciated. He appeared at the Lyceum as Lord Fellsdale in *For Auld Lang Syne* (1900), Paul Sylvaine in *Leah Kleschna* (1905), and as Warren Barrington in *The Stronger Sex* (1907).

Boyneburg, or BEMELBERG, KONRAD or KURT VON (1494–1567), one of the most famous leaders of *landsknechte* in the time of Charles V., learned the art of war under the great captains Sickingen and Frundsberg; distinguished himself in the capture of Rome (1527), the defence of Naples (1528), the capture of Florence (1530), and in wars against Turks (1532) and French (1537, 1544, 1552–4). See Solger's *Der Landsknechtsobrist Konrad von Bemelberg* (1870).

Boys' Brigade, THE, a movement set on foot in 1884 by Mr. (afterwards Sir) W. A. Smith of Glasgow, its object being 'the advancement of Christ's kingdom among boys, and the promotion of habits of obedience, reverence, discipline, self-respect, and all that tends towards a true Christian manliness.' The total number of boys enrolled in the United Kingdom is 52,000, with 4,800 officers, their ages varying between twelve and seventeen. They are formed in companies, in connection with missions, churches, and Sunday schools; they adopt a simple uniform of cap, belt, and haversack, in addition to their ordinary clothes; and they are trained by military drill and discipline. The movement has spread to America and the British colonies. In the United States there are 600 companies, with 28,000 boys; and in Canada there are 120 companies, with 5,000 boys. The total strength throughout the world is 94,000. See also BOY SCOUT MOVEMENT.

Boy Scout Movement, THE, was inaugurated by Lieut.-General Sir Robert Baden-Powell in the beginning of 1908. The object of the movement is to develop manliness, self-respect, and self-reliance among boys of all classes, by means of practices and games —such as signalling, tracking and stalking, camping-out, observing nature—which really attract and hold boys. The unit for work is the 'patrol,' or party of six to eight boys under a boy leader. Any number of patrols may combine to form a 'troop,' controlled by a scoutmaster and his assistants. The patrols and troops of a district are supervised by a local committee of scoutmaster representatives, the administration being based on decentralization

of authority and responsibility. Necessary funds are raised locally. A simple but attractive uniform is worn. The movement has made such rapid progress that in Great Britain alone it numbers already some 200,000 members. Boy-scouting has been taken up enthusiastically in Canada, Australia, New Zealand, and in other parts of the empire; and is spreading to Germany, France, Spain, Norway, and other countries. Headquarters of Boy Scouts: 114–118 Victoria Street, Westminster, S.W. An analogous movement for girls, the 'Girl Guides,' has also been started. See *Scouting for Boys* (1909) and Sir R. Baden-Powell's article in *National Defence* (Aug. 1910).

Bozen, or BOTZEN, tn. and summer resort in Tyrol, Austria, on the Etsch, 30 m. N. by E. of Trient; in the middle ages an important emporium in the trade between Venice and Central Europe, and still the chief commercial centre of Tyrol. It has an interesting church of the 14th and 15th centuries, and a monument to the poet Walther von der Vogelweide. It is in a rich fruit district; wine is made and cotton manufactured. Pop. 14,000.

Bozrah (mod. *El-Buseireh*), chief city of the Edomites, 25 m. S.E. of the Dead Sea, Palestine. It was a place of great antiquity (Gen. 36:33); now in ruins.

Bozzaris, MARCOS (1788–1823), celebrated Greek patriot, 'the modern Leonidas,' was born at Suli in Epirus. From early youth he was in the midst of the struggle for Grecian independence. Defeated in 1803 by Ali Pasha, and compelled to retreat to the Ionian Isles, he afterwards joined Ali in 1806, on the latter's revolt against the Sultan, and kept up the war after Ali's defeat and death at Janina (1822). He died near Missolonghi, which he had long defended, in the course of a daring night attack on the Turkish army in August 1823.

Bra, tn., prov. Cuneo, Italy, 31 m. by rail S. by E. of Turin; breeds silkworms, and trades in wine, truffles, and silk. Pop. 16,000.

Brabançonne, La, the national song of Belgium, composed and sung during the revolution in 1830. The words were by Jenneval—*i.e.* Dechet (1801–30)—a French actor, an active revolutionist, killed fighting near Antwerp in October 1830. The music was composed by François van Campenhout (1779–1848).

Brabant. (1.) SOUTH BRABANT, prov. of Belgium, in the middle of the kingdom, between the Meuse and the Scheldt. It is flat, fertile, and the most densely inhabited province of Belgium (1,080 inhabitants to the sq. m.). Both agriculture and manufacturing industries flourish—the latter producing lace, linen, cloth, carpets, hats, spirits, tobacco, starch, paper, chemicals, beer, machinery, leather, pottery, and soap. Area, 1,268 sq. m. Pop. 1,370,000. Chief town, Brussels. (2.) NORTH BRABANT, prov. in S. of Holland, to the E. of Zeeland; very level, marshy, and generally unfertile. Area, 1,980 sq. m. Pop. 630,000. Cap. 's Hertogenbosch.

Brabant, SIR EDWARD YEWD (1839), South African soldier and politician, born in England, raised and commanded Brabant's Horse, which did excellent service in the Boer war (1899–1902). His subsequent appointment to the command of the Colonial Division was a tribute to his soldierly qualities, and to his influence in Cape Colony. He was elected to the Cape Parliament for East London in 1873, and again in 1882 and 1888. He was also president of the South African League in 1897, and a member of the Defence Committee in 1896–7. He was appointed field-commandant of the colonial forces in 1878, and

in the following year became colonel of the Cape Yeomanry. His services were rewarded with a K.C.B. in 1900. In 1902–4 he was commandant-general of the Cape forces.

Brabazon, JOHN PALMER (1843), British soldier, born in Co. Mayo, Ireland; served in the Ashanti war of 1874. In the Afghan war (1878–80) he was present at the capture of the Peiwar Kotal, and at the engagement at Charasiah (Oct. 6, 1879); accompanied Sir Frederick (now Earl) Roberts on his famous march from Kabul to Kandahar (Aug. 9–31, 1880), and was present at the battle of Kandahar (Sept. 1), when Ayub's army was defeated. In the 1884 Sudan expedition he was present in the engagements of El Teb (where he was wounded) and Tamai. He served throughout the Nile expedition for the relief of Gordon (1884–5) with the Light Camel Regiment, and took part in the operations of the desert column, including the engagement at Abu Klea Wells (Feb. 16 and 17, 1885). In the Boer war (1899–1902), Colonel Brabazon was first given the command of the 2nd Cavalry Brigade, and later that of a division of Imperial Yeomanry. He retired from the army in 1901.

Brac, Dalmatia. See BRAZZA.

Bracara Augusta, Portugal. See BRAGA.

Bracciano, tn., prov. Rome, Italy, 27 m. N.W. of Rome, on the S. side of the Lake of Bracciano. Its principal feature is the vast baronial castle, built by one of the Orsini in 1480, and since 1696 a possession of the Odescalchi. Pop. 4,000.—The LAKE OF BRACCIANO, known to the ancients as *Lacus Sabatinus*, fills an extinct crater, and lies 540 ft. above sea-level, but has a depth of over 800 ft., or 260 ft. *below* sea-level. It measures about 20 m. in circumference, and has been famous for its fish since Roman times.

Braccio, or FORTEBRACCIO, whose real name was ANDREA DA MONTONE (1368–1424), Italian *condottiere*, or captain of mercenaries, was born at Perugia. Banished from Perugia in 1400, he aided, in 1408, Ladislaus, king of Naples, in taking the city, of which, on the death of Ladislaus, he assumed (1416) control. In 1416 he made himself master of Rome for over two months. In 1421 he espoused the cause of Joanna II. of Naples, surprised Capua, and entered Naples in triumph. His ambition awakened the suspicion of Joanna, who joined Anjou and Sforza against him. At the siege of Aquila Braccio was wounded, and died three days afterwards.

Bracciolini, FRANCESCO (1566–1645), Italian poet, born at Pistoja, enjoyed the patronage of Cardinal Maffeo Barberini, who became Pope Urban VIII. He produced an imitation of Tasso, in the *Croce Racquistata* (1605–11), which narrates the war of the Emperor Heraclius against the king of Persia for the recovery of the cross. In the burlesque poem, *Lo Scherno degli Dei* (1618–26), the ancient gods are parodied after the manner of Tassoni. There are humour and life in this work, but the matter is not adequate to fill twenty cantos. Among Bracciolini's minor works the *Poesie Giocose* (1626) is the best. See G. Cegani, *F. B. e il suo Poema*, in *Ateneo Veneto* (1883, vol. ii.); M. Menghini, preface to our poet's *Psiche* (1889); and Barbi, *Notizia della Vita e delle Opere di F. Bracciolini* (1897).

Brace, CHARLES LORING (1826–90), American philanthropist and author, born at Litchfield, Connecticut. After extensive travels in Europe he settled (1852) in New York, and devoted himself to ameliorating the condition of the lowest classes by founding the Children's Aid Society and other

organizations. His most important publications are *Hungary in 1851* (1852); *Home Life in Germany* (1853); *The Norse Folk* (1857); *The Races of the Old World* (1863); *The New West, or California in 1867–8* (1869); *The Dangerous Classes of New York* (1872); *Gesta Christi* (1882); *The Unknown God* (1889). See *Life* by his daughter (1894).

Bracebridge, tn. and summer resort, Muskoka co., Ontario, Canada, 98 m. N. of Toronto, on the Muskoka R.; manufactures lumber, flour, and woollen goods. Pop. 2,500.

Bracegirdle, ANNE (?1663–1748), English actress, made her début in *The Orphan* at the Duke's Theatre in Dorset Garden, London, and from 1693 appeared in the Theatre Royal as Lucia at Shadwell's *Squire of Alsatia* (1688), and with Betterton at the Lincoln's Inn Theatre as Angelina in Congreve's *Love for Love* (1695); she created Belinda in Vanbrugh's *Provoked Wife*, and Almeria in Congreve's *Mourning Bride*. She was at home in tragedy as well as in comedy, and her professional career was a long series of triumphs until she retired from the stage in 1707, eclipsed by Mrs. Oldfield. See Cibber's *Apology* (1822), and W. Clark Russell's *Representative Actors* (1875).

Bracelet. (1.) An ornamental band worn on the arm or wrist. (2.) An ornament worn on the neck and the bejewelled covers of caps. (3.) A fetter or gyve. (4.) A piece of armour covering the arm. The three last meanings are unusual. In the stricter sense, bracelets or armlets are of various types. Prehistoric bracelets (*armillæ*) of gold and bronze are found, both penannular, and with trumpet-shaped ends, the gold generally plain, the bronze most frequently richly decorated with zoomorphic designs, and sometimes set with enamels. Some of the latter were also arranged as a coil down the arm. The Norse or Viking type consisted of large bracelets of finely-twisted silver terminating in knobs or in hooks. A special variety of bracelets of bronze is the massive armlet of 'late-Celtic' type peculiar to Scotland, an enrichment of the coiled serpent variety. Bracelets of chain-work were worn by Hebrew women. Enamelled bracelets of various metals prevailed in Egypt. In the regalia of the Mogul emperors of India was a unique pair of bracelets set with diamonds of unrivalled beauty and costliness. Bracelets were worn by both men and women among the ancient Germanic tribes and among the Romans, and were bestowed upon distinguished warriors and others as a mark of honour. But since about the end of the 12th century the wearing of bracelets has been chiefly confined to women. Horn and mother-of-pearl, besides copper and brass, have been used for bracelets; and in Anglo-Saxon tombs bracelets have been found made of beads of vitreous paste strung together. See Bartholinus' *De Armillis Veterum* (1676).

Brachial Artery, the artery carrying the blood to the arm. It is a prolongation of the axillary artery. It begins at about the lower border of the armpit, and ends by dividing into the radial and ulnar arteries just below the bend of the elbow, lying, in its upper part, in a position corresponding to that of the inner seam of a sleeve, and gradually sweeping outward to the front of the elbow joint. When hæmorrhage occurs below the armpit, and cannot be stopped by direct pressure on the bleeding spot, forcible pressure should be applied on the line of the inner seam of the sleeve, high up on the arm; this compresses the

brachial artery against the bone (humerus). This vessel gives off several branches before dividing below the elbow.

Brachial Plexus, the network of nerves which supply the arm. It is formed by the four lower cervical nerves and part of the first dorsal, and lies between the root of the neck and the axilla or armpit, where it breaks up into several branches.

Brachiopoda ('arm-footed'), or LAMP-SHELLS, an interesting group of animals which, owing to the presence of two calcareous shells, were once placed in the group Mollusca near bivalves. They received their name from the fact that the two spirally-coiled arms round the mouth, which are very characteristic structures, were compared with the foot of molluscs—a comparison long since shown to be erroneous. Brachiopods in no way resemble molluscs; even the shell has nothing more than a superficial resemblance to that of bivalves. Their exact position is not very certain, but they are now placed in proximity to the Polyzoa or Bryozoa, which they resemble in many points. As fossils, brachiopods are numerous, especially in the old rocks; but there are relatively few species now extant. To distinguish between the shells of brachiopods and bivalves, the following points should be noticed. In a bivalve the two valves are usually equal, but each valve is unsymmetrical about the median line; in a brachiopod the valves are of unequal size, but each valve is symmetrical about the median line. Where the soft parts are present, the absence in the brachiopod of foot, gills, and mantle, and the presence of 'arms,' are diagnostic. In British waters Terebratula and Crania not infrequently occur.

Brachycephalic. See ANTHROPOLOGY.

Brachyura ('short tails'), a name given to those decapod crustaceans in which the tail is short and bent beneath the body —*e.g.* the common edible crab— in opposition to the Macrura, or long-tailed forms, like lobster and prawn. Though the distinction seems at first sight an easy and satisfactory one, it is now often abandoned: because, in the first place, there exist transitional forms between the two states; and, in the second, the brachyurous habit is merely an adaptation to life on the sea-bottom, and has been independently acquired by many different forms. The squat lobsters (*Galathea*), which are macrurous forms, are closely related to the short-tailed porcelain crabs (*Porcellana*). The anomalous hermit crabs (Paguridæ), with their lank, uncalcified tails, are nearly related to the short-tailed stone crab (*Lithodes*), and so on. In brief, the scientific term Brachyura is as devoid of precision as its English equivalent, the word 'crab.' See DECAPODA and CRAB; T. R. Stebbing's *Hist. of Crustacea*, in the 'International Science Series' (1893); and the chapters on Decapods in *Life by the Seashore*, by M. I. Newbigin (1901).

Brackel, or BRAKEL, tn., in Prussian prov. of Westphalia, 20 m. E. of Paderhorn. Pop. 6,700.

Bracken, or COMMON BRAKE, FERN (*Pteris aquilina*), is the most common of all British ferns, and of almost world-wide distribution. Its stem is a wide-spreading underground structure, covered with fine brown hairs, and giving off roots in all directions; this stem sends up each year a single leaf or frond, which may vary in height from six inches to twelve feet, according to the conditions in which the plant is growing. The spore cases occur in lines along the margin of the pinnæ, thus distinguishing the bracken

from all other British ferns. These fronds are used in large quantities for bedding cattle, and even in some instances for thatching stacks and houses; and the subterranean stem has been employed as an article of food, on account of the large quantity of starch and mucilage which it contains.

Brackenbury, CHARLES BOOTH (1831–90), English soldier, was born in London; served in the Crimea in 1855–6. In 1860 he was appointed assistant instructor in artillery at the Royal Military Academy, and in 1864 assistant director of military studies. He acted as military correspondent of the *Times* in the Prusso-Austrian (1866), the Franco-German (1870–1), and the Russo-Turkish (1877–8) wars. Brackenbury was also superintendent of Waltham gunpowder factory, and director of the Artillery College. He was the author of many works and papers on military affairs, especially tactics, including *The Constitutional Forces of Great Britain* (1869), *Foreign Armies and Home Reserves* (1871), and *Field Works* (1888).

Brackenbury, SIR HENRY (1837), English soldier, was born at Bolingbroke, Lincolnshire; served in the Indian mutiny (1857–8); was attached to the British National Society for Aid to Sick and Wounded in the Franco-German war (1870–1); served in the Ashanti war (1873–74), and the Zulu war (1879–80), where he acted as chief of the staff. In 1882 he became assistant under-secretary for Ireland. In the Sudan expedition of 1884–5 he commanded the river column, and was promoted to be major-general for distinguished service in the field. From 1886 to 1891 he acted as director of military intelligence; from 1896 to 1899 he was president of the ordnance committee, and director-general of the ordnance from 1899 to 1904. K.C.B. in 1894; K.C.S.I. in 1896; P.C. in 1904. He has written *The Last Campaign of Hanover* (1870), *The Tactics of the Three Arms* (1873), *Narrative of the Ashanti War* (1874), *The River Column* (1885), and *Some Memories of My Spare Time* (1909).

Bracklesham Beds, richly fossiliferous beds of mud and clay, belonging to the Middle Eocene, exposed in the cliffs at Bracklesham in Sussex, and well known also in the Isle of Wight. They form a sub-group of the Bagshot Beds.

Brackley, munic. bor. and mrkt. tn., Northamptonshire, England, on the Ouse, 7 m. N.W. of Buckingham; manufactures lace, and boots and shoes. Pop. 2,500.

Brackwede-Brock, tn., Prussian prov. of Westphalia, 3 m. S.W. of Bielefeld. Pop. 9,600.

Bract, a term applied in botany to any leaf which bears in its axil (the angle between itself and the stem from which it arises) a flower, or a branch which terminates directly in a flower.

Bracteates (Lat. *nummi bracteati*, from *bractea* = a thin plate of gold-leaf), in ancient Scandinavia, large, flat gold ornaments, shaped like coins, and bearing the impress of fanciful figures, with runic inscriptions. They are very thin, stamped only on one side, vary in size from $\frac{7}{8}$ inch to $3\frac{7}{8}$ inches, and are made of very pure gold. The name is also given to the large, thin pennies (*denarii*), stamped on one side only, which were struck in Germany between the middle of the 12th and the middle of the 15th century.

Bracton, or BRATTON, HENRICUS DE (d. *c.* 1268), English ecclesiastic and judge, was born in Devon or Somerset. He was archdeacon (1264–5) of Barnstaple and chancellor of Exeter Cathedral, where he lies buried. He was also one of the royal judges

(1245) who went on circuit in the later years of Henry III.'s reign. His comprehensive treatise, *De Legibus et Consuetudinibus Angliæ*, one of the greatest of European mediæval law books, was written just as the victory of the royal courts over their rivals, the feudal and the local courts, was being completed. Bracton did much to bring about the victory, and to establish one 'common law' for the whole of England. Two editions of the book were printed, in 1569 and 1640. See also Sir Travers Twiss's edition (Rolls Series, 1878–83); Professor Maitland's edition of the *Notebook* (1887), and his admirable account of Bracton (Selden Series, 1895); and Güterbock's *Bracton* (1866).

Braddock, bor., Allegheny co., Pennsylvania, U.S.A., situated on the Monongahela R., 10 m. S.E. of Pittsburg. The principal manufactures are iron and steel. General Braddock was defeated and killed here (1755). Pop. 20,000.

Braddock, EDWARD (1695–1755), British soldier; born in Perthshire, Scotland; arrived in Virginia, February 20, 1755, to assume the command in the campaign against the French settlers. Having organized an army of regulars and provincials, among whom was George Washington, Braddock marched against Fort Duquesne. After crossing the Monongahela with 1,200 chosen men, the army fell into an ambush of French and Indians, and was defeated with great slaughter, Braddock himself being wounded, and dying four days later (July 13, 1755). See *Memoirs of Hist. Soc. of Pennsylvania*, vol. v.; Winthrop Sargent's *Hist. of the Expedition against Fort Du Quesne* (1855); Parkman's *Montcalm and Wolfe* (1884).

Braddon, MARY ELIZABETH (1837), English novelist, daughter of a London solicitor, was born in London. In 1860 the Strand Theatre produced her comedietta *Loves of Arcadia*. In 1861 she published a volume of verse entitled *Garibaldi, and other Poems*. About this time also a young printer of Beverley commissioned her to write for his weekly newspaper, for ten pounds, a serial, which was her first novel, *The Trail of the Serpent*, originally published as *Three Times Dead*. But it was *Lady Audley's Secret* which made her name as a novelist (1862). This was followed by the equally popular *Aurora Floyd* (1863), *Eleanor's Victory* (1863), and *Henry Dunbar* (1864). Her characteristics are a well-conceived plot, and an endless supply of the stock-in-trade of melodrama. She has written more than fifty novels. Her later works include *Ishmael* (1884), *Wyllard's Weird* (1886), *London Pride* (1896), *The Infidel* (1900), *The Conflict* (1903), *The Rose of Life* (1905), *Her Convict* (1907), *Our Adversary* (1909), and *Beyond these Voices* (1910). Miss Braddon married Mr. John Maxwell, publisher, in 1874.—Her son, Mr. W. B. MAXWELL, is also a novelist, and the author of *The Ragged Messenger*, *Vivien*, *Hill Rise*, etc.

Bradfield, civil par. (34,780 ac.), W. Riding, Yorkshire, England, 6 m. N.W. of Sheffield; contains many reservoirs for water supply of Sheffield. In 1864 Old Dale Dyke reservoir burst, and the 'Sheffield flood' drowned 238 persons. Pop. 8,000.

Bradford ('broad ford'), (1.) City, munic. and co. bor., W. Riding, Yorkshire, England, on Bradford Beck, a trib. of the Aire R., and on a branch of the Leeds and Liverpool Canal, 9 m. W. of Leeds. There are seven public parks (Peel, Lister, Horton, Bowling, Wibsey, Harold, and Bradford Moor—total area, 300 ac.); and Baildon Moor (670 ac.) is also available for recreation. The principal buildings are the cor-

poration buildings, the hall, the covered market, a technical school, Cartwright Memorial Hall, Central Baths, Independent college (1888), and grammar schools (boys and girls). Bradford is, and has been since 1798, when the first worsted mill was erected, the chief seat in Britain of the worsted, yarn, and soft goods industry. Velvets, plush and woollen coatings, are also made; and there are also iron mines and works, engineering shops, and collieries in the town and vicinity. The chief iron works are at Bowling and Low Moor. Bradford was twice besieged during the civil war (1642 and 1643). It returns three members to Parliament. Pop. (co. and munic. bor.) 300,000. (2.) City, M'Kean co., Pennsylvania, U.S.A., on an affluent of the Allegheny R., 66 m. S. of Buffalo. The dist. is one of the richest in the country in petroleum. Pop. 20,000.

Bradford, SIR EDWARD RIDLEY COLBORNE, G.C.B., K.C.S.I. (1836), son of the rector of West Meon, Hants; entered Madras army (1853), and saw much service. He commanded the operations against the Thugs and Dacoits, and for some time was secretary in the political and secret department of the India Office. From 1890 to 1903 he was commissioner of police of the metropolis (London).

Bradford, JOHN (1510–55), Protestant preacher and martyr, was born in Manchester, England; educated at Cambridge, converted to Protestantism by Latimer, and appointed (1553) royal chaplain to Edward VI., after whose death he was tried before Gardiner and Bonner, condemned as a heretic, and burned at Smithfield. He wrote many theological treatises, published in the collections of the Parker Society (1848–53). See W. Stevens's *Life of Bradford* (1832).

Bradford, WILLIAM (1590–1657), Pilgrim Father, sailed from Southampton in the *Mayflower* with the first band of pilgrims (Sept. 5, 1620) for Virginia, but through stress of weather landed at Plymouth, U.S.A.; and of this settlement Bradford, in 1621, became governor. He wrote a *History of Plimouth Plantation* (first pub. 1856).

Bradford Clay, a marly stratum found above the Great Oolite at Bradford in Wiltshire, England, in which crinoids are numerous, showing that the upper surface at one time was the bottom of a sea, where the crinoids had existence till they were overwhelmed by a layer of mud.

Bradford-on-Avon, par. (10,074 ac.) and mrkt. tn., Wiltshire, England, on the Avon, 6 m. E.S.E. of Bath. Holy Trinity Church contains monuments of the 13th century; but the most interesting ecclesiastical building is the unique little Saxon church of St. Lawrence, built by Aldhelm in the 8th century. The manufacture of kerseymere is said to have originated here in England. Rubber is now the staple industry. Pop. 4,500.

Brading, par. (8,273 ac.) and tn., Isle of Wight, Hampshire, England, 4 m. S. of Ryde. Some valuable Roman remains have been found near the town. Legh Richmond, author of the *Annals of the Poor*, was curate here (1797–1805), and his heroine, Little Jane, rests in the old churchyard. Pop. 1,800.

Bradlaugh, CHARLES (1833–91), social and political reformer, son of a solicitor's clerk, was born in London. From an early date he was a strong advocate of the secularist and advanced radical causes, writing and lecturing under the name of 'Iconoclast;' and he took a prominent part in all popular movements—the Reform League agitation, Irish

Church reform, and was leader of the National Secular Society and the Land Law Reform League. His organ, *The National Reformer* (1862), was the subject of a futile government prosecution, which led to the repeal of statutes still fettering the liberty of the press. In 1870 Lord Chief-Justice Cockburn decided the oaths question in courts of justice in Bradlaugh's favour. In 1872 he published *The Impeachment of the House of Brunswick* (7th ed. 1880), and subsequently lectured in America and the colonies. In 1876 the republication by Bradlaugh and Mrs. Annie Besant of an old pamphlet, *The Fruits of Philosophy*, which advocated the restriction of progeny, led to a sentence of six months' imprisonment and a fine of £200; but the sentence was reversed on appeal. In 1880 Bradlaugh became M.P. for Northampton, and a struggle ensued with the House of Commons on the question of the parliamentary oath, which Bradlaugh, an atheist by conviction, refused to take. Afterwards he offered to take it (avowedly as a mere form) or to affirm, but the House would not allow him to do either. He was re-elected in 1881, 1882, and 1884, but was still excluded from his seat. Once more elected for Northampton in 1885, he was at length permitted to take the oath and his seat in January 1886. Bradlaugh died on January 30, 1891, three days after the House of Commons had expunged the resolution passed against him in 1880. See Bradlaugh's *Autobiography* (1873); the *Biography of Charles Bradlaugh*, by A. S. Headingley (1880); *Charles Bradlaugh*, by H. B. Bonner and J. M. Robertson (1895).

Bradley, ANDREW CECIL (1851), was fellow of Balliol (1874), professor of English literature, Glasgow University (1889–1900), and professor of poetry at Oxford (1901–6). He is one of the subtlest and most brilliant of modern critics. He has published *Shakespearean Tragedy* (1904), and *Oxford Lectures on Poetry* (1909).

Bradley, FRANCIS HERBERT (1846), fellow of Merton College, Oxford, and philosophical writer. Chief works: *The Presuppositions of Critical History* (1874); *Ethical Studies* (1876); *The Principles of Logic* (1883); *Appearance and Reality* (1893).

Bradley, GEORGE GRANVILLE (1821–1903), dean of Westminster from 1881 to 1902, was a pupil of Dr. Arnold at Rugby, and a student at University College, Oxford, under Dean Stanley, winning the chancellor's prize for the Latin essay (1845). Elected a fellow of his college in 1844, he was assistant master at Rugby from 1846, and in 1858 was appointed headmaster of Marlborough College, where he advocated the teaching of natural sciences and modern languages, in addition to the subjects of the old curriculum. In 1870 he left Marlborough to become master of University College, Oxford; and in 1881 he succeeded Stanley as dean of Westminster, which office he resigned in 1902. In addition to two volumes of *Lectures* on the Book of Job (1884; new ed. 1888) and the Book of Ecclesiastes (1885; new ed. 1898), he published a revised edition of Arnold's *Introduction to Latin Prose* (1884), *Recollections of A. P. Stanley* (1883), *Aids to Writing Latin Prose Composition* (1884), and, with Mr. R. E. Prothero, *Life of Dean Stanley* (1893). His daughter is Margaret L. Woods, novelist and poet.

Bradley, HENRY (1845), English lexicographer, was born in Manchester, and became a clerk and foreign correspondent in a commercial house in Sheffield. In 1884 he went to London, and contributed to the leading literary

journals, and was three times (1891–3, 1900–1, and 1909–10) elected president of the Philological Society. Since 1889 he has been joint-editor with Dr. Murray (now Sir James) of the *New English Dictionary* (Oxford). He is the author of *The Story of the Goths* (1888), *The Making of English* (1904), and has edited numerous English texts, notably Caxton's *Dialogues* (1900), for the Early English Text Society.

Bradley, JAMES (1693–1762), English astronomer-royal. His chief astronomical researches were conducted from the beginning at Wanstead in Essex, of which his uncle, the Rev. James Pound, an astronomer of some repute, was rector. In 1721 he was appointed to the Savilian chair of astronomy at Oxford, and in 1729 lecturer on experimental philosophy; and in 1742 succeeded Halley as astronomer-royal. Bradley's reputation rests on his accuracy as an observer; his discovery of the 'aberration of light,' by which he accounted for the apparent displacement of the fixed stars; and his discovery of the nutation of the earth's axis, due to the moon's unequal action on the equatorial parts. These discoveries, by making exact knowledge of the position of the fixed stars possible, laid the foundation of modern observational astronomy. See Rigaud's *Memoirs* in his edition of Bradley's *Miscellaneous Works* (1832).

Bradshaw, GEORGE (1801–53), originator of railway guides, began life as an engraver in Manchester (1821). In 1839 appeared *Bradshaw's Railway Time-tables*, at sixpence, enlarged and changed next year to *Bradshaw's Railway Companion*. The monthly *Railway Guide* dates from December 1841. His other publications include the *Continental Railway Guide* (begun Paris, 1847) and the *Railway Directory and Shareholders' Guide* (1849).

Bradshaw, HENRY (d. 1513), English poet, was a native of Chester and monk of the Benedictine monastery of St. Werburgh's, and passed his course in theology at Gloucester College, Oxford; author of the Latin *De Antiquitate et Magnificentia Urbis Cestriæ*, and a *Chronicon and Life of St. Werburgh* in English verse, reprinted in the Chetham Society's publications, vol. xv., ed. E. Hawkins (1848).

Bradshaw, HENRY (1831–86), English scholar, antiquary, and librarian, was born in London, and educated at Eton, which he left as captain of the school, entering King's College, Cambridge, as a scholar in 1850. In 1853 he was elected to a fellowship of his college, and after acting for some time as a schoolmaster in Dublin he returned to Cambridge in 1856, where he became an assistant in the university library. He resigned his post in 1858, but in 1859 he rejoined the staff, and for many years devoted himself to the compilation of a catalogue of the MSS. in the library. In 1857 he unearthed the MS. of the famous *Book of Deer*, and rediscovered the Vaudois MSS. (1862), containing the earliest remains of the Waldensian language and literature. In 1863 he assisted in the exposure of Simonides, the forger of the Codex Sinaiticus, discovered by Tischendorf in 1859. He also brought to light (1866) two previously unknown works ascribed to Barbour, *The Siege of Troy* and *Lives of the Saints*. Bradshaw's work was very varied. Celtic research, papers on English, German, Dutch, and Irish bibliography, and Chaucer studies, all occupied his attention. His *Collected Papers* were published in 1889, a *Memoir* by G. W. Prothero having appeared in 1888.

Bradshaw, JOHN (1602–59), English regicide, son of a well-to-

do country gentleman in Cheshire, was judge of the sheriff's court in London (1643-9) and chief-justice of Chester from 1647, but was comparatively unknown when called upon to preside over the commission for the trial of King Charles (1649), where he is accused of acting with undue harshness. President of the Council of State from 1649 until its dissolution by Cromwell in 1653, he was a strong opponent of Cromwell's later policy. Under Richard Cromwell he was again president of the Council of State. After the restoration (1661) his body was dug up, hanged at Tyburn, and decapitated.

Bradwardine, THOMAS (?1290–1349), Archbishop of Canterbury, and one of Edward III.'s chaplains, styled 'Doctor Profundus.' He was entered at Merton College, Oxford, and there delivered those lectures against Pelagianism afterwards expanded into the treatise known as *De Causâ Dei contra Pelagium* (ed. 1618). Bradwardine was a strong opponent of the doctrine of works, and a stout upholder of the doctrine of free grace, which he regarded as inextricably bound up with the doctrine of God's foreknowledge. He was canon of Lincoln, chancellor of St. Paul's, and in 1349 was consecrated Archbishop of Canterbury, but died a few weeks later. See Milner's *Church Hist.*, vol. iv. (1810).

Brady, NICHOLAS (1659–1726), divine and poet, born at Bandon, Ireland; became rector of St. Catherine Cree, London, and from 1696 to his death, of Richmond, Surrey. He was chaplain to William, Mary, and Anne. He made a translation of Virgil's *Æneid*, and wrote a play, *The Rape, or the Innocent Impostors* (1692); but his name survives only in connection with the 'Tate and Brady' metrical version of the Psalms (1696), once popular, but now disused.

Bradycardia, an abnormal slowness of pulse, which may be either peculiar to the individual, or due to disease, exhaustion, pain, poisoning, or other cause.

Bradypus. See SLOTH.

Braemar, vil. and dist. in parish of Braemar and Crathie, S.W. Aberdeenshire, Scotland; the vil. Castleton of Braemar is 16 m. W. by S. of the Ballater terminus of the Deeside Ry. The district is exceedingly picturesque, and contains several lofty peaks of the Cairngorm group. Balmoral Castle is close to Crathie. Pop. of Braemar and Crathie, 1,500.

Braga. (1.) Administrative dist. in the Portuguese prov. of Entre Minho e Douro. Area, 1,040 sq. m. Pop. 360,000. (2.) The ancient *Bracara Augusta*, tn. and archiepisc. see of Portugal, in the dist. of Braga, 33 m. N.N.E. of Oporto. It is mediæval in appearance, still surrounded by walls, and has picturesque old houses, an imposing cathedral, citadel, and archiepiscopal palace. It manufactures cutlery, firearms, and jewellery. Pop. 25,000.

Bragança. (1.) Administrative dist. in the Portuguese prov. of Traz-os-Montes. Area, 2,513 sq. m. Pop. 185,000. (2.) City and episc. see of Portugal, cap. of the prov. of Traz-os-Montes; stands on a treeless plateau in the N.E. corner of the kingdom, 9 m. from the Spanish frontier. It is overlooked by a fortified castle, the cradle of the recently deposed dynasty of Portugal. The people are engaged in the silk industry. Pop. 5,500. (3.) Town and seaport, Para, Brazil, 120 m. N.E. of Belem. It is an agricultural centre. Pop. 18,000. (4.) Town, prov. São Paulo, Brazil, 50 m. by rail N. of São Paulo, with numerous sugar mills, and trade in pigs and cattle. Pop. 10,000.

Braganza, HOUSE OF, the royal family of Portugal. See PORTUGAL—*History*.

Bragg, BRAXTON (1817–76), American Confederate general, was born in Warren co., N. Carolina. When the civil war broke out, Bragg was made (1861) commander-in-chief of all the state troops in Louisiana. In February 1862 he became a major-general, with his headquarters at Mobile, in command of the second division of the Confederate army, the centre of which he led at the battle of Shiloh. He was next appointed (June 1862) commander of the department of the Mississippi. In August he marched northward through Tennessee and captured Munfordville, with 4,000 prisoners; but the place was retaken by General Buell, who also defeated him at Perryville (Oct. 8). He was again defeated at Murfreesboro (Dec. 31, 1862, and Jan. 2, 1863); but in September 1863 he won a brilliant but barren victory for the Confederates at Chickamauga. In November of the same year he was decisively defeated by General Grant at Chattanooga, and in December he was relieved of his command. In 1864 he was appointed military adviser to Jefferson Davis. His brother, THOMAS BRAGG (1810–72), was successively governor of N. Carolina (1855–59), U.S. senator (1859–61), and Confederate attorney-general (1861–3).

Bragi, or BRAGR, a famous minstrel in the ancient Norse sagas, sometimes called a son of Odin, and esteemed as a god. His name is identified with eloquence.

Braham, JOHN (?1774–1856), tenor vocalist, born in London of Jewish parents (his name was really Abraham), and made his début at Covent Garden in 1787. In 1796 he was engaged for Drury Lane, and next year for the Italian opera. After studying and singing in Italy and Austria, he reappeared at Covent Garden in 1801, and composed the music of his own part for several operas. His subsequent career was one of continuous success; indeed, he was without a rival in theatre and concert room. He was the original Max in Weber's *Der Freischütz* (1824), and the original Sir Hüon in *Oberon* (1826). His voice had great compass, and his falsetto was exceptionally fine. He composed numerous songs and duets, some of which, such as *All's Well* and *The Death of Nelson*, have retained their popularity.

Brahe, PER, THE YOUNGER (1602–80), Swedish soldier and administrator; fought in Germany (1626–31) in the Thirty Years' war; distinguished himself greatly as governor-general of Finland (1637–40 and 1648–54), where, in 1640, he founded the university of Åbo (statue near the cathedral); and served on the councils which governed Sweden during the minority of Queen Christina (1641, etc.) and Charles XI. (1660, etc.). See Tigerstedt's *Administratio Fenniæ Petri Brahei* (1846), and *Ur Per Brahes Brefvexling* (1880–8).

Brahe, TYCHO or TYGE (1546–1601), Danish astronomer, born at Knudstrup in S. Sweden (then a province of Denmark). An eclipse of the sun in 1560 directed his mind to astronomical study. In 1572 he discovered a new star in Cassiopeia. Down to this period he had resided mostly in Germany; but in 1576 Frederick II., the Danish king, helped him to build and equip in an efficient way the observatory of Uraniborg, on the little island of Hven in the Sound, north of Copenhagen. There he laboured until 1597, when intrigues compelled him to carry his instruments to Germany; and in 1599 he was invited to Prague by the Emperor Rudolph II. There Brahe had for a fellow-worker the famous Kepler, but died two years later. Tycho Brahe held

that the planets moved round the sun, and the sun round the earth. This hybrid theory was expounded in the second volume of his *Astronomiæ Instauratæ Mechanica*, printed in 1598 (new ed. 1901). The first volume of the work, containing a dissertation on the star of 1572, was published by Kepler in 1602. Tycho Brahe first assigned to comets their position in interplanetary space. He discovered the variation and annual equation of the moon, investigated precession, and introduced a correction for refraction. His observatory of Uraniborg was excavated in 1901. See *Lives* by Gassendi (in Latin, 1655) and Dreyer (1890).

Brahma, the creator of the universe, according to Brahmanism; the first person of the Trimurti, or trinity, of Hinduism. The Brahmans are his peculiar offspring, and the sole exponents of his will. See BRAHMANISM.

Brahmanabad, ruined city in Haidarabad dist., Sindh, India, 45 m. N.E. of Haidarabad. It stood on a former course of the Indus, and was strongly fortified.

Brahmanas, those prose commentaries on the Vedas which describe the elaborate ritual to be observed by Brahmans (Hindu priests) in sacrifice and worship. The oldest is supposed to have been written about the 7th century B.C.

Brahmanbaria, munic. tn. in Tipperah dist., Eastern Bengal, India, 50 m. N.E. of Dacca. Pop. 20,000.

Brahmani, riv. in Chota Nagpur, Bengal, India; traverses Chota Nagpur and Orissa. It is famous in Hindu lore as the traditional scene of the love of the sage Parásara and the mother of Vyasa, reputed compiler of the *Vedas* and the *Mahâbhârata*.

Brahmanism or BRAHMINISM. A slight variation of the opening words of the Gospel of St. John serves to express the philosophy of Brahmanism: 'In the beginning was the Word, and the Word was Brahma'—a splendid universal monism. 'The Word was made flesh,' and Brahma, the creator, stood self-evolved. The doctrine of the Trimurti—the trinity, Brahma, Vishnu, and Siva—was a subsequent development; and it is at this point—in contact, doubtless, with contemporary faiths and modes of thought—that Brahmanism merges into the complex system of theology called Hinduism. From the head of Brahma sprang the holy Brahman—'the twice born'—establishing a line of priestly lawgivers, who, six centuries before Christ, changed a philosophical system into a religious ordinance, of which Brahmans became the custodians and exponents. Of inferior birth to the Brahmans were the Kshatriyas, princes and warriors, who are alleged to have issued from the arms of Brahma; the Vaisyas, husbandmen, who proceeded from the creator's thighs; and the Sudra, begotten of his feet. The rest of mankind were outcasts. This was the origin of caste, that powerful and rigid distinction which has survived the passive antagonism of successive religious revivals and the combative efforts of missionaries of all creeds. Preceded by Vedism, the ancient faith of the Indian Aryan, and lost in the Hinduism to which it gave birth, it is difficult to indicate the lines which separate Brahmanism from the one or the other. Its fundamental doctrine was spiritual pantheism. but there is no evidence that either idol-worship or human sacrifice in any form had a place in the Brahmanical system. See Monier Williams's *Brahmanism and Hinduism* (1887), and his *Indian Wisdom* (1893). In these all the most important authori-

ties on the subject are mentioned. See HINDUISM, VEDISM.

Brahmapurana. See PURANAS.

Brahmaputra (lit. 'son of Brahma'), one of the largest rivers of India. Its source is the Kubitsanpo, or Tsanpo, which flows from an enormous glacier on the N. side of the most northerly parallel range of the Himalayas, near Lake Manasarowar, in W. Tibet, the altitude being between 15,000 and 16,000 ft. It flows E. for about 1,000 m. on the plateau of Tibet; then turning S.E. penetrates the Himalayas, under the name of Dihong, and descends to the valleys of Assam. There it flows in a S.W. and S. direction, and after partial confluence with the Ganges enters the Bay of Bengal in an expansive delta. Its length is about 1,800 m. During the rains the Brahmaputra floods and fertilizes hundreds of square miles of country. It is navigable for steamers to Dibrugarh, 800 m. from the sea. Here the discharge of the river at its lowest is said to be 116,115 cub. ft. per second. See Sven Hedin's *Transhimalaya* (1910).

Brahma Samaj ('the Society of God'). The most remarkable religious revival of modern times in India has been that of the Brahma Samaj, or, as it is sometimes called, Arya Samaj. Its founder, Rajaram Mohun Roy, born in 1774, had studied the philosophy of Hinduism at Benares and of Buddhism in Tibet. Denouncing *sati* and idol-worship, he sought to establish an eclectic system of practical morality. Although undoubtedly influenced by Christianity and Islamism, it is important to note that the Hindu Unitarian Church which he founded (about 1830) was a return to ideal Brahmanism—the worship of a supreme deity, the essence of the universe. Rajaram was born a Brahman, and died a Brahman. After his death the movement received a certain impetus (about 1842) as the Adi Samaj (New Church), under the leadership of one Debendra Nath Tagore; and Debendra Nath was followed by Keshub Chandra Sen (1838–84). Inspired by Sen's religious fervour and lofty eloquence, the Adi Samaj marked a distinct change of creed. God the Father was substituted for the Vedic definition of the Creator, and in the establishment of the 'brotherhood of man' the new church shook off all vestige of Brahmanism, and grew and prospered. A false step checked its career, and disappointed those who thought that they saw in this last development an approach of Hindu Unitarianism towards the theism of the West. Keshub Chandra Sen, who had repeatedly and strenuously opposed infant marriage, sanctioned the nuptials of his own daughter, at the age of fourteen, with the maharajah of Kuch Behar. In the succeeding disruption (1878) the mass of his congregation took refuge with the dissenters, the Sadharana (general) Brahma Samaj of the present day. In a conservative reaction this Samaj fell back on Vedic authority for the theism which it professes. Allied to this movement of religious thought in India are other forms of Vedic theisms, among which may be mentioned the Prarthana Samaj (Prayer Society) of Bombay, and the Arya Samaj (Aryan Society): the latter, however, is rather a political organization than a religious body, and of late has come prominently forward as a movement less to reform Hinduism than to rouse it into active resistance to the alien influences, both Christian and Mohammedan, which threaten to denationalize it. Politically it is strongly aggressive, and its attempt to check enlistment and even to tamper with the loyalty of certain regi-

ments is no secret. See Ghose's *Works of Rammohun Roy* (1888), Mozoomdar's *Life and Teachings of Keshub Chandra Sen* (1887), Max Müller's *Ramakrishna* (1899), and *East and West* (1904–5).

Brahman Ox. See ZEBU.

Brahms, JOHANNES (1833–97), an eminent composer and pianist, born at Hamburg. His musical education, begun by his father, was continued by Marxsen of Altona. He began the study of composition at a very early age, but was first known to the public as a pianist. Brahms settled in Vienna in 1861, but after some years consecrated his energies to composition. As his productions became known, it was acknowledged that he was one of the greatest composers of modern times. In the development of his ideas the serious purpose and lofty aim of his work preclude any pandering to meretricious devices, and the superlative excellence of his compositions is only revealed to the trained intelligence of the cultured musician. Brahms wrote in practically every branch but the dramatic. His symphonies, overtures, and other orchestral compositions; his great choral-orchestral works, such as the *Deutsches Requiem* (op. 45), the *Song of Destiny* (op. 54), etc.; also his productions in the domain of chamber music in all its forms, take rank with the greatest creations in their several classes of composition. His concertos, Hungarian dances, etc., for piano, and his violin concerto (op. 77, written for Joachim), are works of outstanding merit; while as a vocal composer in every form, and especially as a song-writer, Brahms occupies a position of almost unique distinction. As a pianist he showed great intellectual power. See his *Correspondence* (1876–97), ed. by Kalbeck (Eng. trans. 1909); also *Life* by May (1905); by Kalbeck (1904, etc.); Hadow's *Studies in Modern Music* (1908); and J. A. Fuller-Maitland's *Brahms* (1911).

Brahui. See BALUCHISTAN.

Braid, JAMES (?1795–1860), Scottish writer on hypnotism, was led to a scientific examination of this subject by La Fontaine's lectures in Manchester (1841), where he practised medicine most of his life. He demonstrated the subjective nature of the phenomena, and their independence of the alleged magnetic influence passing from the operator, and was the first to use the term 'hypnotism.' He wrote *Neurypnology, or the Rationale of Nervous Sleep, considered in Relation to Animal Magnetism* (1843); *Magic, Witchcraft, Animal Magnetism, Hypnotism, and Electrobiology* (3rd ed. 1852); and *Observations on Trance* (1850).

Braidwood, tn., co. of St. Vincent, New South Wales, 140 m. s.s.w. of Sydney; has mining, and trade in timber and dairy produce. Alt. 3,357 ft. Pop. 1,600.

Braidwood, THOMAS (1715–1806), was born in Scotland, and was a teacher of the deaf and dumb in Edinburgh. Encouraged by his success in teaching a pupil, Charles Sherriff, born deaf, and therefore mute, to speak (1760), Braidwood established his academy for teaching the mute, which was visited by Dr. Johnson. The academy was afterwards removed to Hackney, London. See Johnson's *Works* (1806), ix. p. 337; Boswell's *Life of Johnson*.

Braila, tn., Roumania, 12 m. s.s.w. of Galatz, on l. bk. of Danube, and on state line Galatz-Buseu. It exports wheat and other cereals, cement, petroleum, etc., to the annual value of about £3,000,000. Before 1883 Braila was a free port. From the end of the 16th to the end of the 18th century it belonged to the Turks. Pop. 60,000.

Braille, LOUIS. See BLIND—*Types and Printing.*

Brain, the organ of thought, sensation, and voluntary movement. It is protected by the skull, between which and the brain are delicate serous membranes (meninges) and a small quantity of fluid (the cerebro-spinal fluid), which acts as a water-bed, lessening the shock of any blow. The brain is divided by anatomists into four principal parts—the *cerebrum* (brain proper), the *cerebellum* (Lat. 'little brain'), *pons Varolii* ('bridge of Varolius'), and *medulla oblongata* (Lat. 'oblong marrow'). The cerebrum, or fore brain, is divided longitudinally into two cerebral hemispheres, the right and left, by the great longitudinal fissure. This completely divides it, except where, towards the middle, the two halves are joined by a broad band of white substance (nerve fibres) called the *corpus callosum* (hard body). The surface of each cerebral hemisphere is divided (arbitrarily by anatomists) into four lobes, marked off from one another more or less plainly by fissures of various lengths and curves. These lobes and fissures are named and described in anatomical works for convenience in mapping out the brain, and locating the seats of its functions as far as possible. They have not precisely the same appearance in all brains, nor are the two sides exactly equal; and although useful to the surgeon as guides in operations, the fissures can only be considered very vague landmarks by the physiologist and the psychologist, our knowledge of the action of different parts of the brain being still comparatively rudimentary. Its minute anatomy must be looked for in the anatomical dissecting-room and in text-books. Broadly speaking, the cerebrum is made up of gray matter (cells which in groups form centres for thought, action, or sensation) and white matter (nerve strands acting as lines of communication). The surface of the cerebrum, in fact of the whole brain, is covered with gray matter —*i.e.* brain-cells, or centres—and owing to the arrangement of the surface in convolutions, the gray matter dips into the fissures and *sulci*, and so covers a larger area than it would were the brain uniformly smooth. Islands of gray matter are also embedded in the white. It is believed that brain power depends not altogether on the apparent size or the weight of the brain, but partly on the amount of convolution, which is much more marked on some brain surfaces than on others. Weight, however, seems to give a general index of brain power, and this argument is used by some when comparing the brain capacity of man and of woman—the average male brain weighing 49½ ounces, the average weight of the female brain being 44 ounces. Male brains range in weight generally between 46 and 53 ounces; female, between 41 and 47 ounces. Notable examples of heavy brains are Cuvier's (64 ounces) and Dr. Abercromby's (63 ounces). The weight of the brain should, however, be compared with the weight of the individual to whom it belonged. A big head does not necessarily mean a big brain, for that may arise from hydrocephaly. Below a certain size and weight we get microcephaly, and idiocy generally goes with these, though some remarkably powerful minds have accompanied exceptionally small heads (*e.g.* Shelley, Descartes, Foscolo, Donizetti, and Schumann). The cerebrum forms the largest part of the brain, and contains what are commonly spoken of as the 'higher centres' —viz. those for the higher or thinking faculties. This seems beyond question, although many

higher centres cannot be exactly localized; and there are cases on record where a considerable quantity of cerebral brain substance has been injured or destroyed without any obvious psychical result. The whole brain is supplied with blood from the two internal carotid arteries and two vertebral arteries. There is also a circulation of lymph; each cell of gray matter lies bathed in lymph.

Functions of the Cerebrum.—From experiments made by Ferrier, Horsley, and others, those parts of the gray matter (cerebral cortex) concerned in certain actions have been mapped out roughly. The centres for movement of one side of the body lie on the opposite side of the brain. Thus, the right hand is guided by the left cerebral hemisphere. Motor areas—*i.e.* areas of the gray brain covering, apparently necessary for voluntary movement—have, until recently, been supposed to lie about the fissure of Rolando, on both sides of it; and the respective centres were roughly shown by taking a model of a brain and tracing the outline of a man's figure covering the fissure, head downward, looking backward, and with his arms and legs flexed. It has lately (Sherrington and Grünbaum, *Brit. Med. Jour.*, Sept. 13, 1902) been stated that these motor areas lie entirely in front of the fissure of Rolando, and dip into the fissure, but do not cross it. The report mentioned is illustrated by two photographs, which show what a comparatively small part of the cerebral gray matter seems to be concerned in movement; consequently, what a large portion has its use undefined. The conclusions of Sherrington and Grünbaum were reached by electrical experiments on the brains of anthropoid apes; but, at the same time, Symington showed that the arrangement of fibres in the brain of a child agreed with these conclusions. When an injury to the brain is followed by loss of voluntary movement, the mischief may lie either in the gray matter, or motor area, concerned in that movement, or it may be in the communication fibres, which normally carry the impulse from the motor centre to the part paralyzed. The brain is not bilaterally symmetrical (equal-sided) any more than is the skull, which shows curious asymmetry in many cases, when accurate measurements are taken.

Cerebellum.—The cerebellum, or little brain, lies under the after part of the cerebrum, and is connected with that and other parts of the brain by processes called *crura* (legs). Two join it to the cerebrum, two to the medulla oblongata, and two more form the pons Varolii. The cerebellum is divided into lateral hemispheres, with six lobes lying between. It is formed, like the cerebrum, of gray matter overlying white, with distinct masses of gray also in the interior. Disease of certain parts (lobes) of the cerebellum is believed to affect equilibration (balancing) and co-ordinated (controlled) movements. Some of the nerve fibres (white matter) are believed to be concerned in muscular sense (the sense of weight when exerting a group of muscles in lifting), but the function of the greater part of the cerebellum is unknown.

Pons Varolii.—The pons Varolii is made up mostly of bundles of nerve fibres joining the higher parts of the brain with the medulla. The cerebrum lies above it, the cerebellum behind it, and the medulla oblongata below.

Medulla Oblongata.—The medulla oblongata (sometimes called the spinal bulb) is the expanded upper end of the spinal cord. Of its nerve fibres, some run through

the pons Varolii into the cerebrum, while others run directly into the cerebellum. It must be understood that all connections of the brain with the spinal cord pass through the medulla. In it there is also gray matter, which forms various collections of cells known as the vital centres. These work independently of the will, and govern respiration, the heart's action, the constriction of blood-vessels, swallowing, and secretion of saliva. The last six of the twelve pairs of cranial nerves (nerves emerging from the cranium or skull) arise in the medulla. When the medulla is cut all sensation is lost, because all impulse fails to reach the cerebrum. All voluntary movement is abolished, because the cerebrum cannot send down a message. Death immediately follows, because of interference with the impulses by which heart and lungs are kept in action. It is in the medulla that most of the nerve fibres cross; so that fibres which started on the right side of the brain reach the left side of the spinal cord, and those starting on the left go to the right.

The base of the brain, resting on the base of the skull, the floor of the cavity which holds the brain (or rather on the water-bed of cerebro-spinal fluid), gives off cranial nerves in twelve pairs, each cranial nerve arising from a spot on one half of the brain corresponding to that from which its fellow arises on the other half, and each being traceable to a similar centre; the centre, or directing cells of gray matter, being also in pairs—*i.e.* in corresponding positions in the cerebrum or cerebellum on either side of a longitudinal mesial line. Certain special centres (not for cranial nerves) are apparently single. Such is the speech centre, low down on the gray matter in the front of the left cerebral hemisphere. Any brain centre may conceivably be trained by use, enfeebled by disuse or insufficient use, excited by irritants, and paralyzed by a sufficient injury. Thus, one becomes expert in any movement through habit, and loses expertness for want of practice; and this not merely because of muscular incapacity, but because the impulse is not properly generated in the brain and transmitted by a nerve. Also, a nerve centre becomes irritated by a certain degree of pressure, and works independently of volition—as in epilepsy, started by the pressure of blood or broken bone on the brain surface. A greater degree of pressure from the same cause will produce, not movement, but immobility, followed, if the pressure reach vital centres, by insensibility and death. The sensory centres are not so well mapped out as the motor, for obvious reasons.

Development.—The brain at birth is heavy in proportion to the total body weight. It increases rapidly during the first seven years; more slowly from then until the age of about twenty; then more slowly still, until about forty. Soon after that age the weight begins to lessen very slowly. Sight and hearing are dormant at birth, and all the other senses are probably almost functionless.

Diseases.—Development may stop prematurely, and is followed by premature ossification of the cranial sutures, producing microcephaly. Hydrocephalus (water on the head), if severe, is also a cause of impaired development of the brain, and consequently of the faculties. Brain troubles in children occur chiefly through faults of development, or through the greater instability of the developing tissues. In old age, cerebral troubles arise from the weakness of degeneration, due in some

cases to age alone, and in others to the gradual effect of chronic disease. The commonest of brain affections in old age arise from the loss of elasticity of vessel walls, and perhaps a roughening of their inner surface. Thereafter any increased blood pressure tends to rupture the walls and produce cerebral hæmorrhage; or a thrombus forming in the vessel, and blocking the circulation, may cut off the blood supply from a part of the brain, so that it ceases to work. 'A man is as old as his tissues,' and their age, for working purposes, is governed by the treatment which he has given them: one may suffer from the cerebral effects of old age before one has reached middle life. (See CEREBRAL SOFTENING, and also VESSELS, DISEASES OF.) The commonest symptoms of disease of the unstable, developing brain are convulsions, often slight, and due merely to distant irritation (such as worms), or developing to the extent of true epilepsy. Inflammation of the brain coverings (meningitis) may be simple, or may arise from tubercle. Syphilis, tubercle, and alcohol are probably the commonest causes of cerebral degeneration; but it must not therefore be supposed that all cerebral mischief is either syphilitic, tuberculous, or alcoholic. Physical violence, producing hæmorrhage, or pressure of depressed bone, often starts brain symptoms. Gradually growing tumours, either of the brain substance, or arising from the inner table of the skull, will slowly disturb those parts of the brain on which they press, and first excite and then destroy their powers. The brain is remarkable as an organ both for its extreme delicacy and its great power of resistance and recuperation. A man may live with a bullet in or through his brain, and may die as the result of brain trouble the originating cause of which cannot be detected by any known method; he may live after an iron bar has passed through the roof of his mouth and out at the crown of his head, yet he may die because of a minute clot of blood. See Ferrier's *The Functions of the Brain* (2nd ed. 1886); Horsley's *Structure and Functions of the Brain* (1892); Cunningham's *Textbook of Anatomy* (1902); Obersteiner's *The Anatomy of the Central Nervous System* (trans. Hill, 1890); Mendel's *Gehirn, Anatomisch* (1886); Gehuchten's '*La Structure des Centres Nerveux*' (*La Cellule*, vii. 1891); Luys's *The Brain and its Functions* ('International Science Series,' 1884); Quain's *Anatomy*, vol. iii. pt. 1 (10th ed. 1893); *Diseases of the Nervous System*, Turner and Grainger Stewart (1910).

Brain Coral (*Meandrina*), one of the madreporian or reef-forming corals, which has the surface of the corallum curiously convoluted, so that in surface view it somewhat resembles the human brain.

Braine-l'Alleud, tn., prov. Brabant, Belgium, 10 m. S. of Brussels; manufactures glass and cottons. Pop. 8,500.

Braine-le-Comte (Flemish *'s Graven-Brakel*), tn., prov. Hainaut, Belgium, 18 m. S.S.W. of Brussels; has stone quarries and makes lace thread. Pop. 9,000.

Brainerd, tn., Minnesota, U.S.A., co. seat of Crow Wing co., on the l. bk. of the Mississippi R., 110 m. N.N.W. of St. Paul. Has foundries, lumber mills, and cigar factories. Pop. 7,500.

Brainerd, DAVID (1718–47), American missionary, born in Connecticut; devoted his life to work among the N. American Indians. His *Journal* (1826) has taken rank as a religious classic. He died in the house of Jonathan Edwards, who afterwards became his biographer (1749; newed. 1884).

Braintree. (1.) Par. (2,282 ac.) and mrkt. tn., Essex, England, on the river Brain, 40 m. N.E. of London; manufactures crape, silk, brushes, iron-work, and cocoa-nut matting. Brewing is carried on. Pop. 5,500. See Cunnington and Warner's *Braintree* (1906). (2.) Tn., Norfolk co., Massachusetts, U.S.A., 10 m. S.S.E. of Boston. The chief manufactures are electrical machinery, leather, shoes, and carpets. Down to 1792 Braintree included a part of Quincy, the birthplace of the presidents John Adams and John Quincy Adams. Pop. 6,000. See Pattee's *History of Old Braintree and Quincy* (1878), and Wilson's *Quincy, Old Braintree* (1906).

Braithwaite, JOHN (1797–1870), English engineer, was born in London. His earliest works were the air-pumps for the ventilation of the House of Lords (1820); in 1822 he devised the donkey engine. In 1823 he cast the statue of the Duke of Kent which was erected in Portland Place, London. In 1829, in conjunction with Captain John Ericsson, he constructed for the Stephensons the locomotive engine the 'Novelty,' the first that ever ran a mile within a minute. He also manufactured the first practical steam fire-engine; and in 1833, with the assistance of Ericsson, he built the caloric engine. In 1834 he projected and laid out, along with C. B. Vignoles, the Eastern Counties Railway. In 1836–8 he and Ericsson fitted a canal boat with screw propeller, which voyaged from London along the canals to Manchester, returning by way of Oxford and the Thames.

Brake, tn., grand-duchy of Oldenburg, Germany, on the left bank of the Weser, 27 m. N.E. of Oldenburg. It has shipbuilding and ropemaking industries. Pop. 5,200.

Brakes are devices for arresting motion or for absorbing energy. The former are familiar in their use on ordinary vehicles, railway cars, and street cars. They are also necessary on elevators (lifts), on hoisting-engines and appliances, and on inclined railways or cableways. There is a large variety of different forms for these various uses, and hand, steam, air, hydraulic, or electric power may be utilized for working them, often in conjunction with springs. Of course, all these brakes absorb power, but their direct function is to reduce excessive speed, or bring a moving machine to a stop. Absorption brakes (used in engine testing), however, primarily absorb energy (by converting it into heat), the engine running at uniform speed. The Prony brake, rope brake, and hydraulic brake are used for this purpose. They are also called absorption dynamometers. For brakes of this class see DYNAMOMETER.

A vehicle may be braked by means which tend to prevent the wheels from turning (wheel brakes), or by grips or friction devices which take hold of the track, and thus check the vehicle (track brakes). The former are most common. They comprise: simple or shoe brakes, in which a block (brake-shoe) fastened to the car is pressed against the wheel to resist its turning by producing friction between wheel and shoe; band or strap brakes, in which a loose band surrounding an enlarged hub of the wheel is drawn up tight, producing great frictional holding; disc brakes, in which a disc fast on the axle and a disc held by the car are pressed together to produce friction; cone or cup brakes, like disc brakes, but having instead of discs a cone and cup which are forced into each other; electric eddy-current brakes, in which a disc fast on the axle turns past the faces of an electromagnet so

as to set up eddy-currents in the disc which resist the rotation; and electric generator brakes, which consist of a motor run reversed as generator, so that the induced currents drag back on the armature and resist the rotation.

Sand tracks, used on railways at times to prevent a car going beyond a fixed danger limit, are also brakes. They consist simply of a layer of sand over the track, 1 to 3 in. deep over top of rail, which checks the wheels. This simple device, not much used, needs no further reference.

Of the above forms, *shoe brakes* exclusively are used for railway cars. The prototype (hand operated) is seen on ordinary vehicles. Railway car brakes are operated by hand and by power (steam, vacuum, compressed air). Street railway cars mainly use hand and air operated shoe brakes, but occasionally track brakes are employed, and electric cars may always be braked electrically through the motors.

Band brakes are used on automobiles exclusively, and on hoisting-engines, crane motors, and electric elevator motors.

Disc brakes have been tried for street cars, but have been abandoned. The best example of the disc brake is found in the speed-governor of the phonograph, where a fly-ball governor presses against a friction disc when the correct speed is just exceeded. Some types of geared hoisting blocks use disc brakes to hold the load against running down. Cone brakes are sometimes used in such appliances.

Eddy-current brakes are used chiefly in electric meters, where they regulate the speed to the proper amount for correct registry.

Track brakes are either simple friction shoes or gripping jaws. A track brake frequently employed for electric cars uses friction shoes in conjunction with shoe wheel-brakes and electric braking. The motors are so connected (by shifting the controller to the braking point) that their rotation generates current at the expense of the car's momentum, which is sent through magnet windings on the track shoes, drawing these down upon the track by magnetic attraction. The drag of these shoes against the rail not only retards the car directly, but also through a set of links presses a set of brake shoes against the wheels. The gripping-jaw type of track brake, on the other hand, is used as safety brake on elevators, on inclined railways, and on cableways. In the first case it grips the guide bars; in the second, the head of the track-rail; and in the third, the carrying-rope. Usually, these safety brakes are thrown on by strong helical springs released by a trigger, which is worked either by hand or by a speed-governor. (Electric elevator motors similarly are braked by a band brake held in action by strong springs, and released only when current is applied to a set of magnets arranged to pull off the brake against the spring pressure.) In elevators and cable railway inclines, also, there is usually a spring-operated safety brake, which is held off by levers on which the cables pull, so that if the cables should be broken the jaws will grip the rail and bring the car to a stop.

The chief details which we can consider here are the arrangement and operation of band brakes and pneumatic railway brakes.

Band brakes. The best form of band brake consists of a metal or leather band completely encircling a smoothly turned hub or rim on the axle to be braked. The ends of a band are not joined directly, but have one of two

forms of connection: (1) One end may be fastened to a fixed support adjacent to the brake rim, while the other end is hitched to a lever so pivoted that a pull on the handle exerts a multiplied pull on the band. The rotation of the axle should be in the direction from the fixed support toward the lever end of the band, so that the band tends to draw itself tight by the drag of the wheel, the lever having little more to do than take up the slack. (2) Both ends of the band may be fastened to the lever, being attached on the same side of the fulcrum, but at different distances from it. Such a brake, if these distances from the fulcrum are suitably proportioned, will draw itself tight just as soon as the lever is pulled enough to lay the band snug on the brake rim. An enormous braking force may be obtained with very slight pull on the lever; in fact, unless the band when released by the lever holds itself clear of the rim it may draw itself into full action by slight initial contact friction.

Railway brakes. In passenger trains each vehicle has a separate brake, worked from the engine, there being two systems in use—the Westinghouse and the vacuum. The former was invented

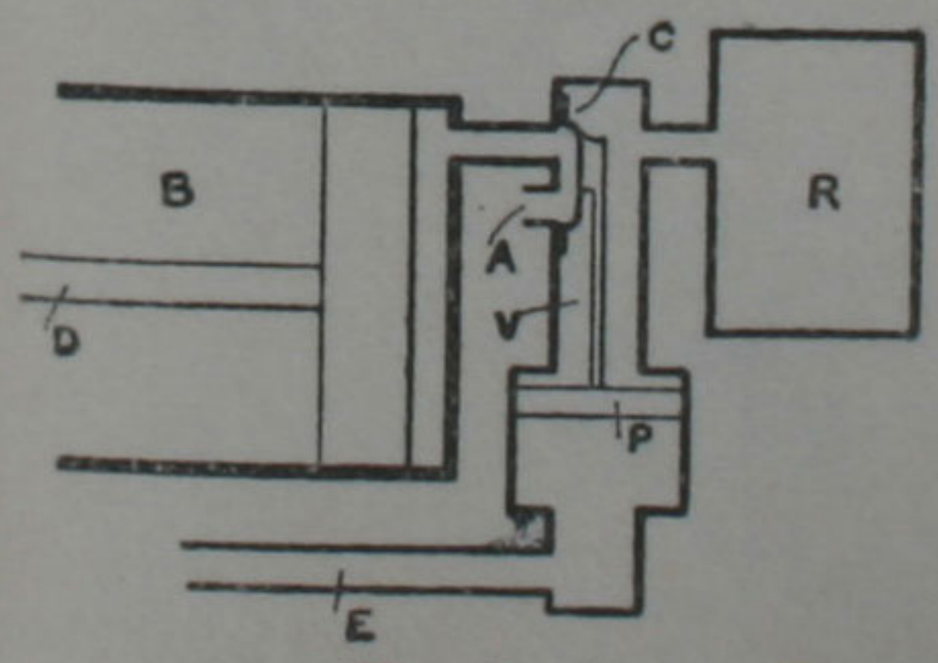


Fig. 1.

by George Westinghouse of Pittsburg, U.S.A., in 1872; the latter was patented a few years later. Fig. 1 shows in a diagrammatic way the construction of the *Westinghouse brake*, which is worked by compressed air, supplied by a small compressor on the engine. The air is pumped into a reservoir, from which it is admitted by a valve, under the control of the driver, into the train

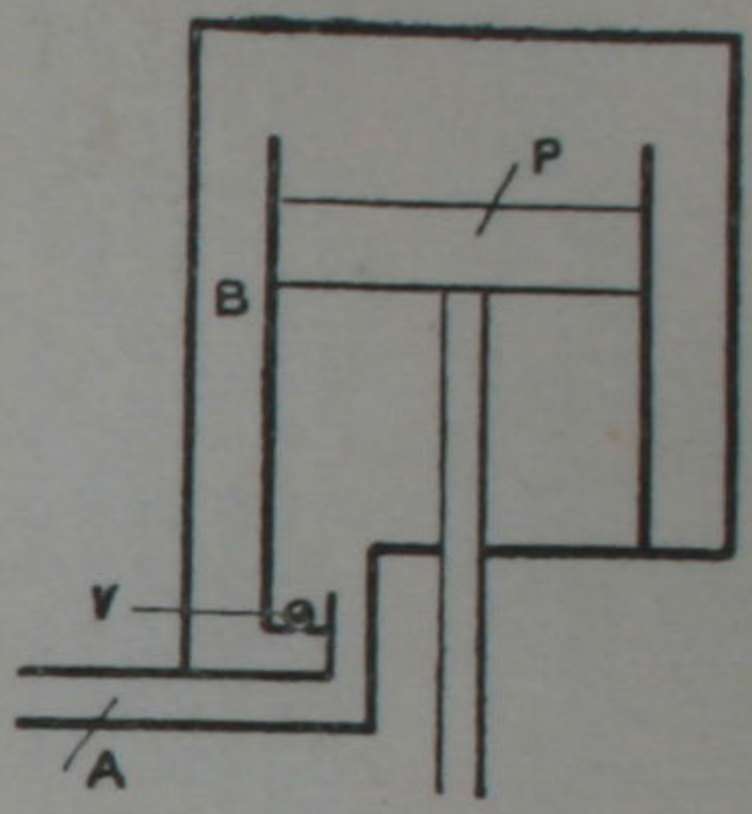
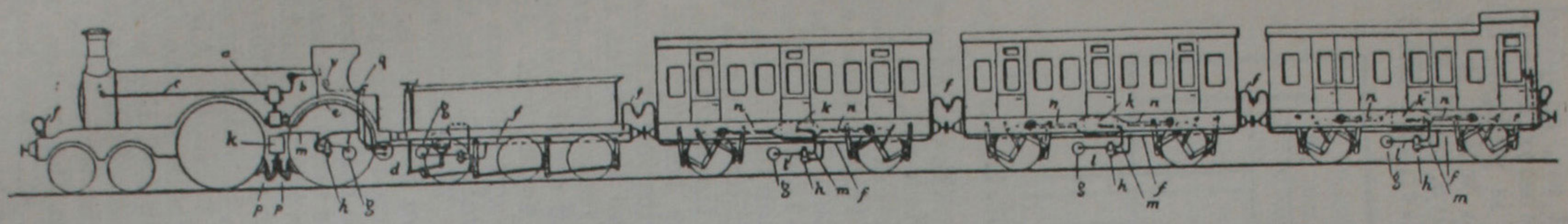
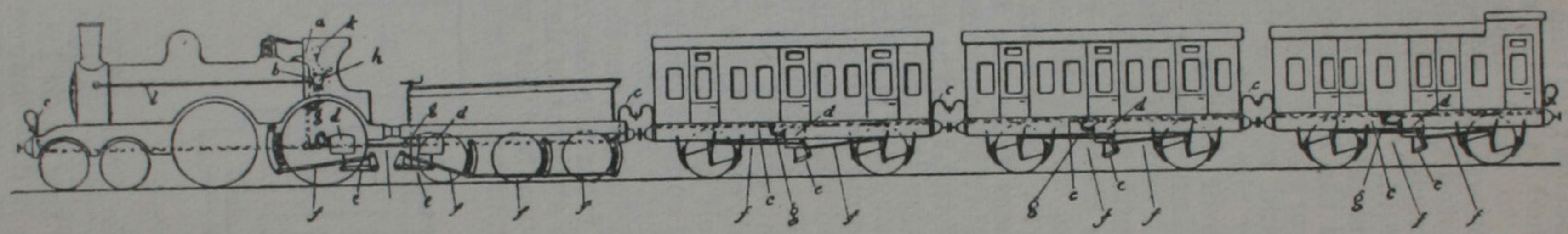


Fig. 2.

pipe. B is the brake cylinder and piston—the piston rod, D, being connected by levers to the brake blocks. V is a 'triple valve,' consisting of a piston, P, and a slide valve, C. R is a reservoir of compressed air. When the piston, P, is in the 'off' position shown in the figure, air from the train pipe, E, passes into the reservoir, R, a small groove allowing it to pass the piston, P; so that when the brake is off, the reservoir, R, is always kept full of air at the same pressure as the train pipe. Any air in the brake cylinder can escape past the valve, C, into the atmosphere at A. When the driver desires to put on the brakes, he allows air to escape from the train pipe, E, causing a fall of pressure in the pipe. The air in the reservoir, R, then tries to pass into the train pipe, and in doing so forces down the piston, P, which carries with it the slide valve, C. Air is then admitted from R into the brake cylinder, B, and the brake is put on. To take off the brakes, the pressure in the train pipe, E, is restored, when the piston, P, and slide valve, C, move back, and the air in the brake cylinder escapes to the atmosphere at A.



BRAKE.—Fig. 3. Train fitted with the Westinghouse Brake.—*a* is the steam air-pump supplied with steam through pipe *b*, and exhausting into smoke-box through pipe *c*. This air-pump delivers air to the main air chamber *d* through pipe *e*, and thence to the train pipe *f f f* through the driver's valve *q*. *f f f* is the train pipe connected with the small air chambers *g g g* under each vehicle through the 'triple' valves *h h h*, these valves supplying air to the brake cylinders *k k k* from the air chambers *g g g* through the pipes *l* and *m*. Brake cylinders *k k k* are fitted with pistons, applying the brakes to the wheels of the carriages and tender through the rods *n n n*, and to the wheels of the engine through the rods and levers *p p*. *q* is the driver's valve through which air is allowed to escape from the train pipe in order to apply the brakes, and supplied to the train pipe *f* from the main air chamber *d* in order to release the brakes. *r* is a pressure gauge, showing pressure in the train pipe *f* and main air chamber *d*.



BRAKE.—Fig. 4. Train fitted with the Vacuum Brake.—*a* is the pipe which supplies steam to the ejector *b*, by means of which the air is withdrawn from the train pipe *c* and delivered into the atmosphere through the smoke-box and funnel of the locomotive by the pipe *l*. *d d d* are vacuum chambers placed under each vehicle, and fitted with pistons which operate the brakes through the levers *e e e* and the coupling rods *f f f*. The vacuum chambers *d d d* are coupled to the train pipe *c c c* through the pipes *g g g*. *h* is a driver's valve which admits steam to the ejector to withdraw the air from the train pipe and vacuum chambers in order to release the brakes, and which also admits air to the train pipe and vacuum chambers to apply them. *k* is a vacuum gauge.

The *vacuum brake*, as its name implies, works by utilizing the pressure of the atmosphere by first creating a partial vacuum. Fig. 2 shows diagrammatically the construction of the brake. It consists of a cylinder with a piston, P, which is connected to the brake blocks, and a ball valve, V. The lower side of the piston is always in communication with the train pipe, A, in which a partial vacuum is always maintained when the brakes are off, by means of an ejector on the engine. Also, any air above the piston, P, will pass down the passage, B, and through the valve, V, into the train pipe, A, from which it is exhausted by the ejector on the engine; so that when the brakes are off there will be a partial vacuum on each side of the piston, P, which will be in its lowest position. To apply the brakes, the driver admits air to the train pipe, A; the air rushes into the cylinder, and lifts the piston, P, being prevented by the valve, V, from passing to the upper side of P.

In both the vacuum and the Westinghouse brake, should a coupling break, and a portion of the train become detached from the remainder, the breaking of the train pipe will immediately cause the brakes to be put hard on. The most recent improvements in these brakes have been connected with the provision of very rapidly acting valves, which enable the application of the brakes to be made almost simultaneously on every pair of braked wheels of the train. Figs. 3 and 4 give details of trains fitted with the Westinghouse and the vacuum brake respectively. For brakes in cycles, motors, guns, etc., see these articles.

Brake. See BRACKEN.

Brake Horse Power. See HORSE POWER.

Brakelonde. See JOCELIN DE BRAKELONDE.

Bramah, JOSEPH (1748–1814), English mechanical inventor, was born at Stainborough in Yorkshire; worked for some time in London as a cabinetmaker. In 1796 he invented the hydraulic press that bears his name, by means of which a number of small impulses may be converted into a continuous pressure of practically unlimited amount. His patent lock (1784) was believed unpickable, until actually picked in 1851 by an American called Hobbs. In 1806 he patented a machine for printing bank notes which was adopted by the Bank of England. He also devised improvements in pumps, wheel carriages, engine boilers, fire-engines, and paper-making. See Smiles's *Industrial Biography* (new ed. 1879).

Bramante, DONATO D'AGNOLO (1444–1514), Italian architect of the renaissance; born near Urbino. He at first studied painting, but upon reaching Milan (1472) he devoted himself to architecture. He next settled (1499) in Rome, and became a favourite with Pope Julius II. His chief works are the joining of the Belvedere Palace with the Vatican by means of two grand galleries (*loggie*), and the rebuilding of St. Peter's at Rome, begun in 1506, and finished, with alterations by Michael Angelo and others, after his death. In the Raphael Palace and the chancelry and church of San Lorenzo, in Rome, he showed a predilection for Grecian architecture, in which he instructed his nephew Raphael, whose genius he was the first to bring to light. Bramante stands at the head of the renaissance architects of Italy. Breadth, mass, and classic grace are the chief characteristics of his style. The surname Lazzari, which was formerly given to him, is now believed to be an error. See Semper's *Donato Bramante* (1879).

Bramantino, whose proper name was BARTOLOMMEO SUARDI (?1470–*c.* 1535), Italian painter of the Lombard school, born at Milan. He was the pupil of Foppa and Leonardo da Vinci, then of the architect Bramante, hence his cognomen ('Little Bramante'). He occupied an important position in Milanese art after the departure of Leonardo in 1499, and influenced Luini and Gaudenzio Ferrari. In the meantime, however, he seems to have accompanied Bramante to Rome; for in 1506 he collaborated with Sodoma in Rome upon frescoes in the Vatican, afterwards destroyed and replaced by those of Raphael. His chief works are to be found in Milan. His fine *Adoration of the Magi* in the Layard Collection, Venice, will ultimately be placed in the National Gallery, London. There are six panels of heads by him in the S. Kensington Museum, and two frescoes in the Wallace Collection. See Selwyn Brinton's *Renaissance in Italian Art* (2nd ed. 1903).

Brambanan, or PARAMBANAN, a vil. of Java, 10 m. by rail E. of Jokjokarta, with ruins of six groups of ancient temples, in all probability Buddhist. They resemble in plan and arrangement the famous temple of Boro-Budur. Local tradition puts their erection back to the second half of the 13th century.

Bramble, or BLACKBERRY (*Rubus fruticosus*), belongs to the same genus as the raspberry and the dewberry, and is a member of the order Rosaceæ. It is a shrub which is assisted in climbing through hedges and thickets by its numerous prickles. The leaves vary in colour, according to the season, from green to brilliant yellow and crimson, with pinky-white flowers, which appear late in the summer; and the fruit consists of small dark-purple or black stone berries, resembling a raspberry, and not ripening till late autumn. Hooker and Arnott enumerate seven varieties of the British bramble. The foreign varieties are more numerous. The blackberry is extensively cultivated for the sake of its fruit in America, the berries being thus improved in quality and quantity; but in Britain the cultivation extends only to the production of flowers—the best-known varieties being the *Rubus deliciosus*, from the Rocky Mountains, the finest ornamental bramble grown; the Japanese bramble, a rapid-growing climber; and the Himalayan bramble, whose silvery-white stems show up well in winter.

Brambling, or BRAMBLE FINCH (*Fringilla montifringilla*), a beautiful little bird allied to the chaffinch, which nests in N. Europe and Asia, and migrates northwards in autumn. It nests regularly in the northern parts of Great Britain.

Bramhall, JOHN (1594–1663), Irish prelate; a scion of the Bramhalls of Bramhall Hall, Cheshire; passed over to Ireland in 1633 as Wentworth's chaplain, was consecrated bishop of Derry (1634), and became one of Wentworth's chief agents in his proceedings against the recusants and the covenanting Ulster Scots. On Strafford's impeachment Bramhall was also imprisoned and impeached by the Irish Commons, but was liberated by the king. On the collapse of the royalist cause in England he took refuge in Paris, where he associated with Hobbes. But at the restoration he became archbishop of Armagh, and rigorously carried out his policy of compelling conformity. His works are published in the Anglo-Catholic Library (1842). See Vesey's Life in ed. of *Works* (1677); J. S. Reid's *History of Presbyterian Church in Ireland* (new ed. 1867).

Brampton. (1.) Tn., 9 m. E.N.E. of Carlisle, England. It is a market town, and has manufactures of cotton and tweeds. The fine border castle of Newark is in the neighbourhood. Pop. 2,500. (2.) Co. tn., Peel, Ontario, Canada, 20 m. w. of Toronto; important grain and flour market. Pop. 2,500.

Brampton, Baron. See Hawkins, Sir Henry.

Bramwell, Sir Frederick Joseph (1818–1903), engineer, was born in London. After some experience as manager of an engineering factory, he started business as a civil engineer, and obtained an extensive practice. He was president of the Institute of Civil Engineers (1884–5), chairman of the executive committee of the Inventions Exhibition (1884), and president of the British Association (1888). In 1874–5 he acted as president of the Institute of Mechanical Engineers.

Bramwell, George William Wilshere (1808–92), Baron Bramwell, English judge, was born in London, and became a barrister in 1838. He acquired a lucrative practice, and was made Q.C. in 1851. In 1856 he succeeded Baron Parke in the Court of Exchequer, and was knighted. In this court he sat till it ceased to exist in 1876, when he was appointed one of the justices in the court of appeal established by the Judicature Acts. He retired from that office in 1881, and in 1882 he was created a peer by the title of Baron Bramwell. Two of Bramwell's best-known contentions as a judge were that by English law some insane persons who commit crimes are responsible for their actions and others are not; and that a corporation was legally incapable of malice, and therefore could not be sued as such for malicious prosecution. See C. Fairfield's *Life* (1898).

Bramwell, John Milne (1852), Scottish physician, was born at Perth, and studied in Edinburgh. He practised for some years at Goole in Yorkshire, and after 1889 attracted considerable attention by his publications on hypnotism and his treatment by suggestion. He settled in London in 1892. His works include *James Braid, Surgeon and Hypnotist; Hypnotic Anæsthesia; Suggestion, its Place in Medicine and Scientific Research; Dipsomania and its Treatment by Suggestion; Hypnotism; its History, Practice, and Theory* (1903); and *Hypnotism and Treatment by Suggestion* (1909).

Bran, the husk or outer covering of wheat, which, in the process of milling, is separated from the finer flour. In 100 parts of bran, which has the appearance of scaly yellow-brown particles, we find of water, 13·1; albumin, 19·3; oil, 4·7; husk, 55·6; ash or saline matter, 7·3. Bran is used in the making of digestible brown bread; for feeding horses, cattle, and poultry; and by calico printers for removing the colouring matter from the parts of their goods which are not mordanted.

Bran, a name in Celtic legend variously associated with the hero of the Welsh *Mabinogion of Branwen*, the hero of the 8th-century Irish epic, *The Voyage of Bran*, and the dog of Ossian's Fingal. See Meyer and Nutt's *Voyage of Bran* (1895).

Branchiæ. See Gills.

Branchidæ, an ancient town near Miletus, on the coast of Asia Minor, famous for its temple and oracle of Apollo Didymæus.

Branching. When any part of a plant gives rise to second parts similar to itself, it is said to branch. Thus, a stem forms stem branches, and a root forms root branches. These branches may arise either from the sides of the parent structure (*monopodial branching*), or from division of

its growing apex (*dichotomous branching*). In the former case the branch or branches may remain subordinate in size and position to the parent axis (*racemose branching*), or may displace and overtop it (*cymose branching*). In many of our forest trees—*e.g.* lime, elm, birch, etc.—the buds which are formed throughout the growth of any one year grow out, during the following spring, into lateral branches, the branching being thus typically racemose. The last formed bud, however, grows very rapidly, and pushes to one side the prolongation of the main axis, taking its place, and becoming the main axis of the following year, so that the sequence of racemose branching is annually interrupted by the occurrence of a single cymose branching at the end of each year's growth. In the common lilac a very similar mode of annual cymose branching may be observed; but in this case the branches are arranged in pairs, and the last pair of buds formed in each year grow equally, forming two main axes of the second year, while the prolongation of the preceding main axis dies. When two new main axes arise, as in the lilac, the cyme is said to be *biparous;* when only one, as in the lime, etc., it is said to be *uniparous.*

Branchiopoda, a term used in the classification of the lower Crustacea (Entomostraca). It has been used both as an ordinal and as a subordinal term, and in the former case includes both Cladocera and Phyllopoda. In the narrower sense it includes only such forms as Apus, the brine-shrimps, and similar organisms.

Branco, CAPE, headland, Parahyba state, Brazil, 60 m. N. of Pernambuco, the most easterly point of the South American continent.

Branco, RIO ('white river'), riv., Brazil, rises in Parima Mts., between Venezuela and Brazil, and after a course of 400 miles joins the Rio Negro, a trib. of the Amazon.

Brancovan, CONSTANTIN (1654–1714), prince of Walachia from 1688; rendered great service to the Porte in the campaign against Austria in 1690, and helped Tököly to become prince of Transylvania. In the contest between the Porte and Peter the Great of Russia his attitude was doubtful, but in the disastrous campaign of Peter the Great on the Pruth, when he was forced to make peace (1712), Brancovan again took the part of the Porte; whereas Dimitrie Cantemir, the prince of Moldavia, rendered all possible assistance to Russia. Notwithstanding this, Brancovan was accused of treason, deposed, carried prisoner to Constantinople, and put to death, together with his four sons (1714), and his vast fortune was confiscated. This marked the beginning of the Phanariot period (1714–1821) of the principalities. See ROUMANIA.

Brand, HENRY BOUVERIE WM. (1814–92), first Viscount Hampden, and twenty-third Baron Dacre, Speaker of the House of Commons, entered Parliament in 1852 as Liberal member for Lewes, which he represented till 1868, when he became M.P. for Cambridge county. In 1859 he was appointed financial secretary to the Treasury, and acted as Liberal whip till 1868. In 1872 he was elected Speaker of the House of Commons, holding this office till 1884, when he was created a peer, with the title of Viscount Hampden.

Brand, SIR JAN HENDRIK (1823–88), president of the Orange Free State, son of Sir H. C. Brand, Speaker of the Cape House of Assembly, was born at Cape Town. He practised as a barrister till 1863, when he was elected president of the Boer state, a position

which he held for four successive terms of five years each. At the beginning of the struggle between Great Britain and the Transvaal in 1880, Brand maintained the strict neutrality of his republic, and was present as mediator in 1881 at the conference which led to the final arrangement of peace after the British defeat at Majuba Hill. Brand's phrase, 'Als sal recht komen' (All will come right), has often been quoted in South African discussions.

Brand, JOHN (1744–1806), English antiquary, became rector of the united parishes of Mary-at-Hill and St. Mary Hubbard, London, in 1784, and was also secretary to the Society of Antiquaries from that year till his death. Chief works: *Popular Antiquities* (1777; enlarged 1813; new ed. 1888), which stands in the first rank of books of its kind; *History and Antiquities of Newcastle-on-Tyne* (1789); and *Letters to Mr. Ralph Beilby* (1825).

Brande, WILLIAM THOMAS (1788–1866), English chemist, was born in London. He became member of the Westminster Medical Society (1805), fellow of the Royal Society (1809), professor of chemistry to the Apothecaries' Company (1812), succeeded Davy in the same capacity at the Royal Institution (1813), and in 1854 became chief officer of the coinage department at the Mint. Besides papers in the *Transactions of the Royal Society*, Brande was author of a *Manual of Chemistry* (1819; 6th ed. 1848), *Elements of Chemistry* (1831), and a *Dict. of Pharmacy and Materia Medica* (1839), and edited the *Dict. of Science, Literature, and Art* (1842; new ed. by Cox, 1875).

Brandenburg. (1.) Province of Prussia (15,383 sq. m.), occupying the middle of the N. German plain—*i.e.* the Havel-Spree depression, the valleys of the middle Oder and its trib. the Warthe, and part of the valley of the middle Elbe. Forty-six per cent. of the area is under cultivation, the most fertile land lying in the N. and middle. Fruit, flax, hemp, and vines are cultivated. In the S. forests cover thirty-two per cent. of the area. Lignite is mined to the annual value of three-quarters of a million sterling; other mineral products are iron, lime, and gypsum. Berlin is the capital of the province. Other important towns are Frankfort-on-the-Oder, Potsdam, Charlottenburg, and Spandau. The history begins with its colonization by Wends and other Slavs in the 6th century. Their first subjugation was effected by Albert the Bear, who assumed the title of Margrave of Brandenburg in 1134. In 1356 it was made an electorate of the empire. In 1415 the emperor conferred the electoral dignity of Brandenburg upon Frederick, burgrave of Nuremberg, of the house of Hohenzollern, the present imperial dynasty of Germany. With the accession of Frederick William, the Great Elector, the history of Brandenburg merges in that of Prussia. Pop. 3,550,000. (2.) Town, prov. Brandenburg, Prussia, 38 m. W.S.W. of Berlin, and on the Havel; produces baskets, bricks, leather, flour, and silks. From 949 to 1544 it was the seat of a bishop. Pop. 55,000.

Brandes, GEORG MORRIS COHEN (1842), Danish critic, of Jewish extraction, whose *Æsthetiske Studier* (1868) and *Kritiker og Portraiter* (1870) caused him to be regarded as one of the most promising of the younger critics. The teaching of John Stuart Mill, Taine, Renan, and Comte gave his criticism its philosophical basis. In 1871 he began his lectures *Hovedströmninger i det 19 Aarhundredes Literatur* (6 vols. 1871–90; Eng. trans. 1886–

1906). He pursued his theories in various publications, besides translating John Stuart Mill's *Emancipation of Woman* into Danish. Brandes breathed a new spirit into Danish literature, and gathered around him many talented men in the journal *Det Nittende Aarhundrede*. From 1877–83 he resided at Berlin, where he wrote, among other things, *Danske Digtere* (1877), *Sören Kierkegaard* (1877), *Esais Tegnér* (1878), *Benjamin Disraeli* (1878; Eng. version 1879), *Ferdinand Lassalle* (1877), *Ibsen* (1898). His influence in Scandinavia and on the Continent has been incalculable, though there are signs that it is now on the wane. His partialities and strong antipathies often obscure his judgment; his anti-clericalism approaches fanaticism; and his attitude towards the Christian religion generally is that of a pagan philosopher. After his return from Berlin his principal works were *Mennesker og Værker i nyere Europæisk Literatur* (1883); *Essays*, two series (1889, 1897); *Holberg* (1884); *Poland* (1888); *Indtryk fra Rusland* (1889; Eng. trans. 1889 and 1890); *Det Moderne Gjennembruds Mænd* (1883); *William Shakespeare* (1895 and 1898; trans. W. Archer, 1898); and the autobiographical *Levned* (1906, etc.). His *Samlede Skrifter* appeared in 1900–8.

Brandes, CARL EDVARD COHEN (1847), Danish author, brother of Georg Brandes, distinguished himself early as an Orientalist and original dramatist, as a member of the Folkething, as one of the best debaters of the Left since 1880, and as assistant editor of the influential *Morgenblad*, and subsequently of *Politiken*. Like his brother, a strenuous radical, with a somewhat pessimistic point of view, his brilliant talents are counterpoised by an irritating dogmatism. He has written several plays—*e.g.* *Lägemidler* (1881), *Et Besög* (1882), *Under Loven* (1890), *Asgerd* (1895), *Vera* (1904), and *Haardt imod Haardt* (1904). A romance by him, *Jung Blut* (1899), led, because of its unveiled naturalism, first to a bitter controversy, and finally to a prosecution and fine.

Brandfort, tn., Orange Free State prov., S. Africa, 35 m. N.E. of Bloemfontein; alt. 4,566 ft. Pop. 2,000 (whites, 400).

Branding (cognate with Ger. *brennend*, 'burning') primarily denotes the impressing of a mark with hot iron upon men, beasts, or inanimate objects. From early times it was customary to brand felons and slaves with certain marks, which, being indelible, distinguished them for life from their fellow-men. Hence the secondary application of 'brand' and 'stigmatize' (from Gr. *stigma*). Offenders against English law were branded on the breast, on the cheek and forehead, on the shoulder and hand, and on the cheek alone, according to circumstances, usually with a certain letter denoting the offence. In 1424 an Act of the Scottish Parliament ordained that vagrants be burnt on the cheek, and a later Act of 1574 specified that they should be 'burnt through the gristle of the right ear with a hot iron of the compass of an inch about.' Branding was the custom in France, where, until 1832, a letter or letters were branded on the shoulder of a galley slave; previously, the *fleur-de-lis* was the mark impressed. Burning with a hot iron had, however, been completely abandoned in Britain (1829) and France before the middle of the 19th century; but in the United States slaves were burnt in the hand with their master's initial until the outbreak of the civil war. The Jamaica planters also used to mark their initials on the bodies of their slaves with a silver

brand dipped in burning spirits. Modern branding is confined to stamping a distinguishing mark upon goods or the cases which contain them. (See TRADE MARKS.) On the option of a curer, herrings are branded by government inspectors. Horses and cattle on large ranches are branded with their owner's mark. In the pastoral colonies, such as Australia and South Africa, the branding question is one of vital importance, and has been dealt with in numerous Brands Acts.

Brandis, CHRISTIAN AUGUST (1790–1867), German philologist and philosopher, was born in Hildesheim, and was professor of philology at Bonn from 1822 till his death. He visited the principal libraries in Europe to prepare, with Bekker, the edition of the works of Aristotle (1831–36) undertaken by the Berlin Royal Academy of Science. His principal work was *Handbuch der Geschichte der Griechisch-römischen Philosophie* (1835-66). See Trendelenburg's *Zur Erinnerung and C. A. Brandis* (1868).

Brandl, ALOIS LEONHARD (1855), Austrian student of English literature, born at Innsbruck, and became professor of philology successively at Prague (1884), Göttingen (1888), Strassburg (1892), and Berlin (1895). He has written *Coleridge und die Englische Romantik* (1886; Eng. trans. 1887), *Geschichte der mittelenglischen Literatur* (1892), *Die Quellen des weltlichen Dramas in England vor Shakespeare* (1898), and *Ags. Literature* (1908), and edited a new issue of Schlegel and Tieck's German translation of Shakespeare (10 vols. 1897, etc.), as well as an edition of *Thomas of Erceldoune* (1881).

Brandling (*Lumbricus fœtidus*), an earthworm remarkable for its banded body. It is a small species, and much prized by anglers as bait.

Brandon. (1.) Parish (6,759 ac.) and mrkt. tn., partly in Suffolk and partly in Norfolk, England, on the Little Ouse (which here separates the two counties), 7 m. N.W. of Thetford. The free grammar school dates from 1646. Considerable trade is done in grain, timber, coal, and rabbit skins. In 1870 implements of Neolithic times were discovered here. Pop. 5,800. (2.) Tn., Manitoba, Canada, co. seat of Brandon co., on the S. bank of the Assiniboine R., 126 m. W. of Winnipeg, on the C.P. and C.N. Rys. It has a government experimental farm, and exports large quantities of wheat and lumber. Pop. 11,000.

Brandon, CHARLES, DUKE OF SUFFOLK. See SUFFOLK.

Brandon, RICHARD (d. 1649), succeeded his father as public executioner (1640), and is said to have beheaded Charles I., Strafford, Laud, and others.

Brandon, ST. See BRENDAN, ST.

Brandram, ROSINA (1846–1907), English actress, born in London. She made her début in 1877 at the Opéra Comique, London, in *The Sorcerer*. After a tour in the United States she returned to London, and appeared at the Savoy in *Iolanthe* in 1882; this was followed by *Princess Ida*, *The Mikado*, *Ruddigore*, *The Yeomen of the Guard*, *The Gondoliers*, *The Vicar of Bray*, *Haddon Hall*, *Utopia Limited*, *Mirette*, etc.

Brandt, ENEVOLD, COUNT (1738–72), Danish statesman, was through the influence of his friend Struensee appointed (1770) chief warder to the imbecile Christian VII. His jealousy of Struensee led him to plot against that minister; but before he could take any action he was involved in the ruin of his former friend, and was beheaded.

Brandy (Ger. *Branntwein*, 'burnt wine;' Fr. *eau de vie*), a spirit prepared by the distilla-

tion of wines, the quality depending not only on the process, but also on the wine. The best comes from the town of Cognac, in Western France, where a special grape is grown; thus cognac has become a synonym for brandy. Much good brandy is imported from California. The spirit owes its flavour and aroma to the presence of small quantities of furfurol, œnanthic, acetic, butyric, and other ethers. It contains from forty-seven to eighty per cent. of alcohol, the average being about fifty-four per cent.; the sp. gr. varies from 0·9274 to 0·9342. Like other liquors, brandy is often concocted of alcohol flavoured with the above ethers and diluted with water. The spirit is colourless; pale brandy gains its colour from the cask, and brown brandy from the addition of caramel. In its general medicinal effects brandy may be regarded as alcohol.

spirit obtained by a patent still is not a true brandy; while a genuine brandy may be defined as one distilled from grape wines by a pot still. The best comes from the Charentes; but California, Australia, Spain, Algiers, Greece, Egypt, and Canada all export brandy. The Martell Star brandies are examples of genuine cognacs, rich in esters. Unfortunately, most of the French brandies are patent still products; hence many of them outside the Charentes are blended with cognac to improve their quality. In deciding between brandies an analyst should determine the ethers (esters), furfuroid bases, acidity, aldehydes, and higher alcohols. The minimum for esters should be about 80 parts per 100,000 pure alcohol, and for furfurol about 0·75 part. This standard does not apply to vintage brandies, where the esters are often much lower. Examples:—

QUANTITY IN PARTS PER 100,000 OF PURE ALCOHOL.

Constituents.	Genuine brandy from inferior wine.	Genuine cognac.	Sophisticated brandy.
Acidity.....	35·38	94·76	51·8
Aldehydes.....	24·55	10·68	12·7
Alcohols (higher)....	173·60	287·94	422·9
Ethers (esters).....	98·71	116·82	40·8
Furfuroid bases.....	1·39	4·88	2·9
Total.....	333·63	515·08	531·1

Recently many prosecutions have taken place in connection with the sale of brandy. No recognized standard exists, therefore penalties were inflicted only in few cases. It has been shown to be a difficult matter to discriminate between the genuine article and a sophisticated or 'silent spirit' brandy. Generally it is agreed that a neutral

Brandywine Creek flows S.E. through Chester co., Pennsylvania, U.S.A., and joins Christiana Creek near Wilmington, Delaware. On its banks General Howe defeated Washington in 1777.

Brangwyn, FRANK (1867), English decorative painter, born at Bruges in Belgium; worked for William Morris with designs for

tapestries, etc., but left him when only sixteen and went to sea. His paintings include *Ashore* (1890), *Burial at Sea* (1891), *Salvage* (1891), *Convict Ship* (1892). Renan wrote of his pictures, 'The eye rejoices before them; they swim in colour.' His *Trade on the Beach* (1895) is in the Luxembourg, Paris; *The Scoffers* in the Sydney National Gallery; *St. Simon Stylites* in Venice; and his panel *Commerce* in the Royal Exchange, London. See *The Studio* (1898), and Shaw Sparrow's *Frank Brangwyn* (1910).

Brank (in England), or BRANKS (in Scotland), a kind of bridle made of iron bands, formerly used to punish scolding women and those guilty of slander. It was occasionally used as a punishment for fornication, and, still more rarely, for men guilty of abusive language. The three specimens in the Antiquarian Museum at Edinburgh are all different in design, and a still greater variety may be seen at pp. 38–64 of *Old-Time Punishments*, by W. Andrews (1890). The witches' branks, preserved in the county hall at Forfar, Scotland, is a spiked collar of cruel design. Nearly all dated specimens in British museums belong to the 16th and 17th centuries. The use of the branks in Great Britain died out about the middle of the 19th century.

Brankovich, GEORGE, prince of Servia from 1425, with intervals, to 1455, served in the Turkish army under Bayazid II., and was made prisoner by Tamerlane. Two years after he became prince of Servia, Sultan Murad II. invaded that country, and Brankovich was forced to give up a part of it, to recognize the Turkish suzerainty over the part left to him, and to give his daughter to the Sultan in marriage. After being expelled from Servia, he took part with John Hunyady in his expedition against the Turks, and regained the independence of Servia in 1444. After that, however, he was in continual conflict with Hunyady, who often invaded Servia.

Branksome, par., Dorsetshire, England, 1 m. W. of Bournemouth. Pop. 8,000.

Brant, JOSEPH (1742–1807), whose native name was THAYENDANEGEA, was a Mohawk chief and missionary, who fought as a colonel in the British army during the American revolution. In 1787 he settled on a grant of land on the Grand R., Ontario. He built the first Episcopal church in Upper Canada with money collected in England (1786), and translated the Prayer Book and parts of the New Testament into his own tongue. See *Life* by Stone (1865).

Brant, or BRANDT, SEBASTIAN (1457–1521), German poet and humanist, went to Basel in 1476; licentiate of canon law (1481), and doctor of law (1489). The celebrated preacher, Geiler von Kaisersberg, was instrumental in securing Brant's return to Strassburg, his native city, in the capacity of syndic (1501). In 1503 he was appointed town clerk. He remained at Strassburg until his death. He wrote many works in Latin (mainly religious and political) and German, in prose and verse, popular and learned. His most successful writing was his *Narrenschiff* (1494), a ship sailing to Narragonia (Fools' Land), and having on board over a hundred fools: each of them has some particular folly, which is described by a set of verses, accompanied by a rough woodcut (based on the author's own drawings). Translated into Latin by Locher in 1496, it immediately became popular. In the same year appeared renderings in Low German and in French; in 1500 one in Dutch. The English rendering of 1507 goes back to the French; but Barclay's *Ship of Fools* (1509) is mainly a free translation from

Locher's Latin. It was he who invented the figure of St. Grobianus, the embodiment of the coarseness and indecency of his age. The *Narrenschiff* was edited by Zarncke (1854) and Goedeke (1872); an edition, with all the designs of the original, was issued by Bobertag in 1891.

Brantford, tn., Ontario, Canada, 23 m. W. by S. of Hamilton, on Grand R., which is navigable to the town, with short canal connection. It produces large quantities of agricultural and other machinery. It derives its name from the Indian chief, Joseph Brant. Pop. 22,000.

Brantôme, PIERRE DE BOURDEILLES, SEIGNEUR DE (?1540–1614), French chronicler, descended from a noble family in Périgord. He became abbé de Brantôme when only sixteen, but the greater part of his life was passed as a soldier and courtier. He accompanied Mary Queen of Scots to Holyrood in 1561. He afterwards fought against the Huguenots in the first (1562) and third (1573) religious wars, and against the Turks (1564 and 1566). He was chamberlain to Charles IX. and Henry III.; but after the death of his patroness, Catherine de' Medici, he retired to Brantôme. There he wrote his famous *Mémoires*, which contain accounts of the principal personages of the period, and are valuable for their faithful portrayal of the scandalous manners of the times. The first edition was published after his death (10 vols. 1666–7); other editions by Le Duchal (15 vols. 1740), Lacour and Merimée (13 vols. 1858–93), Lalanne (10 vols. 1865–81). See *Brantôme, sa Vie et ses Ecrits*, by Lalanne (1897).

Bras d'Or, LAKE, is not a lake but a gulf, Cape Breton I., Canada, 50 m. long by 20 m. broad. The south end is connected by a ship canal (half a mile long) with St. Peter's Bay, and thus bisects the island of Cape Breton.

Brasenia, a small genus of tropical S. American water-plants, belonging to the Nymphæaceæ, with small dark purple flowers and very mucilaginous peltate leaves.

Brash. See PYROSIS.

Brasidas, son of Tellis, was the most famous and successful Spartan commander in the earlier part of the Peloponnesian war. In its first year (431 B.C.) he saved Methone from an Athenian invading force, became ephor, and distinguished himself at Pylos in 425 B.C. The next year he defeated the Athenians outside Megara, and secured that city to Sparta. He was then on his way to Chalcidice, in Thrace, to stir up disaffection among the Athenian subjects. Arriving there, he succeeded, by his policy of moderation and his energy, in securing Acanthus, Stagirus, Amphipolis, Scione, and Mende. He also accompanied Perdiccas, king of Macedonia, on an expedition against the Lyncestians, proving his military ability by a skilful retreat under difficulties. In 422 B.C. he gained a complete victory over an Athenian force under Cleon which was attempting to recover Amphipolis, but fell in the battle, and was buried in Amphipolis. As a soldier and statesman he had abilities unusual in a Spartan—daring, energy, and readiness, moderation, tact, and eloquence. Thucydides relates (bks. ii.–v. incl.) his career.

Brass, an alloy of copper and zinc in various proportions. The alloy was known to the Romans, though bronze, the alloy of copper and tin, was the material most used by the ancients, and is often rendered 'brass.' Brass is prepared by fusing the metals in the proportions of about three of copper to from two to one of zinc in plumbago or clay crucibles. First

a little scrap brass is melted in the crucible with some flux or powdered charcoal; the copper is then added, and, when it is melted, the zinc. After it has stood in the furnace for some time, the alloy is cast into ingots or moulds. Sheet brass is prepared by casting into strips, and these are passed cold through rolls. The proportion of the two metals varies greatly according to the uses to which the alloy is to be put. A large proportion of zinc increases the hardness and lightens the colour, but reduces the tenacity and ductility of the alloy. Brass is highly tenacious, malleable, and ductile, and makes good castings. The addition of two to four per cent. iron gives a very hard and tenacious metal. Brasses, in machinery, are the brass fittings in a bearing in which the revolving journal lies. This comparatively soft metal is introduced so that the shaft may not wear away.

Brass, tn., on R. Brass, S. Nigeria, immediately E. of the mouth of the Niger. The river forms an arm of the Niger delta.

Brasses. See MONUMENTAL BRASSES.

Brasseur de Bourbourg, CHARLES ETIENNE (1814–74), a French abbé, was born in Bourbourg. Proceeding to America in 1846, he was vicar-general at Boston, then a missionary (1848–64) in Central America and Mexico. He was the author of *Histoire de Canada* (1851), *Histoire....du Mexique et de l'Amérique Centrale dans les Siècles antérieurs à Christophe Colombe* (1857–9), and other works.

Brassey, THOMAS (1805–70), English engineer and railway contractor, was the son of a Cheshire farmer. In 1834–5 he executed contracts on the Grand Junction and London and Southampton Railways. In 1836 he moved to London, and began business in a large way as a railway contractor. In 1847 and following years he constructed the Great Northern Railway. Other contracts included railways in France, Italy, Spain, Canada, Australia, and India, the Crimean Railway, the Victoria Docks, London, and the East London Railway. His last contract was the Wolverhampton and Walsall Railway. Brassey is said to have left a fortune of about £7,000,000. See Helps's *Life and Labours of Mr. Brassey* (1872).

Brassey, THOMAS, BARON (1836), son of the preceding, was born at Stafford, England. He was elected for Devonport in the Liberal interest in 1865, was called to the bar in 1866, and was elected M.P. for Hastings in 1868, which he represented until 1886. He became a civil lord of the Admiralty in 1880–3, and secretary to the Admiralty in 1883–5. He is a high authority on naval questions, and has been a frequent writer on these subjects. He was chairman of the Opium Commission and the commissions on unseaworthy ships, coaling stations, and pensions to the aged poor. In 1876–7 he and Lady Brassey undertook a voyage round the world in their yacht the *Sunbeam*, and the account which the latter published of the voyage attained wide popularity. Lady Brassey died (1887) on a homeward voyage from Australia. Lord Brassey is the author of a number of works, including *Work and Wages* (1872), *British Seamen* (1877), *The Eastern Question* (1878), *Foreign Work and English Wages* (2nd ed. 1879), *The British Navy*, in 5 vols. (1882–3); *Sixty Years of Progress* (1904); and he edited for a number of years the *Naval Annual*. He was made a K.C.B. in 1880, a baron in 1886, and in 1906 received a G.C.B. He was president of the Institute of Naval Architects in 1893–5, and was appointed governor of Vic-

toria in 1895, but retired early in 1900.

Brassica, a large genus of plants belonging to the Cruciferæ, and extending over the whole of Europe and N. and Central Asia. The commonest British species is *B. sinapistrum*, the wild mustard or charlock, a yellow-flowered weed sometimes too abundant in cornfields, its presence pointing to land of poor quality or land that is badly farmed. Many important edible plants belong to the genus. The white and black mustards of commerce are obtained from the seeds of the indigenous *B. alba* and *B. nigra* respectively; while *B. campestris*, also an indigenous plant, has given rise, under cultivation, to the common turnip, which, along with its ally the swede (*B. rutabaga*), owes its importance to a fleshy thickening of the root and lower portion of the stem. Other varieties of *B. campestris* are the rape and colza, from the seeds of which oils are obtained; while the crushed seeds from which the oil has been expressed constitute the cattle food known as oilcake. *B. oleracea* occurs on the cliffs of the English Channel, and is the source from which the various forms of cabbage, kale, kohl-rabi, cauliflower, broccoli, etc., have arisen.

Brasso, Transylvania. See KRONSTADT.

Brathwaite, RICHARD (1588–1673), English poet, born in Westmorland. Going to London, he started at once as a poet and dramatist, and continued to produce in a most prolific manner almost every kind of composition. His best-known work, *Barnabæ Itinerarium, or Barnabee's Journal* (1638), also known as *Drunken Barnaby's Four Journeys*, was published under the pseudonym of Corymbæus, and is a popular record of English travel in mixed English and Latin verse. His other works include pastorals like *The Poet's Willow* (1614), satires like *A Strappado for the Devil* (1615), threnodies like *Astræa's Tears* (1641), and novels like *The Arcadian Princess* (1635). See Preface to 9th ed. of *Barnabee's Journal*, by Jos. Haslewood (1820).

Bratianu, ION CONSTANTIN (1822–91), Roumanian statesman; born at Pitesci, and educated at Paris, where he took an active part in the revolution of 1848. Returning to Bucharest, he made himself one of the leaders of the Roumanian revolution of the same year, and was elected a member of the provisional government. Then he took a prominent part in calling to the Roumanian throne Prince Charles of Hohenzollern. From that time (1866) he was the leading statesman in the country, being prime minister from 1876 to 1888, a period during which Roumania took part in the Russo-Turkish war of 1877–8, became independent of Turkey, and was raised to the status of a kingdom (1881). In 1878 Bratianu represented his country at the Congress of Berlin. During the period of his rule, also, a great number of administrative reforms were introduced in Roumania, the railways nationalized and developed, and schools and colleges founded. Although at first a man of democratic or even republican principles, Bratianu encouraged the formation and building up of a bourgeois class in the last years of his government.

Bratsberg, mountainous and picturesque co. on the coast of S. Norway, embracing the dist. of Telemarken; cap. Skien. Area, 5,865 sq. m. Forestry and agriculture are the main occupations of the inhabitants. Pop. 100,000.

Bratslav, or BRAZLAW, tn., Podolsk gov., Russia, 110 m. E. of Kamenez Podolsk. Pop. 8,000.

Brattice, transverse partition of board, brick, plate-iron, or other suitable material, set up in the galleries of mines for the purpose of directing ventilating air currents. A brattice-cloth of heavy waterproof canvas is sometimes used temporarily.

Brattleboro, vil., Windham co., Vermont, U.S.A., on the W. bk. of Connecticut R., 7 m. N. of the Massachusetts boundary. It is the centre of the Vermont maple-sugar industry, and manufactures furniture and organs. Pop. 6,500.

Braun, AUGUST EMIL (1809–56), German archæologist, born at Gotha, and died at Rome. He studied under Schelling and Gerhard, and became secretary to the Archæological Institute of Rome in 1833. His chief works are *Griechische Götterlehre* (1851–55), *Vorschule der Kunstmythologie* (1854; Eng. trans. 1856), and *Die Ruinen und Museen Roms* (1854; Eng. trans. 1855).

Braun, KARL FERDINAND (1850), physicist, was born at Fulda, and occupied professorships successively at Marburg, Strassburg, Carlsruhe, and Tübingen, where he directed the construction of the Physical Institute. In 1895 he returned to Strassburg as professor of physics and director of the Physical Institute there. Braun's studies have been mainly devoted to electricity, magnetism, and telegraphy. His calculation of the constant of gravitation, by the torsion balance method, is in close agreement with that made by Professor Boys. With the aid of Hartmann he constructed an ingenious apparatus for measuring the intensity of the magnetic field by means of a fine bismuth wire. His chief work, *Drahtlose Telegraphie durch Wasser und Luft*, was published at Leipzig in 1901. In 1909 he (jointly with Marconi) was awarded the Nobel Prize.

Braunau, tn., Bohemia, Austria, 20 m. E. of Trautenau; has a Benedictine abbey. Pop. 8,000.

Braunsberg, tn., E. Prussia, 35 m. S.W. of Königsberg; is famous as the seat of a Roman Catholic academy with university status the Lyceum Hosianum, founded in 1579, which was a great Jesuit educational centre in the 17th century. Pop. 13,000.

Brava. (1.) Or BARAVA, more properly BARAWA, seapt. tn., E. Africa, 110 m. S.W. of Magadoxo; belongs to the sultan of Zanzibar. Its trade is chiefly with India and Arabia. (2.) The southernmost of the Cape Verde Islands. Although hilly, it is fertile. Area, 22 sq. m. Pop. 10,000.

Bravura (Ital.), a term applied to a style of musical composition or performance. It denotes florid brilliancy and technical dexterity.

Brawling, in England, is the offence of wilfully disturbing any meeting of persons lawfully assembled for religious worship, or misusing any preacher, teacher, or persons so assembled. It is punishable by a fine of £40. By the Brawling Act, 1860, similar offences committed in a place certified under the Places of Worship Act, 1855, are punishable with a fine of £5, or imprisonment for two months.

Braxfield, ROBERT MACQUEEN, LORD (1722–99), Scottish judge, was called to the Scottish bar in 1744, and gained the reputation of being the best feudal lawyer in Scotland. Raised to the bench in 1776, he became a lord of justiciary in 1780, and lord justice-clerk in 1788. His coarseness and cruelty on the bench won for him the names of the 'hanging judge' and the 'Jeffreys of Scotland.' An excellent study of him is given in R. L. Stevenson's *Weir of Hermiston* (1896). See also Ramsay's *Reminiscences of Scottish Life and Character* (21st ed.

1872); Grant's *Old and New Edinburgh* (new ed. 1887).

Braxy. See SHEEP—*Diseases.*

Bray. (1.) Par. and coast tn., N. Wicklow, Ireland, 12 m. S.E. by S. of Dublin; is a favourite seaside resort. A good harbour has been constructed. Fine scenery in the neighbourhood. Pop. 7,500. (2.) Par. (9,063 ac.) and vil., Berkshire, England, on the Thames, 1½ m. S.E. of Maidenhead. Pop. 3,000. See BRAY, VICAR OF.

Bray, ANNA ELIZA (1790–1883), English novelist. Of her novels, some are concerned with foreign life, others (the most popular) with the history of the great Devonshire and Cornwall families. Her best general work is her *Borders of the Tamar and Tavy* (1836; new ed. 1879), an account of local traditions. She also wrote a *Life of Handel* (1857); *The Revolt of the Protestants of the Cevennes* (1870); *Henry de Pomeroy* (1842); and *Warleigh* (1836). See her *Autobiography* (1884), and Southey's *Correspondence* (1849–50).

Bray, THOMAS (1656–1730), English prelate, was selected in 1695 as commissary for the bishop of London in Maryland, U.S.A., where he organized the Anglican Church. After his return home he held (1706) the living of St. Botolph-Without, Aldgate, London. Bray laboured all his life at providing parochial libraries at home and abroad, and his labours resulted in the foundation (1698) of the Society for Promoting Christian Knowledge. In 1701 he was likewise instrumental in founding the Society for the Propagation of the Gospel in Foreign Parts. See *Report of the Association of the late Rev. Dr. Bray and his Associates*, founded 1723, still published annually with memoir attached.

Bray, VICAR OF. Simon Aleyn was vicar of Bray, in Berkshire, England, from 1540 to 1588, during the reigns of Henry VIII., Edward VI., Mary, and Elizabeth. He changed his faith three times, being twice a Papist and twice a Protestant, in order to adhere to his one principle, which was 'to live and die vicar of Bray.' The ballad, *The Vicar of Bray*, makes the vicar live in the reigns of Charles II., James II., William III., Anne, and George I.

Brayley, EDWARD WEDLAKE (1773–1854), English antiquary and topographer, was born at Lambeth, Surrey. By trade he was an enameller, and for long he was librarian and secretary of the Russell Institution (1825–54), of which he compiled a catalogue. He published many works on the antiquities and topography of England, including (along with John Britton) the *Beauties of England and Wales* (1801–15), and *Londoniana* (1829). See *Memoir* by J. Britton (1855).

Brazen Head, a mechanical contrivance which was fabulously reputed to possess the power of human speech, and was capable of acting as a kind of oracle. Several are mentioned in the old necromancers' and other books. One was made or owned by Pope Sylvester II. (*c.* 950–1003); another by Robert Grosseteste, bishop of Lincoln (1175–1253); another by Albertus Magnus (1193–1280); and another by Friar Bacon (1214–94), the most famous of all.

Brazil (officially styled *Republica dos Estados Unidos do Brazil*), the largest republic in S. America, is bounded on the N. by the Atlantic Ocean, Guiana, and Venezuela; on the W. by Colombia, Peru, Bolivia, Paraguay, and Argentina; on the S. by Uruguay; and on the E. by the Atlantic. Its greatest length is 2,660 m.; breadth, 2,700 m.; area, 3,270,000 sq. m.

Geographically, Brazil falls into two divisions—(1) the great plateau (4,000 to 5,000 ft.) of the

east and centre, its slopes being marked by rapids in the rivers flowing E. to the Atlantic, S. to the La Plata estuary, or N. to the Amazons; and (2) the great valley of the Amazons. The chief mountain ranges of the plateau, which generally trend N.E. and S.W., parallel to the coast, are Serra do Mar, Serra Geral, Serra da Mantiqueira (8,900 ft.), Serra dos Vertentes, Serra de Santa Martha, Serra dos Pyreneos, and Serra de Piauhy. Iron ore, precious stones, gold in quartz veins, arsenic, less frequently copper, lead, bismuth, and antimony, are found in the mountains. The great basin of the Amazons is bounded on the N. by ranges extending from the Tumuc-Humac Mts., separating it from the Guianas westward to Colombia, and on the S. by the Brazilian plateau.

Hydrographically, Brazil belongs for the most part to four chief drainage basins—(1) that of the Amazons in the N., this river flowing for nearly 2,000 m. through the country, and being joined within it by some of its largest tributaries—*e.g.* the Rio Negro, Madeira, and Tocantins; (2) the Rio Paranahyba, also in the N.; (3) the Rio São Francisco in the E.; and (4) the Parana-Paraguay in the S. Besides these, several shorter rivers discharge direct into the Atlantic—*e.g.* the Jaguaribe, Jequitinhonha, Doce, Itapicuru, and Parahyba. Large lakes, caused by the expansion of the rivers, are very common in the Amazon basin. On the plateau they are also numerous; one of the largest (100 m. long by 25 broad) lies on the island of Bananal, in Goyaz.

Brazil is divided into three meteorological zones. (1.) The tropical (mean temp. 77° F.), which embraces the N. part of the country, and is subdivided into three regions: (*a*) the Upper Amazon, where the rainfall amounts to as much as 78 in.; (*b*) Matto Grosso and the interior of the states bordering on the Atlantic, with heavy rains in spring and summer (45·9 in. on an average); and (*c*) the littoral, with rain in summer and autumn (58 in. of rainfall). (2.) The subtropical zone (mean temp. 74° at Rio Janeiro; rainfall, 44 in. between November and April). (3.) The temperate zone, with fine climate (mean temp. at Palmeiras, 63° F.; rainfall chiefly in winter and autumn, 40 to 60 in.).

The flora of the lands subject to inundation comprises forests of myrtle, rubber trees, bombax, mimosa, cinchona, etc., dominated by palms. Creeping plants are rare, but the ground grows tough grasses. American willow, plantains, palms, and the *Arundo saccharoides* (16 to 20 ft. high) are found on the banks of the streams. In the virgin forest beyond the reach of floods the trees are tall (200 ft. and more), and the trunks are draped with lianas bearing brilliantly-coloured flowers. The undergrowth consists of ferns and the phytelephas, yielding vegetable ivory. The Brazil nut, india-rubber, cocoa, vanilla, sarsaparilla, and cabinet woods are the main productions of these forests. Along the Atlantic, from Pernambuco to Rio de Janeiro, mangroves and *conocarpos* grow. The *campos* are grass-covered plains, in the hollows of which grow cypresses and palms.

As regards fauna, Brazil occupies almost the whole of a subregion of the neotropical region which extends from Mexico to Tierra del Fuego, and contains nearly all its characteristic types. Monkeys, eight species of bats, the jaguar, the puma, several species of wild dogs, the anta or tapir (the largest mammal), the peccary, five species of deer, the capybara, the agouti, the sloth, the ant-eater, and two species

of armadillo, are among the animals. The birds are numerous and of brilliant plumage; fifty-nine species of humming-birds and twenty-six of Tanagridæ; woodpeckers, goatsuckers, and the American ostrich belong to this region. The snakes are of forty-eight species, including the boa constrictor and anaconda. Fish number some 2,000 species, and insects are innumerable.

A census was taken in 1900, but the results were officially rejected as being unsatisfactory. The population, estimated at about 20,000,000, is very mixed—Europeans, 45 per cent.; Indian half-breeds, 32 per cent.; negroes, 15 per cent.; and pure Indians, 8 per cent. Population is densest in the coastal states, particularly in Rio de Janeiro, Sergipe, Pernambuco, Ceara, and Alagoas; Matto Grosso, Goyaz, and the Amazon states are sparsely inhabited. In the southern states of Parana, Santa Catharina, and Rio Grande do Sul there exist numerous colonies of Germans, amounting to nearly half a million persons in all. There are about an equal number of Italians scattered over southern Brazil.

On the Upper Amazon the chief occupation of the inhabitants is the collection of india-rubber (40,000 tons in 1909) and other forest products. Good tobacco and cocoa (especially in Para) are produced; while in the Atlantic states agriculture is more developed. Brazil, which produces three-fourths of all the coffee of the world, exports nearly £35,000,000 worth annually, chiefly from São Paulo, Minas, and Rio. In 1906 a scheme for the 'valorization of coffee'—*i.e.* to maintain the product at an artificial price—was originated by São Paulo, and in 1910 was still in operation. Sugar is grown in Maranhão and Piauhy; and the great tobacco state is Bahia. Paraguay tea (*maté*) is exported from Parana, and Minas Geraes is celebrated for its wines. The latter state is the chief mining region, yielding diamonds, gold, iron, manganese, copper, lead, etc. Gold is mined in the north-western and southern provinces, and in Goyaz; coal in Rio Grande do Sul and Santa Catharina. Manufactures are not developed, but the preparation of tobacco, sugar, etc., employs many of the people. The most important railways are the Central, from Rio de Janeiro to Minas Geraes and São Paulo (1,080 m.); the Mogyana in Minas Geraes and São Paulo (910 m.); the Sorocabana, in São Paulo (813 m., to be extended 250 m. further to reach the Bolivian frontier); the Paulista, in São Paulo (690 m.); the São Paulo-Rio Grande, in Parana and Santa Catharina (608 m. open, and some 1,500 to be constructed). A railway is also being constructed for a length of 210 m. (100 m. open) round the cataracts and rapids of the Madeira and Mamore rivers from Porto Velo to Guajara Mirim. In 1910 there were over 12,000 m. of railways open. The annual value of the exports is over £63,000,000, and of the imports, £37,000,000. Great Britain absorbs one-third of the foreign trade. The chief ports are Para, Fortaleza (Ceara), Recife, Bahia, Rio de Janeiro, and Santos. The capital is Rio de Janeiro, though a site has been selected for a new federal capital in the state of Goyaz.

The government is a republic, and the legislative power is in the hands of two chambers—the Senate of 63 members, three from each state (including the Federal District), a third of whom are replaced every three years; and a Chamber of Deputies, 212 in number (one for about 70,000 persons, with the restriction that not fewer than four shall be elected by each state). The president and vice-

president are elected for a term of four years by the direct vote of the people.

The external debt of the republic amounted in 1909 to £87,920,000. The government subsidizes the Roman Catholic Church, which is supervised by the archbishop of Bahia and eleven bishops; but otherwise there is absolute equality between all denominations. The army consists of about 28,000 men. Military service is by law compulsory, but conscription was only put in force in January 1908. The landmarks of Brazilian history commence with Cabral, who in 1500 discovered Brazil, named it Tierra da Vera Cruz, and claimed it for the Portuguese; and they took possession of the country by virtue of the treaty of Tordesillas between Spain and Portugal, confirmed by the Papal Bull of 1506. From that time until 1889 (except from 1580 to 1661) Brazil was governed by the Portuguese royal house. In 1624 the Dutch, instigated by Prince Maurice of Nassau, secured possession of a large part of the country, and kept it until 1661. In 1808 the prince regent of Portugal, João VI., transferred his court to Rio de Janeiro, but returned to Portugal in 1821. The following year Brazil declared its independence, and Dom Pedro was crowned emperor as Pedro I. In 1865 began the prolonged war with Paraguay, only ended by the death of Lopez in 1870. The emperor, Pedro II., was deposed in 1889 and a republic was declared. A constitution based upon the model of that of the U.S.A. was drawn up, the former provinces being converted into states. In 1892–5, insurrections in Rio Grande do Sul and elsewhere were suppressed, and the country has since that time rapidly developed.

See Wallace's *Travels on the Amazon and Rio Negro* (2nd ed. 1889); Bates's *The Naturalist on the River Amazon* (new ed. 1892); Agassiz' *A Journey in Brazil* (1868); Santa Anna Néry's *The Land of the Amazons* (Eng. trans. 1901); M. R. Wright's *The New Brazil* (1901); *The United States of Brazil*, by Bureau of American Republics (Washington, 1901); Oakenfull's *Brazil in 1910* (1910); Pereira da Silva's *Historia da Fundação do Imperio Brazileiro* (1864–82); Fialho's *Historia d'Estâbelecimento da Republica do Brazil* (1890); Aker's *History of South America* (1854–1904); and Pierre Denis' *Brazil* (Eng. trans. 1911); and the "Brazilian Year Book."

Brazil, co. tn., Clay co, Indiana, U.S.A., 55 m. W.S.W. of Indianapolis; has extensive collieries, blast furnaces, rolling mills, and machinery works. Pop. 8,000.

Brazil Nut, the seed of *Bertholletia excelsa*, a tree belonging to the Myrtaceæ, indigenous to Brazil, Guiana, and Venezuela, where it attains a height of 100 ft. or more. The fruit is a hard hollow shell, nearly spherical, and about six inches in diameter, and contains from twelve to twenty-two nuts. The nuts are angular, owing to the way in which they are packed in the fruit, and have a white kernel from which an oil is pressed for burning.

Brazil-wood, or LIMA-WOOD, is the heart-wood of a tree, *Cæsalpinia crista*, and is the principal of a number of similar red-dye-yielding woods growing in Brazil, the W. Indies, and Japan. It was at one time largely employed in dyeing, but has now been replaced by aniline colours.

Brazing is a form of soldering by means of a kind of brass called spelter. The surfaces to be united are thoroughly cleaned, and heated to redness by a forge or a blow-pipe, spelter being applied to the joint in the form of

wire or filings, along with borax, which acts as a flux.

Brazos, one of the largest rivers of Texas, U.S.A. It rises in the Llano Estacado, in the W. part of the state, and flows in a general S.E. course to its mouth in the Gulf of Mexico. Length, 900 m.; navigable at high water for 300 m.

Brazza, the mediæval *Brattia* (Slav. *Brac*), isl. of Austria, Dalmatia; lies between the island of Lesina and the Dalmatian coast, S. of Spalato. The surface is hilly, reaching 2,580 ft. in Mt. San Vito. The principal products are fruits, such as olives, almonds, figs, and excellent wine. It also yields good marble. Area, 153 sq. m. Pop. 25,000. Chief town, San Pietro (pop. 3,200), on the N. coast. The port of Milna (pop. 4,700) is on the S. coast.

Brazza, PIERRE PAUL FRANÇOIS CAMILLE, COMTE SAVORGNAN DE (1852–1905), African explorer, of Italian parentage, was born on board ship at Rio de Janeiro, and educated at the Jesuits' College at Paris and the Naval School at Brest. In 1874 he was naturalized a Frenchman, and having entered (1870) the marine service, was sent in 1875 to explore the Ogowe R., in W. Africa. He followed (1876–8) the course of the river for 430 m., and proved the practicability of penetrating into Central Africa by way of the two water-courses of the Ogowe and the Alima. In 1879–80 he again explored the same region, and established two important scientific stations, Franceville and Brazzaville (N. shore Stanley Pool), and twenty-five other posts. He returned to Europe in 1882, and in 1883 was dispatched by the French government to complete his exploration of the Ogowe, to determine the basin of the Alima, and to conciliate the natives. In 1886 he became commissary-general of the French settlements in W. Africa, in 1888 governor-general of French Congo, and in 1891 he explored the Sanga. Ill-health compelled him to retire in 1897. In 1902 he was awarded a pension of 10,000 francs by the Senate. See Bréard's *Les Voyages de Savorgnan de Brazza* (1884).

Brčka, tn., N.E. Bosnia, on the Save, 75 m. N.N.E. of Sarajevo; has large trade. Pop. 6,500.

Breaching Tower, a structure which played an important part in the siege of mediæval castles. In its original form it was a long wooden shed fixed on a wheeled framework, the roof being of great strength. From the roof hung a battering-ram, which could thus be swung to and fro against the base of the castle wall without the workers being exposed to the fire from the battlements above. See BELFRY.

Breach of Peace. The reign of law and order is the King's peace. Any act by which that order is disturbed is a breach of the peace. The term is not applied to any specific offence, but indictments always state that the offence charged is against the King's peace. In popular language, the term is generally confined to assaults, affrays, riots, and other acts of violence. A person who sees a breach of the peace being committed is entitled to arrest the offender. See ARREST.

Breach of Promise OF MARRIAGE is ground for an action for damages, either by a man or a woman, in Scotland or England. It is a good defence to prove that the defendant is an infant, or induced the promise by material misrepresentation—*e.g.* by concealing the fact of her inchastity. But a plaintiff need not disclose facts prejudicial to himself or herself—*e.g.* that he or she is a lunatic. Ill-health, or an already existing marriage if the plaintiff is unaware of it, is no defence. A

contract to marry must be carried out within a reasonable time. A plaintiff's evidence of a promise of marriage must be corroborated. See DAMAGES.

Breach of Trust. See TRUST.

Bread. Wheat-flour may be said to consist of starch, gluten (or a material capable of forming gluten), soluble albuminoids, fat, and mineral matter. It is the gluten which makes wheat-flour so suitable for bread-making. When flour is mixed with water it forms dough, and under suitable conditions of temperature this dough undergoes fermentation, carbon dioxide gas being given off. The gas, in trying to escape, causes the dough to expand and assume the appearance of a vesicular or spongy mass. This special kind of fermentation is known as panary fermentation. It is a slow process, and before completion organic acids are liable to be produced, rendering the bread sour. The process can be hastened by mixing the new dough with some sour dough from a previous baking. The modern method differs from the older mainly in the use of yeast (either brewer's or patent), by which the fermentation is started sooner, and the dough is put in the oven before it has time to turn sour. Potatoes are boiled with water, and are mashed in the liquor in which they have been boiled. Raw flour is added to the mass, which is allowed to ferment for about six hours. A portion of flour is next mixed with the fermented potato mixture, and the whole is made into a slack dough with water. It is covered up, and allowed to ferment for about six hours: this forms what is known as the 'sponge.' The remainder of the flour is now mixed with the sponge, and the whole well kneaded, and covered up for one or two hours, when it is again kneaded, divided into portions of the required size, and baked.

The chemistry of the process is not thoroughly understood, but, speaking generally, it may be said that the yeast acts on the soluble albuminoids of the flour, and enables them to change the starch to some extent into sugar. The yeast now grows in the sugar, producing alcohol and carbon dioxide gas. The soluble nitrogenous constituents of the potato act as a yeast food. The yeast seems also to act in some way on the gluten; for in bread prepared as above the gluten is soft and partially soluble, whereas in gluten separated from flour and baked it is hard and insoluble.

Salt is always added to the mixture before fermentation sets in. It produces a flavour in the finished bread, and acts as a retarder of fermentation changes.

During the process of baking the starch cells burst, the albuminoids are coagulated, while the imprisoned gas expands, making

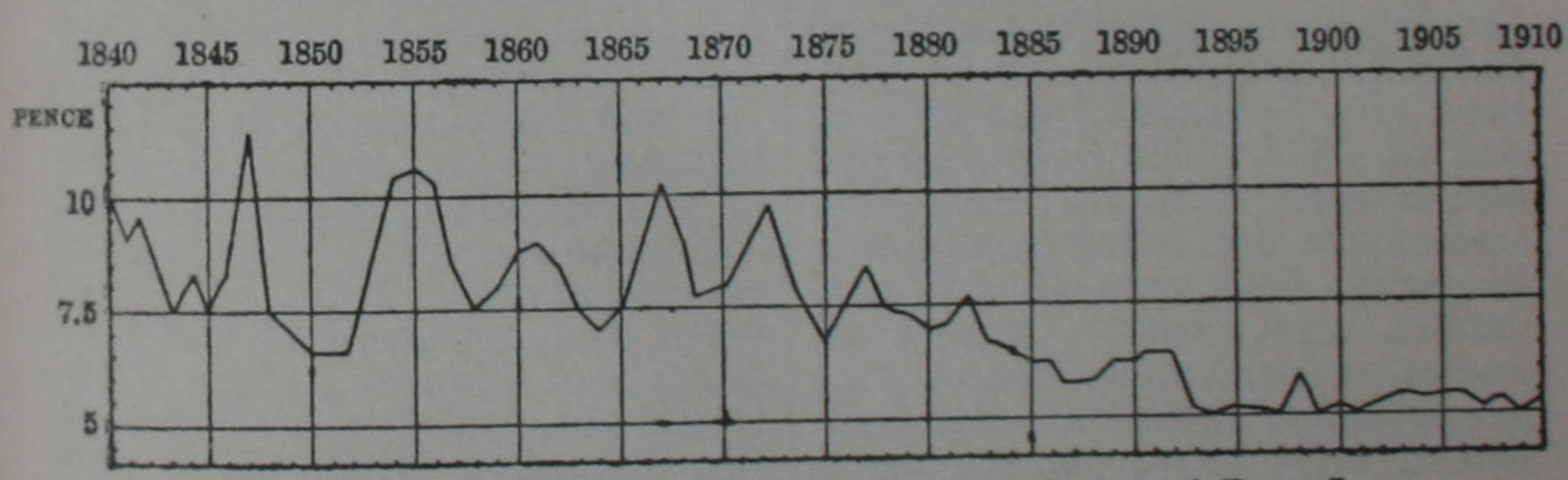


Diagram showing fluctuations in the Price of Bread.

the bread spongy and light. Some of the starch on the outside of the loaf is converted into dextrin. In Dr. Dauglish's method of bread-making (invented in 1859) fermentation does not take place, but the carbon dioxide gas is forced into the flour and water under pressure by suitable machinery, and the dough produced is at once placed in the oven. As can be readily understood, such bread lacks the flavour of the fermented variety, and aerated bread fails to please the palate. Bread made with baking-powder is of a similar nature, the carbon dioxide gas being produced from the constituents of the baking-powder acting chemically one on the other.

The difference between new and stale bread is due, not to loss of water, but to some molecular change in the constituents—most probably a dehydration of the carbohydrates.

The manufacture of bread in London is regulated by the Bread Act, 1822, and elsewhere in England and Scotland by a similar Act of 1836. The Sale of Food and Drugs Act, 1875-99, prescribes the following ingredients of bread: flour or meal of wheat, barley, rye, oats, buckwheat, Indian corn, pease, beans, rice or potatoes, common salt, pure water, eggs, milk, barm, leaven, potato or other yeast. Bread made for sale of other ingredients than those set forth in the act renders the baker liable to a penalty of £10, and publication of the conviction. If made wholly or partially of pease, beans, or potatoes, or any other sort of corn or grain than those specified in the act, it must be marked with a large Roman M; non-compliance entails a penalty. The mark is not required when only potato yeast is used. Standard bread, an attempt to 'standardize' the quality of the ordinary loaf, was put on the market in England on an extensive scale in February 1911.

All bread except French or fancy bread or rolls must be sold by avoirdupois weight, and weighed upon request in the presence of the purchaser. The understood weight of the quartern loaf is 4 lbs. before baking. For bakehouse regulations see FACTORIES AND WORKSHOPS.

Breadalbane, dist., W. Perthshire, Scotland, comprising many lofty peaks of the S. Grampians, the highest being Ben Lawers (3,984 ft.). It is drained by the feeders of Loch Rannoch, Loch Tay, and Loch Lyon, and is rendered accessible by good roads through Glen Dochart, Glen Lyon, and the Rannoch district.

Breadalbane, EARLS AND MARQUISES OF, a noble Scottish family descended from the Glenorchy branch of the Campbells, of whom the most important are JOHN CAMPBELL (1635-1716), who obtained a patent creating him Earl of Breadalbane in 1681. He was largely instrumental in bringing about the submission of the Highland clans, and was responsible—with Sir John Dalrymple and the Duke of Argyll—for the massacre of the Macdonalds of Glencoe (1692).—JOHN CAMPBELL, SECOND MARQUIS OF BREADALBANE (1796-1862), took an active part in the Disruption controversy (1843), and after the formation of the Free Church of Scotland remained one of its most influential supporters. After his death the marquisate became extinct, but was revived in 1885 in favour of GAVIN CAMPBELL (1851), the seventh earl, who succeeded to the earldom in 1871.

Bread-fruit. The bread-fruit tree (*Artocarpus incisa*) is a native of the E. Indies and the islands of the Pacific, where its fruit constitutes an important article of food. The tree grows to a height of about 40 ft., and has bold,

leathery leaves varying from a foot to a yard in length. The male flowers are borne in catkins, the female appear as globular heads. The fruit is of the size and shape of a melon. The young fruit contains a thick, white fluid which is pleasant and nourishing, but it is generally allowed to develop to a more solid condition before being used as food. It is usually cooked in a hole in the ground; it is cut into several pieces, and the core is removed; after which it is placed on heated stones for half an hour in layers, alternately with layers of leaves. It contains about three per cent. of albumin and fourteen per cent. of carbohydrates. In Britain the tree can be grown only in stove heat, considerable moisture being also necessary. A well-drained soil composed of loam, sand, and leaf-mould is desirable. In addition to *A. incisa*, other species of the genus are occasionally grown as stove trees, and being evergreen are valuable plants at all seasons. *A. Cannonii*, which grows to a height of about 8 ft., and has beautiful bronzy-red and crimson leaves about a foot in length, and *A. integrifolia*, the jack-fruit tree, which reaches a height of from 30 to 40 ft., and bears enormous fruits, containing seeds which are sometimes roasted and eaten, are two of the best known. The genus belongs to the order Urticaceæ.

Bread Nut, the fruit of *Brosimum alicastrum*, of the Urticaceæ, common in the W. Indies, etc. The nuts taste like hazel nuts, and, roasted or boiled, are used as bread; the leaves and shoots are eaten by cattle. The wood resembles mahogany.

Bread-root. See YAM and PSORALEA.

Bread-tree. See KAFFIR BREAD.

Breakbone Fever. See DENGUE.

Breakers. See WAVE.

Break Joint, the overlapping of similar pieces of timber, stone, or iron so that two joints should not occur at the same point, which would produce a weak structure. In masonry and bricklaying this is called 'breaking bond.'

Breakspeare, NICHOLAS. See ADRIAN IV., POPE.

Breakwaters. See HARBOURS.

Bream (*Abramis*), fish belonging to the carp family, distinguished by the compressed and elevated body, the short dorsal fin, and the absence of barbels on the mouth. Of the seven European species, two are British, the common bream (*A. brama*) and the white bream (*A. blicca*). The former of these, like some other species, occurs sporadically in salt water; the so-called sea-bream (*A. vimba*) is found in salt, brackish, and fresh water. Bream are often exceedingly abundant in stagnant and slowly-moving waters, and on some parts of the Continent are the object of an important fishery. In Britain they are not highly esteemed as food.

Breast, popularly used for the thorax or chest, but here restricted to its anatomical sense—*i.e.* the milk gland or mamma of mammalia. Breasts exist in the male as well as in the female—in the former only in a rudimentary state, unless their growth has been excited by peculiar circumstances. In the female they are two hemispherical eminences in the pectoral region, corresponding to the intervals between the third and sixth or seventh ribs, and extending from the sternum to the axillæ. They are of small size before puberty, enlarge during pregnancy, and become atrophied in old age. The outer surface is convex, and has a small conical prominence, the nipple. The mamma consists of glandular lobes, of fibrous tissue connecting the lobes, and of fatty tissue in

the intervals between them. The lobes are connected by areolar tissue with blood-vessels and ducts. The ducts unite to form larger ones, which terminate in excretory ducts opening into the nipple. During pregnancy the alveoli or spaces in the glands enlarge, and the cells undergo rapid multiplication. The cells in the centre of the spaces at the commencement of lactation undergo fatty degeneration, and are eliminated as colostrum corpuscles. The peripheral cells of the spaces remain, and form in their interior oil globules, which are ejected into the lumen of the alveolus, and constitute the milk globules.

Diseases of the Breast.—Inflammation, or mastitis, is frequent during lactation, morbid or defective states of the nipple being the most common causes. It often passes on to suppuration or abscess. When actual congestion of the gland tissue exists, it should be reduced by mechanical means or bandaging. When inflammation is present, the local application of warmth, the application of belladonna, and a suitable support for the breast are required. Sometimes the milk accumulates, forming a cyst or galactocele, which varies in size from time to time. The treatment consists in opening, removing the contents, and drainage. At other times a portion of the breast becomes the seat of chronic lobular mastitis, which can be reduced by local soothing applications and attention to the general health. Bier's congestion treatment is often of great value. The breasts are the seat of tumours—some non-malignant, as cysts, adenoma, and fatty tumour; others malignant, as sarcoma or cancer. Cancer of the breast occurs in two chief forms—scirrhous or hard, and encephaloid or soft. In both of these lymphatic glands are included, and the only hope of cure is early removal. Diseases of the nipple may be due to (1) defective formation, remedied by the use of an exhausting glass; (2) fissures, or cracked nipple, which may lead to abscess. Fissure is formed during suckling, is very painful, and should be guarded against by the use of astringent or spirit lotions during the later months of pregnancy; and while nursing, by perfect cleanliness, and by drying the nipples after suckling. Once fissured, the nipple should be protected by a shield, and dusted often with a drying antiseptic powder, such as oxide of zinc.

Breastplate. (1.) The Jewish high priest's breastplate was made of embroidered linen, wherein were inserted four rows of jewels, twelve in all, engraved with the names of the tribes of Israel. (See Ex. 28:15*ff.*) (2.) A cuirass, formed at first of linen or of leather, afterwards of metal, bronze, or brass plates, generally without collars, worn by Egyptian, Greek, Roman, and Hebrew soldiers. See J. G. Wilkinson's *Antiquities*, i. (1878).

Breath. See RESPIRATION.

Breathing Exercises. See RESPIRATION.

Breccia, a rock consisting of angular fragments of any kind, united by a matrix. The shape of the components indicates that they have been produced by fracture, and have not been subjected to rounding by attrition. 'Fault breccia' is often found between the two walls of a geological fault, and is due to the breaking down of the rocky walls when grinding on one another. Mineral veins are often formed in fissures, and are brecciated later by movement of the walls. Another kind of breccia is produced when hot molten lava enters a lake or a stream: it is suddenly cooled and solidified, being at the same time shattered by the clouds of steam