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THE ENCYCLOPÆDIA BRITANNICA

A DICTIONARY OF ARTS, SCIENCES, LITERATURE AND GENERAL INFORMATION

ELEVENTH EDITION

VOLUME IV SLICE I

Bisharin to Bohea

Articles in This Slice

BISHÂRÎN (the anc. *Ichthyophagi*), a nomad tribe of African “Arabs,” of Hamitic origin, dwelling in the eastern part of the Nubian desert. In the middle ages they were known as Beja (*q.v.*), and they are the most characteristic of the Nubian “Arabs.” With the Abâbda and Hadendoa they represent the Blemmyes of classical writers. Linguistically and geographically the Bishârîn form a connecting link between the Hamitic populations and the Egyptians. Nominally they are Mahommedans. They, however, preserve some non-Islamic religious practices, and exhibit traces of animal-worship in their rule of never killing the serpent or the partridge, which are regarded as sacred.

BISHOP, SIR HENRY ROWLEY (1786-1855), English musical composer, was born in London on the 18th of November 1786. He received his artistic training from Francisco Bianchi, and in 1804 wrote the music to a piece called *Angelina*, which was performed at Margate. His next composition was the music to the ballet of *Tamerlan et Bajazet*, produced in 1806 at the King's theatre. This proved successful, and was followed within two years by several others, of which *Caractacus*, a pantomimic ballet, written for Drury Lane, may be named. In 1809 his first opera, *The Circassian's Bride*, was produced at Drury Lane; but unfortunately the theatre was burned down after one performance, and the score of the work perished in the flames. His next work of importance, the opera of *The Maniac*, written for the Lyceum in 1810, established his reputation, and probably secured for him an appointment for three years as composer for Covent Garden theatre. The numerous works—operas, burlettas, cantatas, incidental music to Shakespeare's plays, &c.—which he composed while in this position, are in great part forgotten. The most successful were—*The Virgin of the Sun* (1812), *The Miller and his Men* (1813), *Guy Mannering* and *The Slave* (1816), *Maid Marian* and *Clari*, introducing the well-known air of "Home, Sweet Home" (1822). In 1825 Bishop was induced by Elliston to transfer his services from Covent Garden to the rival house in Drury Lane, for which he wrote with unusual care the opera of *Aladdin*, intended to compete with Weber's *Oberon*, commissioned by the other house. The result was a failure, and with *Aladdin* Bishop's career as an operatic composer may be said to close. On the formation of the Philharmonic Society (1813) Bishop was appointed one of the directors, and he took his turn as conductor of its concerts during the period when that office was held by different musicians in rotation. In 1830 he was appointed musical director at Vauxhall; and it was in the course of this engagement that he wrote the popular song "My Pretty Jane." His sacred cantata, *The Seventh Day*, was written for the Philharmonic Society and performed in 1833. In 1839 he was made bachelor in music at Oxford. In 1841 he was appointed to the Reid chair of music in the university of Edinburgh, but he resigned the office in 1843. He was knighted in 1842, being the first musician who ever received that honour. In 1848 he succeeded Dr Crotch in the chair of music at Oxford. The music for the ode on the occasion of the installation of Lord Derby as chancellor of the university (1853) proved to be his last work. He died on the 30th of April 1855 in impoverished circumstances, though few composers ever made more by their labours. Bishop was twice married: to Miss Lyon and Miss Anne Rivière. Both he and his wives were singers. His name lives in connexion with his numerous glees, songs and smaller compositions. His melodies are clear, flowing, appropriate and often charming; and his harmony is always pure, simple and sweet.

BISHOP, ISABELLA (1832-1904), English traveller and author, daughter of the Rev. Edward Bird, rector of Tattenhall, Cheshire, was born in Yorkshire on the 15th of October 1832. Isabella Bird began to travel when she was twenty-two. Her first book, *The Englishwoman in America* (1856), consisted of her correspondence during a visit to Canada undertaken for her health. She visited the Rocky Mountains, the South Pacific, Australia and New Zealand, producing some brightly written books of travel. But her reputation was made by the records of her extensive travels in Asia: *Unbeaten Tracks in Japan* (2 vols., 1880), *Journeys in Persia and Kurdistan* (2 vols., 1891), *Among the Tibetans* (1894), *Korea and her Neighbours* (2 vols., 1898), *The Yangtze Valley and Beyond* (1899), *Chinese Pictures* (1900). She married in 1881 Dr John Bishop, an Edinburgh physician, and was left a widow in 1886. In 1892 she became the first lady fellow of the Royal Geographical Society, and in 1901 she rode a thousand miles in Morocco and the Atlas Mountains. She died in Edinburgh on the 7th of October 1904.

See Anna M. Stoddart, *The Life of Isabella Bird* (1906).

BISHOP (A.S. *bisceop*, from Lat. *episcopus*, Gr. ἐπίσκοπος, "overlooker" or "overseer"), in certain branches of the Christian Church, an ecclesiastic consecrated or set apart to perform certain spiritual functions, and to exercise oversight over the lower clergy (priests or presbyters, deacons, &c.). In the Catholic Church bishops take rank at the head of the

sacerdotal hierarchy, and have certain spiritual powers peculiar to their office, but opinion has long been divided as to whether they constitute a separate order or form merely a higher degree of the order of priests (*ordo sacerdotium*).

In the Roman Catholic Church the bishop belongs to the highest order of the hierarchy, and in this respect is the peer even of the pope, who addresses him as “venerable brother.”

Roman Catholic.

By the decree of the council of Trent he must be thirty years of age, of legitimate birth, and of approved learning and virtue. The method of his selection varies in different countries. In France, under the Concordat, the sovereign—and under the republic the president—had the right of nomination. The same is true of Austria (except four sees), Bavaria, Spain and Portugal. In some countries the bishop is elected by the cathedral chapter (as in Württemberg), or by the bishops of the provinces (as in Ireland). In others, as in Great Britain, the United States of America and Belgium, the pope selects one out of a list submitted by the chapter. In all cases the nomination or election is subject to confirmation by the Holy See. Before this is granted the candidate is submitted to a double examination as to his fitness, first by a papal delegate at his place of residence (*processus informativus in partibus electi*), and afterwards by the Roman Congregation of Cardinals assigned for this purpose (*processus electionis definitivus in curia*). In the event of both processes proving satisfactory, the bishop-elect is confirmed, preconized, and so far promoted that he is allowed to exercise the rights of jurisdiction in his see. He cannot, however, exercise the functions proper to the episcopal *order* (*potestas ordinis*) until his consecration, which ordinarily takes place within three months of his confirmation. The bishop is consecrated, after taking the oath of fidelity to the Holy See, and subscribing the profession of faith, by a bishop appointed by the pope for the purpose, assisted by at least two other bishops or prelates, the main features of the act being the laying on of hands, the anointing with oil, and the delivery of the pastoral staff and other symbols of the office. After consecration the new bishop is solemnly enthroned and blesses the assembled congregation.

The *potestas ordinis* of the bishop is not peculiar to the Roman Church, and, in general, is claimed by all bishops, whether Oriental or Anglican, belonging to churches which have retained the Catholic tradition in this respect. Besides the full functions of the presbyterate, or priesthood, bishops have the sole right (1) to confer holy orders, (2) to administer confirmation, (3) to prepare the holy oil, or chrism, (4) to consecrate sacred places or utensils (churches, churchyards, altars, &c.), (5) to give the benediction to abbots and abbesses, (6) to anoint kings. In the matter of their rights of jurisdiction, however, Roman Catholic bishops differ from others in their peculiar responsibility to the Holy See. Some of their powers of legislation and administration they possess *motu proprio* in virtue of their position as diocesan bishops, others they enjoy under special faculties granted by the Holy See; but all bishops are bound, by an oath taken at the time of their consecration, to go to Rome at fixed intervals (*visitare sacra limina apostolorum*) to report in person, and in writing, on the state of their dioceses.

The Roman bishop ranks immediately after the cardinals; he is styled *reverendissimus*, *sanctissimus* or *beatissimus*. In English the style is “Right Reverend”; the bishop being addressed as “my lord bishop.”

The insignia (*pontificalia* or pontificals) of the Roman Catholic bishop are (1) a ring with a jewel, symbolizing fidelity to the church, (2) the pastoral staff, (3) the pectoral cross, (4) the vestments, consisting of the caligae, stockings and sandals, the tunicle, and purple gloves, (5) the mitre, symbol of the royal priesthood, (6) the throne (cathedra), surmounted by a baldachin or canopy, on the gospel side of the choir in the cathedral church.

The spiritual function and character of the Anglican bishops, allowing for the doctrinal changes effected at the Reformation, are similar to those of the Roman. They alone can administer the rite of confirmation, ordain priests and deacons, and exercise a certain dispensing power. In the established Church of England the appointment of bishops is vested effectively in the crown, though the old form of election by the cathedral chapter is retained. They must be learned presbyters at least thirty years of age, born in lawful wedlock, and of good life and behaviour. The mode of appointment is regulated by 25 Henry VIII. c. 20, re-enacted in 1 Elizabeth c. 1 (Act of Supremacy 1558). On a vacancy occurring, the dean and chapter notify the king thereof in chancery, and pray leave to make election. A licence under the Great Seal to proceed to the election of a bishop, known as the *congé d’eslire*, together with a letter missive containing the name of the king’s nominee, is thereupon sent to the dean and chapter, who are bound under the penalties of *Praemunire* to proceed within twelve days to the election of the person named in it. In the event of their refusing obedience or neglecting to elect, the

Anglican.

bishop may be appointed by letters patent under the Great Seal without the form of election. Upon the election being reported to the crown, a mandate issues from the crown to the archbishop and metropolitan, requesting him and commanding him to confirm the election, and to invest and consecrate the bishop-elect. Thereupon the archbishop issues a commission to his vicar-general to examine formally the process of the election of the bishop, and to supply by his authority all defects in matters of form, and to administer to the bishop-elect the oaths of allegiance, of supremacy and of canonical obedience (see Confirmation of Bishops). In the disestablished and daughter Churches the election is by the synod of the Church, as in Ireland, or by a diocesan convention, as in the United States of America.

In the Church of England the *potestas ordinis* is conferred by consecration. This is usually carried out by an archbishop, who is assisted by two or more bishops. The essential "form" of the consecration is in the simultaneous "laying on of hands" by the consecrating prelates. After this the new bishop, who has so far been vested only in a rochet, retires and puts on the rest of the episcopal habit, viz. the chimere. After consecration the bishop is competent to exercise all the spiritual functions of his office; but a bishopric in the Established Church, being a barony, is under the guardianship of the crown during a vacancy, and has to be conferred afresh on each new holder. A bishop, then, cannot enter into the enjoyment of the temporalities of his see, including his rights of presentation to benefices, before doing homage to the king. This is done in the ancient feudal form, surviving elsewhere only in the conferring of the M.A. degree at Cambridge. The bishop kneels before the king, places his hands between his, and recites an oath of temporal allegiance; he then kisses hands.

Besides the functions exercised in virtue of their order, bishops are also empowered by law to exercise a certain jurisdiction over all consecrated places and over all ordained persons. This jurisdiction they exercise for the most part through their consistorial courts, or through commissioners appointed under the Church Discipline Act of 1840. By the Clergy Discipline Act of 1892 it was decreed that the trial of clerks accused of unfitness to exercise the cure of souls should be before the consistory court with five assessors. Under the Public Worship Regulation Act of 1874, which gave to churchwardens and aggrieved parishioners the right to institute proceedings against the clergy for breaches of the law in the conduct of divine service, a discretionary right was reserved to the bishop to stay proceedings.

The bishops also exercise a certain jurisdiction over marriages, inasmuch as they have by the canons of the Church of England a power of dispensing with the proclamation of banns before marriage. These dispensations are termed marriage licences, and their legal validity is recognised by the Marriage Act of 1823. The bishops had formerly jurisdiction over all questions touching the validity of marriages and the status of married persons, but this jurisdiction has been transferred from the consistorial courts of the bishops to a court of the crown by the Matrimonial Causes Act of 1857. They have in a similar manner been relieved of their jurisdiction in testamentary matters, and in matters of defamation and of brawling in churches; and the only jurisdiction which they continue to exercise over the general laity is with regard to their use of the churches and churchyards. The churchwardens, who are representative officers of the parishes, are also executive officers of the bishops in all matters touching the decency and order of the churches and of the churchyards, and they are responsible to the bishops for the due discharge of their duties; but the abolition of church rates has relieved the churchwardens of the most onerous part of their duties, which was connected with the stewardship of the church funds of their parishes.

The bishops are still authorized by law to dedicate and set apart buildings for the solemnization of divine service, and grounds for the performance of burials, according to the rites and ceremonies of the Church of England; and such buildings and grounds, after they have been duly consecrated according to law, cannot be diverted to any secular purpose except under the authority of an act of parliament.

The bishops of England have also jurisdiction to examine clerks who may be presented to benefices within their respective dioceses, and they are bound in each case by the 95th canon of 1604 to inquire and inform themselves of the sufficiency of each clerk within twenty-eight days, after which time, if they have not rejected him as insufficiently qualified, they are bound to institute him, or to license him, as the case may be, to the benefice, and thereupon to send their mandate to the archdeacon to induct him into the temporalities of the benefice. Where the bishop himself is patron of a benefice within his own diocese he is empowered to collate a clerk to it,—in other words, to confer it on the clerk without the latter being presented to him. Where the clerk himself is patron of the living, the bishop may institute him on his own petition. (See Benefice.)

As spiritual peers, bishops of the Church of England have (subject to the limitations stated below) seats in the House of Lords, though whether as barons or in their spiritual character has been a matter of dispute. The latter, however, would seem to be the case, since a bishop was entitled to his writ of summons after confirmation and before doing homage for his barony. Doubts having been raised whether a bishop of the Church of England, being a lord of parliament, could resign his seat in the Upper House, although several precedents to that effect are on record, a statute of the realm, which was confined to the case of the bishops of London and Durham, was passed in 1856, declaring that on the resignation of their sees being accepted by their respective metropolitans, those bishops should cease to sit as lords of parliament, and their sees should be filled up in the manner provided by law in the case of the avoidance of a bishopric. In 1869 the Bishops' Resignation Act was passed. It provided that, on any bishop desiring to retire on account of age or incapacity, the sovereign should be empowered to declare the see void by an order in council, the retiring bishop of archbishop to be secured the use of the episcopal residence for life and a pension of one-third of the revenues of the see, or £2000, whichever sum should prove the larger. Other sections defined the proceedings for proving, in case of need, the incapacity of a bishop, provided for the appointment of coadjutors and defined their status (Phillimore i. 82).

In view of the necessity for increasing the episcopate in the 19th century and the objection to the consequent increase of the spiritual peers in the Upper House, it was finally enacted by the Bishoprics Act of 1878 that only the archbishops and the bishops of London, Winchester and Durham should be always entitled to writs summoning them to the House of Lords. The rest of the twenty-five seats are filled up, as a vacancy occurs, according to seniority of consecration.

Bishops of the Church of England rank in order of precedency immediately above barons. They may marry, but their wives as such enjoy no title or precedence. Bishops are addressed as "Right Reverend" and have legally the style of "Lord," which, as in the case of Roman Catholic bishops in England, is extended to all, whether suffragans or holders of colonial bishoprics, by courtesy.

The insignia of the Anglican bishop are the rochet and the chimere, and the episcopal throne on the gospel side of the chancel of the cathedral church. The use of the mitre, pastoral staff and pectoral cross, which had fallen into complete disuse by the end of the 18th century, has been now very commonly, though not universally, revived; and, in some cases, the interpretation put upon the "Ornaments rubric" by the modern High Church school has led to a more complete revival of the pre-Reformation vestments.

Orthodox Eastern.

In the Orthodox Church of the East and the various communions springing from it, the *potestas ordinis* of the bishop is the same as in the Western Church. Among his qualifications the most peculiar is that he must be unmarried, which, since the secular priests are compelled to marry, entails his belonging to the "black clergy" or monks. The insignia of an oriental bishop, with considerable variation in form, are essentially the same as those of the Catholic West.

Subordinate bishops.

Besides bishops presiding over definite sees, there have been from time immemorial in the Christian Church bishops holding their jurisdiction in subordination to the bishop of the diocese. (1) The oldest of these were the *chorepiscopi* (τῆς χώρας ἐπίσκοποι), *i.e.* country bishops, who were delegated by the bishops of the cities in the early church to exercise jurisdiction in the remote towns and villages as these were converted from paganism. Their functions varied in different times and places, and by some it has been held that they were originally only presbyters. In any case, this class of bishops, which had been greatly curtailed in the East in A.D. 343 by the council of Laodicea, was practically extinct everywhere by the 10th century. It survived longest in Ireland, where in 1152 a synod, presided over by the papal legate, decreed that, after the death of the existing holders of the office, no more should be consecrated. Their place was taken by arch-presbyters and rural deans. (2) The *Episcopi regionarii*, or *gentium*, were simply missionary bishops without definite sees. Such were, at the outset, Boniface, the apostle of Germany, and Willibrord, the apostle of the Frisians. (3) Bishops *in partibus infidelium* were originally those who had been expelled from their sees by the pagans, and, while retaining their titles, were appointed to assist diocesan bishops in their work. In later times the custom arose of consecrating bishops for this purpose, or merely as an honorary distinction, with a title derived from some place once included within, but now beyond the bounds of Christendom. (4) *Coadjutor bishops* are such as are appointed to assist the bishop of the diocese when incapacitated by infirmity or by other causes from fulfilling his functions alone. Coadjutors in the early church were appointed with a view to their succeeding to the see; but this, though common in practice, is no longer the rule. In

the Church of England the appointment and rights of coadjutor bishops were regulated by the Bishops' Resignation Act of 1869. Under this act the coadjutor bishop has the right of succession to the see, or in the case of the archiepiscopal sees and those of London, Winchester and Durham, to the see vacated by the bishop, translated from another diocese to fill the vacancy. (5) *Suffragan bishops (episcopi sufraganei* or *auxiliares*) are those appointed to assist diocesan bishops in their pontifical functions when hindered by infirmity, public affairs or other causes. In the Roman Church the appointment of the suffragan rests with the pope, on the petition of the bishop, who must prove that such is the custom of the see, name a suitable priest and guarantee his maintenance. The suffragan is given a title *in partibus*, but never that of archbishop, and the same title is never given to two suffragans in succession. In the Church of England the status of suffragan bishops was regulated by the Act 26 Henry VIII. c. 14. Under this statute, which, after long remaining inoperative, was amended and again put into force by the Suffragans' Nomination Act of 1888, every archbishop and bishop, being disposed to have a suffragan to assist him, may name two honest and discreet spiritual persons for the crown to give to one of them the title, name, style and dignity of a bishop of any one of twenty-six sees enumerated in the statute, as the crown may think convenient. The crown, having made choice of one of such persons, is empowered to present him by letters patent under the great seal to the metropolitan, requiring him to consecrate him to the same name, title, style and dignity of a bishop; and the person so consecrated is thereupon entitled to exercise, under a commission from the bishop who has nominated him, such authority and jurisdiction, within the diocese of such bishop, as shall be given to him by the commission, and no other.

Lutheran churches.

The title of bishop survived the Reformation in certain of the Lutheran churches of the continent, in Denmark, Norway, Finland, Sweden and Transylvania; it was temporarily restored in Prussia in 1701, for the coronation of King Frederick I., again between 1816 and 1840 by Frederick William III., and in Nassau in 1818. In these latter cases, however, the title bishop is equivalent to that of "superintendent," the form most generally employed. The Lutheran bishops, as a rule, do not possess or claim unbroken "apostolic succession"; those of Finland and Sweden are, however, an exception. The Lutheran bishops of Transylvania sit, with the Roman and Orthodox bishops, in the Hungarian Upper House. In some cases the secularization of episcopal principalities at the Reformation led to the survival of the title of bishop as a purely secular distinction. Thus the see of Osnabrück (Osnaburgh) was occupied, from the peace of Westphalia to 1802, alternately by a Catholic and a Protestant prince. From 1762 to 1802 it was held by Frederick, duke of York, the last prince-bishop. Similarly, the bishopric of Schwerin survived as a Protestant prince-bishopric until 1648, when it was finally secularized and annexed to Mecklenburg, and the see of Lübeck was held by Protestant "bishops" from 1530 till its annexation to Oldenburg in 1803.[1]

In other Protestant communities, *e.g.* the Moravians, the Methodist Episcopal Church and the Mormons, the office and title of bishop have survived, or been created. Their functions and status will be found described in the accounts of the several churches.

See Wetzer and Welte, *Kirchenlexikon*, s. "Bischof" and "Weihen"; Hinschius, *Kirchenrecht*, vol. ii.; Herzog-Hauck, *Realencyklopadie*, s. "Bischof" (the author rather arbitrarily classes Anglican with Lutheran bishops as not bishops in any proper sense at all); Phillimore's *Ecclesiastical Law*; the articles ORDER, HOLY; VESTMENTS; ECCLESIASTICAL JURISDICTION; EPISCOPACY.

(W. A. P.)

1 The title prince-bishop, attached in Austria to the sees of Laibach, Seckau, Gurk, Brixen, Trent and Lavant, and in Prussia to that of Breslau, no longer implies any secular jurisdiction, but is merely a title of honour recognized by the state, owing either to the importance of the sees or for reasons purely historical.

BISHOP AUCKLAND, a market town in the Bishop Auckland parliamentary division of Durham, England, 11 m. S.S.W. of the city of Durham, the junction of several branches of the North Eastern railway. Pop. of urban district (1901) 11,969. It is beautifully situated on an eminence near the confluence of the Wear and the Gaunless. The parish church is 1 m. distant, at Auckland St Andrews, a fine cruciform structure, formerly collegiate, in style

mainly Early English, but with earlier portions. The palace of the bishops of Durham, which stands at the north-east end of the town, is a spacious and splendid, though irregular pile The site of the palace was first chosen by Bishop Anthony Beck, in the time of Edward I. The present building covers about 5 acres, and is surrounded by a park of 800 acres. On the Wear 1½ m. above Bishop Auckland there is a small and very ancient church at Escomb, massively built and tapering from the bottom upward. It is believed to date from the 7th century, and some of the stones are evidently from a Roman building, one bearing an inscription. These, no doubt, came from Binchester, a short distance up stream, where remains of a Roman fort (*Vinovia*) are traceable. It guarded the great Roman north road from York to Hadrian's wall. The industrial population of Bishop Auckland is principally employed in the neighbouring collieries and iron works.

BISHOP'S CASTLE, a market town and municipal borough in the southern parliamentary division of Shropshire, England; the terminus of the Bishop's Castle light railway from Craven Arms. Pop. (1901) 1378. It is pleasantly situated in a hilly district to the east of Clun Forest, climbing the flank and occupying the summit of an eminence. Of the castle of the bishops of Hereford, which gave the town its name, there are only the slightest fragments remaining. The town has some agricultural trade. It is governed by a mayor, 4 aldermen and 12 councillors. Area, 1867 acres.

Bishop's Castle was included in the manor of Lydbury, which belonged to the church of Hereford before the Conquest. The castle, at first called Lydbury Castle, was built by one of the bishops of Hereford between 1085 and 1154, to protect his manor from the Welsh, and the town which sprang up round the castle walls acquired the name of Bishop's Castle in the 13th century. In 1292 the bishop claimed to have a market every Friday, a fair on the eve, day and morrow of the Decollation of St John, and assize of bread and ale in Bishop's Castle, which his predecessors had held from time immemorial. Ten years later he received a grant from Richard II. of a market every Wednesday and a fair on the 2nd of November and two days following. Although the town was evidently a borough by the 13th century, since the burgesses are mentioned as early as 1292, it has no charter earlier than the incorporation charter granted by Queen Elizabeth in 1572. This was confirmed by James I. in 1617 and by James II. in 1688. In 1584 Bishop's Castle returned two members to parliament, and was represented until 1832, when it was disfranchised.

BISHOP STORTFORD, a market town in the Hertford parliamentary division of Hertfordshire, England; 30½ m. N.N.E. from London by the Cambridge line of the Great Eastern railway. Pop. of urban district (1901) 7143. It lies on the river Stort, close to the county boundary with Essex, and has water-communication with London through the Lea and Stort Navigation. The church of St Michael, standing high above the valley, is a fine embattled Perpendicular building with western tower and spire. The high school, formerly the grammar school, was founded in the time of Elizabeth. Here were educated Sir Henry Chauncy, an early historian of Hertfordshire (d. 1719), and Cecil Rhodes, who was born at Bishop Stortford in 1853. There are a Nonconformist grammar school, a diocesan training college for mistresses, and other educational establishments. The industries include brewing and malting, coach-building, lime-burning and founding, and there are important horse and cattle markets.

Before the Conquest the manor of Bishop Stortford is said to have belonged to Eddeva the Fair, wife of Harold, who sold it to the bishop of London, from whom it was taken by William the Conqueror. William restored it after a few years, and with it gave the bishop a small castle called Waytemore, of which there are scanty remains. The dungeon of this castle, called "Bishop's Hole" or "Bishop's Prison," was used as an ecclesiastical prison until the 16th century. The town now possesses no early incorporation charters, and although both Chauncy and Salmon in their histories of Hertfordshire state that it was created a borough by charter of King John in 1206, the charter cannot now be found. The first mention of Bishop Stortford as a borough occurs in 1311, in which year the burgesses returned two

members to parliament. The town was represented from that date until 1332, and again in 1335-1336, but the privilege was then allowed to lapse and has never been revived.

BISKRA, a town of Algeria, in the arrondissement of Batna, department of Constantine, 150 m. S.W. of the city of Constantine and connected with it and with Philippeville by rail. It lies in the Sahara 360 ft. above the sea, on the right bank of the Wad Biskra, a river which, often nearly dry for many months in the year, becomes a mighty torrent after one or two days' rain in winter. The name Biskra applies to a union of five or six villages of the usual Saharan type, scattered through an oasis 3 m. in length by less than 1 m. broad, and separated by huge gardens full of palm and olive trees. The houses are built of hardened mud, with doors and roof of palm wood. The foreign settlement is on the north of the oasis; it consists of a broad main street, the rue Berthe (from which a few side streets branch at right angles), lined with European houses, the whole in the style of a typical French winter resort, a beautiful public garden, with the church in the centre, an arcade, a pretentious *mairie* in pseudo-Moorish style with entrance guarded by terra-cotta lions, some good shops, a number of excellent hotels and cafes, a casino, clubs, and, near by, a street of dancing and singing girls of the tribe of Walad-Nail. East of the public garden is Fort St Germain, named after an officer killed in the insurrection of the Zaatcha in 1849; it is capable of resisting any attack of the Arabs, and extensive enough to shelter the whole of the civil population, who took refuge therein during the rebellion of 1871. It contains barracks, hospital and government offices. To the south-east lies the Villa Landon with magnificent gardens filled with tropical plants. The population (1906) of the chief settlement was 4218, of the whole oasis 10,413.

From November to April the climate of Biskra is delightful. Nowhere in Algeria can be found more genial temperature or clearer skies, and while in summer the thermometer often registers 110° F. in the shade, and 90° at night, the pure dryness of the air in this practically rainless region makes the heat endurable. The only drawback to the climat is the prevalence of high cold winds in winter. These winds cause temperatures as low as 36°, but the mean reading, on an average of ten years, is 73°.

In the oasis are some 200,000 fruit trees, of which about 150,000 are date-palms, the rest being olives, pomegranates and apricots. In the centre of the oasis is the old kasbah or citadel.

In 1844 the duc d'Aumale occupied this fort, and here, on the night of the 12th of May of that year, the 68 men who formed the French garrison were, with one exception, massacred by Arabs. In the fort are a few fragments of Roman work—all that remains of the Roman post Ad Piscinam.

Biskra is the capital of the Ziban (plural of Zab), a race of mixed Berber and Arab origin, whose villages extend from the southern slopes of the Aures to the Shat Melrir. These villages, built in oases dotted over the desert, nestle in groves of date-palms and fruit trees and waving fields of barley. The most interesting village is that of Sidi Okba, 12 m. south-east of Biskra. It is built of houses of one story made of sun-dried bricks. The mosque is square, with a flat roof supported on clay columns, and crowned by a minaret. In the north-west corner of the mosque is the tomb of Sidi Okba, the leader of the Arabs who in the 1st century of the Hegira conquered Africa for Islam from Egypt to Tangier. Sidi Okba was killed by the Berbers near this place in A.D. 682. On his tomb is the inscription in Cufic characters, "This is the tomb of Okba, son of Nafi. May God have mercy upon him." No older Arabic inscription is known to exist in Africa.

BISLEY, a village of Surrey, England, 3½ m. N.W. of Woking. The ranges of the National Rifle Association were transferred from Wimbledon here in 1890. (See RIFLE.)

BISMARCK, OTTO EDUARD LEOPOLD VON, PRINCE, duke of Lauenburg (1815-1898), German statesman, was born on the 1st of April 1815, at the manor-house of Schönhausen, his father's seat in the mark of Brandenburg. The family has, since the 14th century, belonged to the landed gentry, and many members had held high office in the kingdom of Prussia. His father (d. 1845), of whom he always spoke with much affection, was a quiet, unassuming man, who retired from the army in early life with the rank of captain of cavalry (*Rittmeister*). His mother, a daughter of Mencken, cabinet secretary to the king, was a woman of strong character and ability, who had been brought up at Berlin under the "Aufklärung." Her ambition was centred in her sons, but Bismarck in his recollections of his childhood missed the influences of maternal tenderness. There were several children of the marriage, which took place in 1806, but all died in childhood except Bernhard (1810-1893), Otto, and one sister, Malvina (b. 1827), who married in 1845 Oscar von Arnim. Young Bismarck was educated in Berlin, first at a private school, then at the gymnasium of the Graue Kloster (Grey Friars). At the age of seventeen he went to the university of Göttingen, where he spent a little over a year; he joined the corps of the Hannoverana and took a leading part in the social life of the students. He completed his studies at Berlin, and in 1835 passed the examinations which admitted him to the public service. He was intended for the diplomatic service, but spent some months at Aix-la-Chapelle in administrative work, and then was transferred to Potsdam and the judicial side. He soon retired from the public service; he conceived a great distaste for it, and had shown himself defective in discipline and regularity. In 1839, after his mother's death, he undertook, with his brother, the management of the family estates in Pomerania; at this time most of the estate attached to Schönhausen had to be sold. In 1844, after the marriage of his sister, he went to live with his father at Schönhausen. He and his brother took an active part in local affairs, and in 1846 he was appointed *Deichhauptmann*, an office in which he was responsible for the care of the dykes by which the country, in the neighbourhood of the Elbe, was preserved from inundation. During these years he travelled in England, France and Switzerland. The influence of his mother, and his own wide reading and critical character, made him at one time inclined to hold liberal opinions on government and religion, but he was strongly affected by the religious revival of the early years of the reign of Frederick William IV.; his opinions underwent a great change, and under the influence of the neighbouring country gentlemen he acquired those strong principles in favour of monarchical government as the expression of the Christian state, of which he was to become the most celebrated exponent. His religious convictions were strengthened by his marriage to Johanna von Puttkamer, which took place in 1847.

Parliamentary career.

In the same year he entered public life, being chosen as substitute for the representative of the lower nobility of his district in the estates-general, which were in that year summoned to Berlin. He took his seat with extreme right, and distinguished himself by the vigour and originality with which he defended the rights of the king and the Christian monarchy against the Liberals. When the revolution broke out in the following year he offered to bring the peasants of Schönhausen to Berlin in order to defend the king against the revolutionary party, and in the last meeting of the estates voted in a minority of two against the address thanking the king for granting a constitution. He did not sit in any of the assemblies summoned during the revolutionary year, but took a very active part in the formation of a union of the Conservative party, and was one of the founders of the *Kreuzzeitung*, which has since then been the organ of the Monarchical party in Prussia. In the new parliament which was elected at the beginning of 1849, he sat for Brandenburg, and was one of the most frequent and most incisive speakers of what was called the Junker party. He took a prominent part in the discussions on the new Prussian constitution, always defending the power of the king. His speeches of this period show great debating skill, combined with strong originality and imagination. His constant theme was, that the party disputes were a struggle for power between the forces of revolution, which derived their strength from the fighters on the barricades, and the Christian monarchy, and that between these opposed principles no compromise was possible. He took also a considerable part in the debates on the foreign policy of the Prussian government; he defended the government for not accepting the Frankfort constitution, and opposed the policy of Radowitz, on the ground that the Prussian king would be subjected to the control of a non-Prussian parliament. The only thing, he said, that had come out of the revolutionary year unharmed, and had saved Prussia from dissolution and Germany from anarchy, was the Prussian army and the Prussian civil service; and in the debates on foreign policy he opposed the numerous plans for bringing about the union of Germany, by subjecting the crown and Prussia to a common German parliament. He had a seat in the parliament of Erfurt, but only went there in order to oppose the constitution which the parliament had framed. He foresaw that the policy of the government would lead

it into a position when it would have to fight against Austria on behalf of a constitution by which Prussia itself would be dissolved, and he was, therefore, one of the few prominent politicians who defended the complete change of front which followed the surrender of Olmütz.

Diplomatic career.

It was probably his speeches on German policy which induced the king to appoint him Prussian representative at the restored diet of Frankfort in 1851. The appointment was a bold one, as he was entirely without diplomatic experience, but he justified the confidence placed in him. During the eight years he spent at Frankfort he acquired an unrivalled knowledge of German politics. He was often used for important missions, as in 1852, when he was sent to Vienna. He was entrusted with the negotiations by which the duke of Augustenburg was persuaded to assent to the arrangements by which he resigned his claims to Schleswig and Holstein. The period he spent at Frankfort, however, was of most importance because of the change it brought about in his own political opinions. When he went to Frankfort he was still under the influence of the extreme Prussian Conservatives, men like the Gerlachs, who regarded the maintenance of the principle of the Christian monarchy against the revolution as the chief duty of the Prussian government. He was prepared on this ground for a close alliance with Austria. He found, however, a deliberate intention on the part of Austria to humble Prussia, and to degrade her from the position of an equal power, and also great jealousy of Prussia among the smaller German princes, many of whom owed their thrones to the Prussian soldiers, who, as in Saxony and Baden, had crushed the insurgents. He therefore came to the conclusion that if Prussia was to regain the position she had lost she must be prepared for the opposition of Austria, and must strengthen herself by alliances with other powers. The solidarity of Conservative interests appeared to him now a dangerous fiction. At the time of the Crimean War he advocated alliance with Russia, and it was to a great extent owing to his advice that Prussia did not join the western powers. Afterwards he urged a good understanding with Napoleon, but his advice was met by the insuperable objection of King Frederick William IV. to any alliance with a ruler of revolutionary origin.

The change of ministry which followed the establishment of a regency in 1857 made it desirable to appoint a new envoy at Frankfort, and in 1858 Bismarck was appointed ambassador at St Petersburg, where he remained for four years. During this period he acquired some knowledge of Russian, and gained the warm regard of the tsar, as well as of the dowager-empress, herself a Prussian princess. During the first two years he had little influence on the Prussian government; the Liberal ministers distrusted his known opinions on parliamentary government, and the monarchical feeling of the prince regent was offended by Bismarck’s avowed readiness for alliance with the Italians and his disregard of the rights of other princes. The failure of the ministry, and the estrangement between King William and the Liberal party, opened to him the way to power. Roon, who was appointed minister of war in 1861, was an old friend of his, and through him Bismarck was thenceforward kept closely informed of the condition of affairs in Berlin. On several occasions the prospect of entering the ministry was open to him, but nothing came of it, apparently because he required a free hand in foreign affairs, and this the king was not prepared to give him. When an acute crisis arose out of the refusal of parliament, in 1862, to vote the money required for the reorganization of the army, which the king and Roon had carried through, he was summoned to Berlin; but the king was still unable to make up his mind to appoint him, although he felt that Bismarck was the only man who had the courage and capacity for conducting the struggle with parliament. He was, therefore, in June, made ambassador at Paris as a temporary expedient. There he had the opportunity for renewing the good understanding with Napoleon which had been begun in 1857. He also paid a short visit to England, but it does not appear that this had any political results. In September the parliament, by a large majority, threw out the budget, and the king, having nowhere else to turn for help, at Roon’s advice summoned Bismarck to Berlin and appointed him minister president and foreign minister.

Ministry.

Bismarck’s duty as minister was to carry on the government against the wishes of the lower house, so as to enable the king to complete and maintain the reorganized army. The opposition of the House was supported by the country and by a large party at court, including the queen and crown prince. The indignation which his appointment caused was intense; he was known only by the reputation which in his early years he had won as a violent ultra-Conservative, and the apprehensions were increased by his first speech, in which he said that the German question could not be settled by speeches and parliamentary decrees, but only by blood and iron. His early fall was predicted, and it was feared that he might bring down the monarchy with him. Standing almost alone he succeeded in the task he had undertaken. For four years he ruled without a

budget, taking advantage of an omission in the constitution which did not specify what was to happen in case the crown and the two Houses could not agree on a budget. The conflict of the ministers and the House assumed at times the form of bitter personality hostility; in 1863 the ministers refused any longer to attend the sittings, and Bismarck challenged Virchow, one of his strongest opponents, to a duel, which, however, did not take place. In 1852 he had fought a duel with pistols against Georg von Vindre, a political opponent. In June 1863, as soon as parliament had risen, Bismarck published ordinances controlling the liberty of the press, which, though in accordance with the letter, seemed opposed to the intentions of the constitution, and it was on this occasion that the crown prince, hitherto a silent opponent, publicly dissociated himself from the policy of his father's ministers. Bismarck depended for his position solely on the confidence of the king, and the necessity for defending himself against the attempts to destroy this confidence added greatly to the suspiciousness of his nature. He was, however, really indispensable, for his resignation must be followed by a Liberal ministry, parliamentary control over the army, and probably the abdication of the king. Not only, therefore, was he secure in the continuance of the king's support, but he had also the complete control of foreign affairs. Thus he could afford to ignore the criticism of the House, and the king was obliged to acquiesce in the policy of a minister to whom he owed so much.

Foreign policy.

He soon gave to the policy of the monarchy a resolution which had long been wanting. When the emperor of Austria summoned a meeting of the German princes at Frankfort to discuss a reform of the confederation, Bismarck insisted that the king of Prussia must not attend. He remained away, and his absence in itself made the congress unavailing. There can be no doubt that from the time he entered on office Bismarck was determined to bring to an issue the long struggle for supremacy in Germany between the house of Habsburg and the house of Hohenzollern. Before he was able to complete his preparations for this, two unforeseen occurrences completely altered the European situation, and caused the conflict to be postponed for three years. The first was the outbreak of rebellion in Poland. Bismarck, an inheritor of the older Prussian traditions, and recollecting how much of the greatness of Prussia had been gained at the expense of the Poles, offered his help to the tsar. By this he placed himself in opposition to the universal feeling of western Europe; no act of his life added so much to the repulsion with which at this time he was regarded as an enemy of liberty and right. He won, however, the gratitude of the tsar and the support of Russia, which in the next years was to be of vital service to him. Even more serious were the difficulties arising in Denmark. On the death of King Frederick VII. in 1863, Prince Frederick of Augustenburg came forward as claimant to the duchies of Schleswig and Holstein, which had hitherto been joined to the crown of Denmark. He was strongly supported by the whole German nation and by many of its princes. Bismarck, however, once more was obliged to oppose the current of national feeling, which imperiously demanded that the German duchies should be rescued from a foreign yoke. Prussia was bound by the treaty of London of 1852, which guaranteed the integrity of the Danish monarchy; to have disregarded this would have been to bring about a coalition against Germany similar to that of 1851. Moreover, he held that it would be of no advantage to Prussia to create a new German state; if Denmark were to lose the duchies, he desired that Prussia should acquire them, and to recognize the Augustenburg claims would make this impossible. His resistance to the national desire made him appear a traitor to his country. To check the agitation he turned for help to Austria; and an alliance of the two powers, so lately at variance, was formed. He then falsified all the predictions of the opposition by going to war with Denmark, not, as they had required, in support of Augustenburg, but on the ground that the king of Denmark had violated his promise not to oppress his German subjects. Austria continued to act with Prussia, and, after the defeat of the Danes, at the peace of Vienna the sovereignty of the duchies was surrendered to the two allies—the first step towards annexation by Prussia. There is no part of Bismarck's diplomatic work which deserves such careful study as these events. Watched as he was by countless enemies at home and abroad, a single false step would have brought ruin and disgrace on himself; the growing national excitement would have burst through all restraint, and again, as fifteen years before, Germany divided and unorganized would have had to capitulate to the orders of foreign powers (see Schleswig-Holstein Question).

War with Austria.

The peace of Vienna left him once more free to return to his older policy. For the next eighteen months he was occupied in preparing for war with Austria. For this war the was alone responsible; he undertook it deliberately as the only means of securing Prussian ascendancy in Germany. The actual cause of dispute was the disposition of the conquered duchies, for Austria now wished to put

Augustenburg in as duke, a plan to which Bismarck would not assent. In 1865 a provisional arrangement was made by the treaty of Gastein, for Bismarck was not yet ready. He would not risk a war unless he was certain of success, and for this he required the alliance of Italy and French support; both he secured during the next year. In October 1865 he visited Napoleon at Biarritz and Paris. No formal treaty was made, but Napoleon promised to regard favourably an extension of Prussian power in Germany; while Bismarck led the emperor to believe that Prussia would help him in extending the frontier of France. A treaty of alliance with Italy was arranged in the spring of 1866; and Bismarck then with much difficulty overcame the reluctance of the king to embark in a war with his old ally. The results of the war entirely justified his calculations. Prussia, though opposed by all the German states except a few principalities in the north, completely defeated all her enemies, and at the end of a few weeks the whole of Germany lay at her feet.

Settlement of 1866.

The war of 1866 is more than that of 1870 the crisis of modern German history. It finally settled the controversy which had begun more than a hundred years before, and left Prussia the dominant power in Germany. It determined that the unity of Germany should be brought about not by revolutionary means as in 1848, not as in 1849 had been attempted by voluntary agreement of the princes, not by Austria, but by the sword of Prussia. This was the great work of Bismarck's life; he had completed the programme foreshadowed in his early speeches, and finished the work of Frederick the Great. It is also the turning-point in Bismarck's own life. Having secured the dominance of the crown in Prussia and of Prussia in Germany, he could afford to make a reconciliation with the parties which had been his chief opponents, and turn to them for help in building up a new Germany. The settlement of 1866 was peculiarly his work. We must notice, first, how in arranging the terms of peace he opposed the king and the military party who wished to advance on Vienna and annex part of Austrian Silesia; with greater foresight he looked to renewing the old friendship with Austria, and insisted (even with the threat of resignation) that no territory should be demanded. The southern states he treated with equal moderation, and thereby was able to arrange an offensive and defensive alliance with them. On the other hand, in order to secure the complete control of North Germany, which was his immediate object, he required that the whole of Hanover, Hesse-Cassel, Hesse-Nassau and the city of Frankfort, as well as the Elbe duchies, should be absorbed in Prussia. He then formed a separate confederation of the North German states, but did not attempt to unite the whole of Germany, partly because of the internal difficulties which this would have produced, partly because it would have brought about a war with France. In the new confederation he became sole responsible minister, with the title *Bundes-Kanzler*; this position he held till 1890, in addition to his former post of premier minister. In 1871 the title was altered to *Reichs-Kanzler*.

The reconciliation with the Prussian parliament he effected by bringing in a bill of indemnity for the money which had been spent without leave of parliament. The Radicals still continued their opposition, but he thereby made possible the formation of a large party of moderate Liberals, who thenceforward supported him in his new Nationalist policy. He aslo, in the constitution for the new confederation, introduced a parliament (*Bundestag*) elected by universal suffrage. This was the chief demand of the revolutionists in 1848; it was one to which in his early life he had been strongly opposed. His experience at Frankfort had diminished his dislike of popular representation, and it was probably to the advice of Lassalle that his adoption of universal suffrage was due. He first publicly proposed it just before the war; by carrying it out, notwithstanding the apprehensions of many Liberal politicians, he placed the new constitution on a firmer base than would otherwise have been possible.

Up to 1866 he had always appeared to be an opponent of the National party in Germany, now he became their leader. His next task was to complete the work which was half-finished, and it was this which brought about the second of the great wars which he undertook.

Bismarck and France.

The relations with Napoleon III. form one of the most interesting but obscurest episodes in Bismarck's career. We have seen that he did not share the common prejudice against co-operation with France. He found Napoleon willing to aid Prussia as he had aided Piedmont, and was ready to accept his assistance. There was this difference, that he asked only for neutrality, not armed assistance, and it is improbable that he ever intended to alienate any German territory; he showed himself, however, on more than one occasion, ready to discuss plans for extending French territory, on the side of Belgium and Switzerland. Napoleon, who had not anticipated the rapid success of Prussia, after the battle of Königgratz at the request of Austria came

forward as mediator, and there were a few days during which it was probable that Prussia would have to meet a French attempt to dictate terms of peace. Bismarck in this crisis by deferring to the emperor in appearance avoided the danger, but he knew that he had been deceived, and the cordial understanding was never renewed. Immediately after an armistice had been arranged, Benedetti, at the orders of the French government, demanded as recompense a large tract of German territory on the left bank of the Rhine. This Bismarck peremptorily refused, declaring that he would rather have war. Benedetti then made another proposal, submitting a draft treaty by which France was to support Prussia in adding the South German states to the new confederation, and Germany was to support France in the annexation of Luxemburg and Belgium. Bismarck discussed, but did not conclude the treaty; he kept, however, a copy of the draft in Benedetti's handwriting, and published it in *The Times* in the summer of 1870 so as to injure the credit of Napoleon in England. The failure of the scheme made a contest with France inevitable, at least unless the Germans were willing to forgo the purpose of completing the work of German unity, and during the next four years the two nations were each preparing for the struggle, and each watching to take the other at a disadvantage.

It is necessary, then, to keep in mind the general situation in considering Bismarck's conduct in the months immediately preceding the war of 1870. In 1867 there was a dispute regarding the right to garrison Luxemburg. Bismarck then produced the secret treaties with the southern states, an act which was, as it were, a challenge to France by the whole of Germany. During the next three years the Ultramontane party hoped to bring about an anti-Prussian revolution, and Napoleon was working for an alliance with Austria, where Beust, an old opponent of Bismarck's, was chancellor. Bismarck was doubtless well informed as to the progress of the negotiations, for he had established intimate relations with the Hungarians. The pressure at home for completing the work of German unity was so strong that he could with difficulty resist it, and in 1870 he was much embarrassed by a request from Baden to be admitted to the confederation, which he had to refuse. It is therefore not surprising that he eagerly welcomed the opportunity of gaining the goodwill of Spain, and supported by all the means in his power the offer made by Marshal Prim that Prince Leopold of Hohenzollern should be chosen king of that country. It was only by his urgent and repeated representations that the prince was persuaded against his will to accept. The negotiations were carried out with the greatest secrecy, but as soon as the acceptance was made known the French government intervened and declared that the project was inadmissable. Bismarck was away at Varzin, but on his instructions the Prussian foreign office in answer to inquiries denied all knowledge or responsibility. This was necessary, because it would have caused a bad impression in Germany had he gone to war with France in support of the prince's candidature. The king, by receiving Benedetti at Ems, departed from the policy of reserve Bismarck himself adopted, and Bismarck (who had now gone to Berlin) found himself in a position of such difficulty that he contemplated resignation. The French however, by changing and extending their demands enabled him to find a cause of war of such nature that the whole of Germany would be united against French agression. France asked for a letter of apology, and Benedetti personally requested from the king a promise that he would never allow the candidature to be resumed. Bismarck published the telegram in which this information and the refusal of the king were conveyed, but by omitting part of the telegram made it appear that the request and refusal had both been conveyed in a more abrupt form than had really been the case.[1] But even apart from this, the publication of the French demand, which could not be complied with, must have brought about a war.

The Ems telegram.

In the campaign of 1870-71 Bismarck accompanied the headquarters of the army, as he had done in 1866. He was present at the battle of Gravelotte and at the surrender of Sedan, and it was on the morning of the 2nd of September that he had his famous meeting with Napoleon after the surrender of the emperor. He accompanied the king to Paris, and spent many months at Versailles. Here he was occupied chiefly with the arrangments for admitting the southern states to the confederation, and the establishment of the empire. He also underwent much anxiety lest the efforts of Thiers to bring about an interference by the neutral powers might be successful. He had to carry on the negotiations with the French preliminary to the surrender of Paris, and to enforce upon them the German terms of peace.

For Bismarck's political career after 1870 we must refer to the article Germany, for he was thenceforward entirely absorbed in the affairs of his country. The foreign policy he controlled absolutely. As chancellor he was responsible for the whole internal policy of the empire, and his influence is to be seen in every department of state, especially, however, in the great change of policy after 1878. During the earlier period the estrangement from the Conservatives, which had begun

After 1870.

in 1866, became very marked, and brought about a violent quarrel with many of his old friends, which culminated in the celebrated Arnim trial. He incurred much criticism during the struggle with the Roman Catholic Church, and in 1873 he was shot at and slightly wounded by a youth called Rullmann, who professed to be an adherent of the Clerical party. Once before, in 1866, just before the outbreak of war, his life had been attempted by a young man called Cohen, a native of Württemberg, who wished to save Germany from a fratricidal war. In 1872 he retired from the presidency of the Prussian ministry, but returned after a few months. On several occasions he offered to retire, but the emperor always refused his consent, on the last time with the word “Never.” In 1877 he took a long leave of absence for ten months. His health at this time was very bad. In 1878 he presided over the congress of Berlin. The following years were chiefly occupied, besides foreign affairs, which were always his first care, with important commercial reforms, and he held at this time also the office of Prussian minister of trade in addition to his other posts. During this period his relations with the Reichstag were often very unsatisfactory, and at no time did he resort so freely to prosecutions in the law-courts in order to injure his opponents, so that the expression *Bismarck-Beleidigung* was invented. He was engaged at this time in a great struggle with the Social-Democrats, whom he tried to crush by exceptional penal laws. The death of the emperor William in 1888 made a serious difference in his position. He had been bound to him by a long term of loyal service, which had been rewarded with equal loyalty. For his relations to the emperors Frederick and William II., and for the events connected with his dismissal from office in March 1890, we must refer to the articles under those names.

After his retirement he resided at Friedrichsruh, near Hamburg, a house on his Leuenburg estates. His criticisms of the government, given sometimes in conversation, sometimes in the columns of the *Hamburger Nachrichten*, caused an open breach between him and the emperor; and the new chancellor, Count Caprivi, in a circular despatch which was afterwards published, warned all German envoys that no real importance must be attached to what he said. When he visited Vienna for his son’s wedding the German ambassador, Prince Reuss, was forbidden to take any notice of him. A reconciliation was effected in 1893. In 1895 his eightieth birthday was celebrated with great enthusiasm: the Reichstag alone, owing to the opposition of the Clericals and the Socialists, refused to vote an address. In 1891 he had been elected a member of the Reichstag, but he never took his seat. He died at Friedrichsruh on the 31st of July 1898.

Bismarck was made a count in 1865; in 1871 he received the rank of Fürst (prince). On his retirement the emperor created him duke of Lauenburg, but he never used the title, which was not inherited by his son. In 1866 he received £60,000 as his share of the donation voted by the Reichstag for the victorious generals. With this he purchased the estate of Varzin in Pomerania, which henceforth he used as a country residence in preference to Schönhausen. In 1871 the emperor presented him with a large part of the domains of the duchy of Lauenburg. On his seventieth birthday a large sum of money (£270,000) was raised by public subscription, of which half was devoted to repurchasing the estate of Schönhausen for him, and the rest was used by him to establish a fund for the assistance of schoolmasters. As a young man he was an officer in the Landwehr and militia, and in addition to his civil honours he was eventually raised to the rank of general. Among the numerous orders he received we may mention that he was the first Protestant on whom the pope bestowed the order of Christ; this was done after the cessation of the Kulturkampf and the reference of the dispute with Spain concerning the Caroline Islands to the arbitration of the pope.

Bismarck’s wife died in 1894. He left one daughter and two sons. Herbert (1840-1904), the elder, was wounded at Mars-le-Tour, afterwards entered the foreign office, and acted as private secretary to his father (1871-1881). In 1882 he became councillor to the embassy at London, in 1884 was transferred to St Petersburg, and in 1885 became under-secretary of state for foreign affairs. In 1884 he had been elected to the Reichstag, but had to resign his seat when, in 1886, he was made secretary of state for foreign affairs and Prussian minister. He conducted many of the negotiations with Great Britain on colonial affairs. He retired in 1890 at the same time as his father, and in 1893 was again elected to the Reichstag. He married Countess Margarete Hoyos in 1892, and died on the 18th of September 1904. He left two daughters and three sons, of whom the eldest, Otto Christian Archibald (b. 1897), succeeded to the princely title. The second son, Wilhelm, who was president of the province of Prussia, died in 1901. By his wife, Sybilla von Arnim-Kröchlendorff, he left three daughters and a son, Count Nikolaus (b. 1896).

AUTHORITIES.—The literature on Bismarck’s life is very extensive, and it is only possible to

enumerate a few of the most important books. The first place belongs to his own works. These include his own memoirs, published after his death, under the title *Gedanken und Erinnerungen*; there is an English translation, *Bismarck: his Reflections and Reminiscences* (London, 1898). They are incomplete, but contain very valuable discussions on particular points. The speeches are of the greatest importance both for his character and for political history; of the numerous editions that by Horst Kehl, in 12 vols. (Stuttgart, 1892-1894), is the best; there is a cheap edition in Reclam's *Universalbibliothek.* Bismarck was an admirable letter-writer, and numbers of his private letters have been published; a collected edition has been brought out by Horst Kohl. His letters to his wife were published by Prince Herbert Bismarck (Stuttgart, 1900). A translation of a small selection of the private letters was published in 1876 by F. Maxse. Of great value for the years 1851-1858 is the corrspondence with General L. v. Gerlach, which has been edited by Horst Kohl (3rd ed., Berlin, 1893). A selection of the political letters was also published under the title *Politische Briefe aus den Jahren 1849-1899* (2nd ed., Berlin, 1890). Of far greater importance are the collections of despatches and state papers edited by Herr v. Poschinger. These include four volumes entitled *Preussen im Bundestag, 1851-1859* (4 vols., Leipzig, 1882-1885), which contain his despatches during the time he was at Frankfort. Next in importance are two works, *Bismarck als Volkswirth* and *Aktenstucke zur Wirthschaftspolitik des Fursten Bismarck*, which are part of the collection of state papers, *Akenstucke zur Geschichte der Wirthschaftspolitik in Preussen.* They contain full information on Bismarck's commercial policy, including a number of important state papers. A useful general collection is that by Ludwig Hahn, *Bismarck, sein politisches Leben*, &c. (5 vols., Berlin, 1878-1891), which includes a selection from letters, speeches and newspaper articles. These collections have only been possible owing to the extreme generosity which Bismarck showed in permitting the publication of documents; he always professed to have no secrets. A full account of the diplomatic history from 1863 to 1866 is given by Sybel in *Die Begrundung des deutschen Reichs* (Munich, 1889-1894), written with the help of the Prussian archives. The last two volumes, covering 1866-1870, are of less value, as he was not able to use the archives for this period. Poschinger has also edited a series of works in which anecdotes, minutes of interviews and conversations are recorded; they are, however, of very unequal value. They are *Bismarck und die Parlamentarier, Furst Bismarck und der Bundesrath, Die Ansprache des Fursten Bismarck, Neue Tischgesprache*, and *Bismarck und die Diplomaten.* Selections from these have been published in English by Charles Lowe, *The Tabletalk of Prince Bismarck*, and by Sidney Whitman, *Conversations with Bismarck*. By far the fullest guide to Bismarck's life is Horst Kohl's *Furst Bismarck, Regesten zu einer wissenschaftlichen Biographie* (Leipzig, 1891-1892), which contains a record of Bismarck's actions on each day, with references to and extracts from his letters and speeches. For the works of Moritz Busch, which contain graphic pictures of his daily life, see the article Busch. Further materials were published periodically in the *Bismarck-Jahrbuch*, edited by Horst Kohl (Berlin, 1894-1896; Stuttgart, 1897-1899). Herr v. Poschinger also brought out a *Bismarck Portfeuille.* Of German biographies may be mentioned Hans Blum, *Bismarck und seine Zeit* (6 vols., Munich, 1894-1895), with a volume of appendices, &c. (1898); Heyck, *Bismarck* (Bielefeld, 1898); Kreutzer, *Otto von Bismarck* (2 vols., Leipzig, 1900); Klein-Hattingen, *Bismarck und seine Welt, 1815-1871*, Bd. i. (Berlin, 1902); Lenz, *Geschichte Bismarcks* (Leipzig, 1902); Penzler, *Furst Bismarck nach seiner Entlassung* (7 vols., ib. 1897-1898); Liman, one volume under the same title (ib. 1901). There are English biographies by Charles Lowe, *Bismarck, a Political Biography* (revised edition in 1 vol., 1895), by James Headlam (1899), and by F. Stearns (Philadelphia, 1900). A useful bibliography of all works on Bismarck up to 1895 is Paul Schulze and Otto Koller's *Bismarck-Literatur* (Leipzig, 1896).

(J. W. He.)

1 It was not till many years later that our knowledge of these events (which is still incomplete) was established; in 1894 the publication of the memoirs of the king of Rumania showed, what had hitherto been denied, that Bismarck had taken a leading part in urging the election of the prince of Hohenzollern. It was in 1892 that the language used by Bismarck himself made it necessary for the German government to publish the original form of the Ems telegram.

BISMARCK, the capital of North Dakota, U.S.A., and the county-seat of Burleigh county, on the E. bank of the Missouri river, in the S. central part of the state. Pop. (1890) 2186, (1900) 3319, of whom 746 were foreign-born, (1905) 4913, (1910) 5443. It is on the main line of the Northern Pacific, and on the Minneapolis, St Paul & Sault Ste Marie railways; and steamboats run from here to Mannhaven, Mercer county, and Fort Yates, Morton county.

The city is about 1650 ft. above sea-level. It contains the state capitol, the state penitentiary, a U.S. land office, a U.S. surveyor-general's office, a U.S. Indian school and a U.S. weather station; about a mile S. of the city is Fort Lincoln, a United States army post. Bismarck is the headquarters for navigation of the upper Missouri river, is situated in a good agricultural region, and has a large wholesale trade, shipping grain, hides, furs, wool and coal. It was founded in 1873, and was chartered as a city in 1876; from 1883 to 1889 it was the capital of Dakota Territory, on the division of which it became the capital of North Dakota.

BISMARCK ARCHIPELAGO, the collective name of a large number of islands lying N. and N.E. of New Guinea, between 1° and 7° S., and 146° and 153° E., belonging to Germany. The largest island is New Pomerania, and the archipelago also includes New Mecklenburg, New Hanover, with small attendant islands, the Admiralty Islands and a chain of islands off the coast of New Guinea, the whole system lying in the form of a great amphitheatre of oval shape. The archipelago was named in honour of the first chancellor of the German empire, after a German protectorate had been declared in 1884. (See Admiralty Islands, New Mecklenburg, New Pomerania, New Guinea.)

BISMILLAH, an Arabic exclamation, meaning "in the name of God."

BISMUTH, a metallic chemical element; symbol Bi, atomic weight 208.5 (O = 16). It was probably unknown to the Greeks and Romans, but during the middle ages it became quite familiar, notwithstanding its frequent confusion with other metals. In 1450 Basil Valentine referred to it by the name "wismut," and characterized it as a metal; some years later Paracelsus termed it "wissmat," and, in allusion to its brittle nature, affirmed it to be a "bastard" or "half-metal"; Georgius Agricola used the form "wissmuth," latinized to "bisemutum," and also the term "plumbum cineareum." Its elementary nature was imperfectly understood; and the impure specimens obtained by the early chemists explain, in some measure, its confusion with tin, lead, antimony, zinc and other metals; in 1595 Andreas Libavius confused it with antimony, and in 1675 Nicolas Lemery with zinc. These obscurities began to be finally cleared up with the researches of Johann Heinrich Pott (1692-1777), a pupil of Stahl, published in his *Exercitationes chemicae de Wismutho* (1769), and of N. Geoffroy, son of Claude Joseph Geoffroy, whose contribution to our knowledge of this metal appeared in the *Mémoires de l'académie française* for 1753. Torbern Olof Bergman reinvestigated its properties and determined its reactions; his account, which was published in his *Opuscula*, contains the first fairly accurate description of the metal.

Ores and Minerals.—The principal source of bismuth is the native metal, which is occasionally met with as a mineral, usually in reticulated and arborescent shapes or as foliated and granular masses with a crystalline fracture. Although bismuth is readily obtained in fine crystals by artificial means, yet natural crystals are rare and usually indistinct; they belong to the rhombohedral system and a cube-like rhombohedron with interfacial angles of 92° 20′ is the predominating form. There is a perfect cleavage perpendicular to the trigonal axis of the crystals; the fact that only two (opposite) corners of the cube-like crystals can be truncated by cleavage at once distinguishes them from true cubes. When not tarnished, the mineral has a silver-white colour with a tinge of red, and the lustre is metallic. Hardness 2-2½; specific gravity 9.70-9.83. The slight variations in specific gravity are due to the presence of small amounts of arsenic, sulphur or tellurium, or to enclosed impurities.

Bismuth occurs in metalliferous veins traversing gneiss or clay-slate, and is usually

associated with ores of silver and cobalt. Well-known localities are Schneeberg in Saxony and Joachimsthal in Bohemia; at the former it has been found as arborescent groups penetrating brown jasper, which material has occasionally been cut and polished for small ornaments. The mineral has been found in some Cornish mines and is fairly abundant in Bolivia (near Sorata, and at Tasna in Potosi). It is the chief commercial source of bismuth.

The oxide, bismuth ochre, Bi_2O_3, and the sulphide, bismuth glance or bismuthite, are also of commercial importance. The former is found, generally mixed with iron, copper and arsenic oxides, in Bohemia, Siberia, Cornwall, France (Meymac) and other localities; it also occurs admixed with bismuth carbonate and hydrate. The hydrated carbonate, bismutite, is of less importance; it occurs in Cornwall, Bolivia, Arizona and elsewhere.

Of the rarer bismuth minerals we may notice the following:—the complex sulphides, copper bismuth glance or wittichenite, $BiCu_3S_3$, silver bismuth glance, bismuth cobalt pyrites, bismuth nickel pyrites or saynite, needle ore (patrinite or aikinite), $BiCuPbS_3$, emplectite, $CuBiS_2$, and kobellite, $BiAsPb_3S_6$; the sulphotelluride tetradymite; the selenide guanajuatite, Bi_2Se_3, the basic tellurate montanite, $Bi_2(OH)_4TeOe$; the silicates eulytite and agricolite, $Bi_4(SiO_2)_3$; and the urnayl arsenate walpurgite, $Bi(UO_2),(OH)_{24}(A_3O_4)_4$.

Metallurgy.—Bismuth is extracted from its ores by dry, wet, or electro-matallurgical methods, the choice depending upon the composition of the ore and economic conditions. The dry process is more frequently practised, for the easy reducibility of the oxide and sulphide, together with the low melting-point of the metal, renders it possible to effect a ready separation of the metal from the gangue and impurities. The extraction from ores in which the bismuth is present in the metallic condition may be accomplished by a simple liquation, or melting, in which the temperature is just sufficient to melt the bismuth, or by a complete fusion of the ore. The first process never extracts all the bisbuth, as much as one-third being retained in the matte or speiss; the second is more satisfactory, since the extraction is more complete, and also allows the addition of reducing agents to decompose any admixed bismuth oxide or sulphide. In the liquidation process the ore is heated in inclined cylindrical retorts, and the molten metal is tapped at the lower end; the residues being removed from the upper end. The fusion process is preferably carried out in crucible furnaces; shaft furnaces are unsatisfactory on account of the disintegrating action of the molten bismuth on the furnace linings.

Sulphuretted ores are smelted, either with or without a preliminary calcination, with metallic iron; calcined ores may be smelted with carbon (coal). The reactions are strictly analogous to those which occur in the smelting of galena (see LEAD), the carbon reducing any oxide, either present originally in the ore or produced in the calcination and the iron combining with the sulphur of the bismuthite. A certain amount of bismuth sulphate is always formed during the calcination; this is subsequently reduced to the sulphide and ultimately to the metal in the fusion. Calcination in reverberatory furnaces and a subsequent smelting in the same type of furnace with the addition of about 3% of coal, lime, soda and fluorspar, has been adopted for treating the Bolivian ores, which generally contain the sulphides of bismuth, copper, iron, antimony, lead and a little silver. The lowest layer of the molten mass is principally metallic bismuth, the succeeding layers are a bismuth copper matte, which is subsequently worked up, and a slag. Ores containing the oxide and carbonate are treated either by smelting with carbon or by a wet process.

In the wet process the ores, in which the bismuth is present as oxide or carbonate, are dissolved out with hydrochloric acid, or, if the bismuth is to be extracted from a matte or alloy, the solvent employed is *aqua regia* or strong sulphuric acid. The solution of metallic chlorides or sulphates so obtained is precipitated by iron, the metallic bismuth filtered, washed with water, pressed in canvas bags, and finally fused in graphite crucibles, the surface being protected by a layer of charcoal. Another process consists in adding water to the solution and so precipitating the bismuth as oxychloride, which is then converted into the metal.

The crude metal obtained by the preceding processes is generally contaminated by arsenic, sulphur, iron, nickel, cobalt and antimony, and sometimes with silver or gold. A dry method of purification consists in a liquation on a hearth of peculiar construction, which occasions the separation of the unreduced bismuth sulphide and the bulk of the other impurities. A better process is to remelt the metal in crucibles with the addition of certain refining agents. The details of this process vary very considerably, being conditioned by the composition of the impure metal and the practice of particular works. The wet refining process is more tedious and expensive, and is only exceptionally employed, as in the case of preparing the pure metal or its salts for pharmaceutical or chemical purposes. The basic nitrate is the salt generally prepared, and, in general outline, the process consists in dissolving the metal in nitric acid, adding water to the solution, boiling the precipitated basic

nitrate with an alkali to remove the arsenic and lead, dissolving the residue in nitric acid, and reprecipitating as basic nitrate with water. J.F.W. Hampe prepared chemically pure bismuth by fusing the metal with sodium carbonate and sulphur, dissolving the bismuth sulphide so formed in nitric acid, precipitating the bismuth as the basic nitrate, re-dissolving this salt in nitric acid, and then precipitating with ammonia. The bismuth hydroxide so obtained is finally reduced by hydrogen.

Properties.—Bismuth is a very brittle metal with a white crystalline fracture and a characteristic reddish-white colour. It crystallizes in rhombohedra belonging to the hexagonal system, having interfacial angles of 87° 40′. According to G.W.A. Kahlbaum, Roth and Siedler (*Ziet. Anorg. Chem. 29*, p. 294), its specific gravity is 9.78143; Roberts and Wrightson give the specific gravity of solid bismuth as 9.82, and of molten bismuth as 10.035. It therefore expands on solidification; and as it retains this property in a number of alloys, the metal receives extensive application in forming type-metals. Its melting-point is variously given as 268.3° (F. Rudberg and A.D. von Riemsdijk) and 270.5° (C.C. Person); commercial bismuth melts at 260° (Ledebur), and electrolytic bismuth at 264° (Classen). It vaporizes in a vacuum at 292°, and its boiling-point, under atmospheric pressure, is between 1090° and 1450° (T. Carnelley and W.C. Williams). Regnault determined its specific heat between 0° and 100° to be 0.0308; Kahlbaum, Roth and Siedler (*loc. cit.*) give the value 0.03055. Its thermal conductivity is the lowest of all metals, being 18 as compared with silver as 1000; its coefficient of expansion between 0° and 100° is 0.001341. Its electrical conductivity is approximately 1.2, silver at 0° being taken as 100; it is the most diamagnetic substance known, and its thermoelectric properties render it especially valuable for the construction of thermopiles.

The metal oxidizes very slowly in dry air at ordinary temperatures, but somewhat more rapidly in moist air or when heated. In the last case it becomes coated with a greyish-black layer of an oxide (dioxide (?)), at a red heat the layer consists of the trioxide (Bi_2O_3); and is yellow or green in the case of pure bismuth, and violet or blue if impure; at a bright red heat it burns with a bluish flame to the trioxide. Bismuth combines directly with the halogens, and the elements of the sulphur group. It readily dissolves in nitric acid, *aqua regia* and hot sulphuric acid, but tardily in hot hydrochloric acid. It is precipitated as the metal from solutions of its salts by the metals of the alkalis and alkaline earths, zinc, iron, copper, &c. In its chemical affinities it resembles arsenic and antimony; an important distinction is that it forms no hydrogen compound analogous to arsine and stibine.

Alloys.—Bismuth readily forms alloys with other metals. Treated with sodammonium it yields a bluish-black mass, $BiNa_3$, which takes fire in the air and decomposes water. A brittle potassium alloy of silver-white colour and lamellar fracture is obtained by calcining 20 parts of bismuth with 16 of cream of tartar at a strong red heat. When present in other metals, even in very small quantity, bismuth renders them brittle and impairs their electrical conductivity. With mercury it forms amalgams. Bismuth is a component of many ternary alloys characterized by their low fusibility and expansion in solidification; many of them are used in the arts (see Fusible Metal).

Compounds.—Bismuth forms four oxides, of which the trioxide, Bi_2O_3, is the most important. This compound occurs in nature as bismuth ochre, and may be prepared artificially by oxidizing the metal at a red heat, or by heating the carbonate, nitrate or hydrate. Thus obtained it is a yellow powder, soluble in the mineral acids to form soluble salts, which are readily precipitated as basic salts when the solution is diluted. It melts to a reddish-brown liquid, which solidifies to a yellow crystalline mass on cooling. The Hydrate, $Bi(OH)_3$, is obtained as a white powder by adding potash to a solution of a bismuth salt. Bismuth dioxide, BiO or Bi_2O_2, is said to be formed by the limited oxidation of the metal, and as a brown precipitate by adding mixed solutions of bismuth and stannous chlorides to a solution of caustic potash. Bismuth tetroxide, Bi_2O_4, sometimes termed bismuth bismuthate, is obtained by melting bismuth trioxide with potash, or by igniting bismuth trioxide with potash and potassium chlorate. It is also formed by oxidizing bismuth trioxide suspended in caustic potash with chlorine, the pentoxide being formed simultaneously; oxidation and potassium ferricyanide simply gives the tetroxide (Hauser and Vanino, *Zeit. Anorg. Chem.*, 1904, 39, p. 381). The hydrate, $Bi_2O_4 \cdot 2H_2O$, is also known. Bismuth pentoxide, Bi_2C_5, is obtained by heating bismuthic acid, $HBiO_3$, to 130°C.; this acid (in the form of its salts) being the product of the continued oxidation of an alkaline solution of bismuth trioxide.

Bismuth forms two chlorides: $BiCl_2$ and $BiCl_3$. The dichloride, $BiCl_2$, is obtained as a brown crystalline powder by fusing the metal with the trichloride, or in a current of chlorine, or by heating the metal with calomel to 250°. Water decomposes it to metallic bismuth and the oxychloride, BiOCl. Bismuth trichloride, $BiCl_3$, was obtained by Robert Boyle by heating the metal with corrosive sublimate. It is the final product of burning bismuth in an excess of chlorine. It is a white substance, melting at 225°-230° and boiling at 435°-441°. With excess

of water, it gives a white precipitate of the oxychloride, BiOCl. Bismuth trichloride forms double compounds with hydrochloric acid, the chlorides of the alkaline metals, ammonia, nitric oxide and nitrosyl chloride. *Bismuth trifluoride*, BiF_3, a white powder, *bismuth tribromide*, $BiBr_3$, golden yellow crystals, *bismuth iodide*, BiI_3, greyish-black crystals, are also known. These compounds closely resemble the trichloride in their methods of preparation and their properties, forming oxyhaloids with water, and double compounds with ammonia, &c.

Carbonates.—The basic carbonate, $2(BiO)_2CO_3 \cdot H_2O$, obtained as a white precipitate when an alkaline carbonate is added to a solution of bismuth nitrate, is employed in medicine. Another basic carbonate, $3(BiO)_2CO_3 \cdot 2Bi(OH)_3 \cdot 3H_2O$, constitutes the mineral bismutite.

Nitrates.—The normal nitrate, $Bi(NO_3)_3 \cdot 5H_2O$, is obtained in large transparent asymmetric prisms by evaporating a solution of the metal in nitric acid. The action of water on this solution produces a crystalline precipitate of basic nitrate, probably $Bi(OH)_2NO_3$, though it varies with the amount of water employed. This precipitate constitutes the “magistery of bismuth” or “subnitrate of bismuth” of pharmacy, and under the name of pearl white, *blanc d’Espagne* or *blanc de fard* has long been used as a cosmetic.

Sulphides.—Bismuth combines directly with sulphur to form a, disulphide, Bi_2S_2, and a trisulphide, Bi_2S_3, the latter compound being formed when the sulphur is in excess. A hydrated disulphide, $Bi_2S_2 \cdot 2H_2O$, is obtained by passing sulphuretted hydrogen into a solution of bismuth nitrate and stannous chloride. Bismuth disulphide is a grey metallic substance, which is decomposed by hydrochloric acid with the separation of metallic bismuth and the formation of bismuth trichloride. Bismuth trisulphide, Bi_2S_3, constitutes the mineral bismuthite, and may be prepared by direct union of its constituents, or as a brown precipitate by passing sulphuretted hydrogen into a solution of a bismuth salt. It is easily soluble in nitric acid. When heated to 200° it assumes the crystalline form of bismuthite. Bismuth forms several oxysulphides: Bi_4O_3S constitutes the mineral karelinite found at the Zavodinski mine in the Altai; $Bi_6O_3S_4$ and Bi_2O_3S have been prepared artificially. Bismuth also forms the sulphohaloids, BiSCl, BiSBr, BiSI, analogous to the oyxhaloids.

Bismuth sulphate, $Bi_2(SO_4)_3$, is obtained as a white powder by dissolving the metal or sulphide in concentrated sulphuric acid. Water decomposes it, giving a basic salt, $Bi_2(SO_4)(OH)_4$, which on heating gives $(BiO)_2SO_4$. Other basic salts are known.

Bismuth forms compounds similar to the trisulphide with the elements selenium and tellurium. The tritelluride constitutes the mineral tetradymite, Bi_2Te_3.

Analysis.—Traces of bismuth may be detected by treating the solution with excess of tartaric acid, potash and stannous chloride, a precipitate or dark coloration of bismuth oxide being formed even when only one part of bismuth is present in 20,000 of water. The blackish brown sulphide precipitated from bismuth salts by sulphuretted hydrogen is insoluble in ammonium sulphide, but is readily dissolved by nitric acid. The metal can be reduced by magnesium, zinc, cadmium, iron, tin, copper and substances like hypophosphorous acid from acid solutions or from alkaline ones by formaldehyde. In quantitative estimations it is generally weighed as oxide, after precipitation as sulphide or carbonate, or in the metallic form, reduced as above.

Pharmacology.—The salts of bismuth are feebly antiseptic. Taken internally the subnitrate, coming into contact with water, tends to decompose, gradually liberating nitric acid, one of the most powerful antiseptics. The physical properties of the powder also give it a mild astringent action. There are no remote actions.

Therapeutics.—The subnitrate of bismuth is invaluable in certain cases of dyspepsia, and still more notably so in diarrhoea. It owes its value to the decomposition described above, by means of which a powerful antiseptic action is safely and continuously exerted. There is hardly a safer drug. It may be given in drachm doses with impunity. It colours the faeces black owing to the formation of sulphide.

BISMUTHITE, a somewhat rare mineral, consisting of bismuth trisulphide, Bi_2S_3. It crystallizes in the orthorhombic system and is isomorphous with stibnite (Sb_2S_3), which it closely resembles in appearance. It forms loose interlacing aggregates of acicular crystals without terminal faces (only in a single instance has a terminated crystal been observed), or as masses with a foliated or fibrous structure. An important character is the perfect

cleavage in one direction parallel to the length of the needles. The colour is lead-grey inclining to tin-white and often with a yellowish or iridescent tarnish. The hardness is 2; specific gravity 6.4-6.5. Bismuthite occurs at several localities in Cornwall and Bolivia, often in association with native bismuth and tin-ores. Other localities are known; for instance, Brandy Gill in Caldbeck Fells, Cumberland, where with molybdenite and apatite it is embedded in white quartz. The mineral was known to A. Cronstedt in 1758, and was named bismuthine by F.S. Beudant in 1832. This name, which is also used in the forms bismuthite and bismuthinite, is rather unfortunate, since it is readily confused with bismite (bismuth oxide) and bismutite (basic bismuth carbonate), especially as the latter has also been used in the form bismuthite. The name bismuth-glance or bismutholamprite for the species under consideration is free from this objection.

(L. J. S.)

BISMYA, a group of ruin mounds, about 1 m. long and ½ m. wide, consisting of a number of low ridges, nowhere exceeding 40 ft. in height, lying in the Jezireh, somewhat nearer to the Tigris than the Euphrates, about a day's journey to the south-east of Nippur, a little below 32° N. and about 45° 40′ E. Excavations conducted here for six months, from Christmas of 1903 to June 1904, for the university of Chicago, by Dr Edgar J. Banks, proved that these mounds covered the site of the ancient city of Adab (Ud-Nun), hitherto known only from a brief mention of its name in the introduction to the Khammurabi code (c. 2250 B.C.). The city was divided into two parts by a canal, on an island in which stood the temple, E-mach, with a *ziggurat*, or stage tower. It was evidently once a city of considerable importance, but deserted at a very early period, since the ruins found close to the surface of the mounds belong to Dungi and Ur Gur, kings of Ur in the earlier part of the third millennium B.C. Immediately below these, as at Nippur, were found the remains of Naram-Sin and Sar-gon, c. 3000 B.C. Below these there were still 35 ft. of stratified remains, constituting seven-eighths of the total depth of the ruins. Besides the remains of buildings, walls, graves, &c., Dr Banks discovered a large number of inscribed clay tablets of a very early period, bronze and stone tablets, bronze implements and the like. But the two most notable discoveries were a complete statue in white marble, apparently the most ancient yet found in Babylonia (now in the museum in Constantinople), bearing the inscription—"E-mach, King Da-udu, King of Ud-Nun"; and a temple refuse heap, consisting of great quantities of fragments of vases in marble, alabaster, onyx, porphyry and granite, some of which were inscribed, and others engraved and inlaid with ivory and precious stones.

(J. P. Pe.)

BISON, the name of the one existing species of European wild ox, *Bos* (*Bison*) *bonasus*, known in Russian as *zubr*. Together with the nearly allied New World animal known in Europe as the (North) American bison, but in its own country as "buffalo," and scientifically as *Bos (Bison) bison*, the bison represents a group of the ox tribe distinguished from other species by the greater breadth and convexity of the forehead, superior length of limb, and the longer spinal processes of the dorsal vertebrae, which, with the powerful muscles attached for the support of the massive head, form a protuberance or hump on the shoulders. The bisons have also fourteen pairs of ribs, while the common ox has only thirteen. The forehead and neck of both species are covered with long, shaggy hair of a dark brown colour; and in winter the whole of the neck, shoulders and hump are similarly clothed, so as to form a curly, felted mane. This mane in the European species disappears in summer; but in the American bison it is to a considerable extent persistent.

The bison is now the largest European quadruped, measuring about 10 ft. long, exclusive of the tail, and standing nearly 6 ft. high. Formerly it was abundant throughout Europe, as is proved by the fossil remains of this or a closely allied form found on the continent and in England, associated with those of the extinct mammoth and rhinoceros. Caesar mentions the bison as abounding, along with the extinct aurochs or wild ox, in the forests of Germany and Belgium, where it appears to have been occasionally captured and afterwards exhibited alive

in the Roman amphitheatres. At that period, and long after, it seems to have been common throughout central Europe, as we learn from the evidence of Herberstein in the 16th century. Nowadays bison are found in a truly wild condition only in the forests of the Caucasus, where they are specially protected by the Russian government. There is, however, a herd, somewhat in the condition of park-animals, in the forest of Byelovitsa, in Lithuania, where it is protected by the tsar, but nevertheless is gradually dying out. In 1862 the Lithuanian bisons numbered over 1200, but by 1872 they had diminished to 528, and in 1892 there were only 491. The prince of Pless has a small herd at Promnitz, his Silesian estate, founded by the gift of a bull and three cows by Alexander II. in 1855, his herd being the source of the menagerie supply.

Bison feed on a coarse aromatic grass, and browse on the leaves, shoots, bark and twigs of trees.

The American bison is distinguished from its European cousin by the following among other features: The hind-quarters are weaker and fall away more suddenly, while the withers are proportionately higher. Especially characteristic is the great mass of brown or blackish brown hair clothing the head, neck and forepart of the body. The shape of the skull and horns is also different; the horns themselves being shorter, thicker, blunter and more sharply curved, while the forehead of the skull is more convex and the sockets of the eyes are more distinctly tubular. This species formerly ranged over a third of North America in countless numbers, but is now practically extinct. The great herd was separated into a northern and southern division by the completion of the Union Pacific railway, and the annual rate of destruction from 1870 to 1875 has been estimated at 2,500,000 head. In 1880 the completion of the Northern Pacific railway led to an attack upon the northern herd. The last of the Dakota bisons were destroyed by Indians in 1883, leaving then less than 1000 wild individuals in the United State.

A count which was concluded at the end of February 1903, put the number of captive bisons at 1119, of which 969 were in parks and zoological gardens in the United States, 41 in Canada and 109 in Europe. At the same time it was estimated that there were 34 wild bison in the United States and 600 in Canada.

In England small herds are kept by the duke of Bedford at Woburn Abbey, Bedfordshire, and by Mr C.J. Leyland at Haggerston Castle, Northumberland.

Two races of the American bison have been distinguished—the typical prairie form, and the woodland race, *B. bison athabascae*; but the two are very similar.

(R. L.*)

BISQUE (a French word of unknown origin, formerly spelt in English “bisk”), a term for odds given in the games of tennis, lawn tennis, croquet and golf; in the two former a bisque is one point to be taken at any time during a “set” at the choice of the receiver of the odds, while in croquet and golf it is one extra stroke to be taken similarly during a game. The name is given, in cookery, to a thick soup, made particularly of crayfish or lobsters.

BISSELL, GEORGE EDWIN (1839-), American sculptor, son of a quarryman and marble-cutter, was born at New Preston, Connecticut, on the 16th of February 1839. During the Civil War he served as a private in the 23rd Connecticut volunteers in the Department of the Gulf (1862-1863), and on being mustered out became acting assistant paymaster in the South Atlantic squadron. At the close of the war he joined his father in business. He studied the art of sculpture abroad in 1875-1876, and lived much in Paris during the years 1883-1896, with occasional visits to America. Among his more important works are the soldiers’ and sailors’ monument, and a statue of Colonel Chatfield, at Waterbury, Connecticut; and statues of General Gates at Saratoga, New York, of Chancellor John Watts in Trinity churchyard, New York City; of Colonel Abraham de Peyster in Bowling Green, New York City; of Abraham Lincoln at Edinburgh; of Burns and “Highland Mary,” in Ayr, Scotland; of

Chancellor James Kent, in the Congressional library, Washington; and of President Arthur in Madison Square, New York City.

BISSEXT, or Bissextus (Lat. *bis*, twice; *sextus*, sixth), the day intercalated by the Julian calendar in the February of every fourth year to make up the six hours by which the solar year was computed to exceed the year of 365 days. The day was inserted after the 24th of February, *i.e.* the 6th day before the calends (1st) of March; there was consequently, besides the *sextus*, or sixth before the calends, the *bis-sextus* or "second sixth," our 25th of February. In modern usage, with the exception of ecclesiastical calendars, the intercalary day is added for convenience at the end of the month, and years in which February has 29 days are called "bissextile," or leap-years.

BISTRE, the French name of a brown paint made from the soot of wood, now largely superseded by Indian ink.

BIT (from the verb "to bite," either in the sense of a piece bitten off, or an act of biting, or a thing that bites or is bitten), generally, a piece of anything; the word is, however, used in various special senses, all derivable from its origin, either literally or metaphorically. The most common of these are (1) its use as the name of various tools, *e.g.* centre-bit; (2) a horse's "bit," or the metal mouth-piece of the bridle; (3) in money, a small sum of money of varying value (*e.g.* threepenny-bit), especially in the West Indies and southern United States.

BITHUR, a town in the Cawnpore district of the United Provinces of India, 12 m. N.W. of Cawnpore city. Pop. (1901) 7173. It is chiefly notable for its connexion with the mutiny of 1857. The last of the peshwas, Baji Rao, was banished to Bithur, and his adopted son, the Nana Sahib, made the town his head-quarters. It was captured by Havelock on the 19th of July 1857, when the Nana's palaces were destroyed.

BITHYNIA (Βιθυνία), an ancient district in the N.W. of Asia Minor, adjoining the Propontis, the Thracian Bosporus and the Euxine. According to Strabo it was bounded on the E. by the river Sangarius; but the more commonly received division extended it to the Parthenius, which separated it from Paphlagonia, thus comprising the district inhabited by the Mariandyni. On the W. and S.W. it was separated from Mysia by the river Rhyndacus; and on the S. it adjoined Phrygia Epictetus and Galatia. It is in great part occupied by mountains and forests, but has valleys and districts near the sea-coast of great fertility. The most important mountain range is the (so-called) "Mysian" Olympus (7600 ft.), which towers above Brusa and is clearly visible as far away as Constantinople (70 m.). Its summits are covered with snow for a great part of the year. East of this the range now called Ala-Dagh

extends far above 100 m. from the Sangarius to Paphlagonia. Both of these ranges belong to that border of mountains which bounds the great tableland of Asia Minor. The country between them and the coast, covered with forests and traversed by few lines of route, is still imperfectly known. But the broad tract which projects towards the west as far as the shores of the Bosporus, though hilly and covered with forests—the Turkish Aghatch Denizi, or "The Ocean of Trees"—is not traversed by any mountain chain. The west coast is indented by two deep inlets, (1) the northernmost, the Gulf of Ismid (anc. Gulf of Astacus), penetrating between 40 and 50 m. into the interior as far as Ismid (anc. Nicomedia), separated by an isthmus of only about 25 m. from the Black Sea; (2) the Gulf of Mudania or Gemlik (Gulf of Cius), about 25 m. long. At its extremity is situated the small town of Gemlik (anc. Cius) at the mouth of a valley, communicating with the lake of Isnik, on which was situated Nicaea.

The principal rivers are the Sangarius (mod. Sakaria), which traverses the province from south to north; the Rhyndacus, which separated it from Mysia; and the Billaeus (Filiyas), which rises in the Ala-Dagh, about 50 m. from the sea, and after flowing by Boli (anc. Claudiopolis) falls into the Euxine, close to the ruins of the ancient Tium, about 40 m. north-east of Heraclea, having a course of more than 100 m. The Parthenius (mod. Bartan), the boundary of the province towards the east, is a much less considerable stream.

The natural resources of Bithynia are still imperfectly developed. Its vast forests would furnish an almost inexhaustible supply of timber, if rendered accessible by roads. Coal also is known to exist near Eregli (Heraclea). The valleys towards the Black Sea abound in fruit trees of all kinds, while the valley of the Sangarius and the plains near Brusa and Isnik (Nicaea) are fertile and well cultivated. Extensive plantations of mulberry trees supply the silk for which Brusa has long been celebrated, and which is manufactured there on a large scale.

According to ancient authors (Herodotus, Xenophon, Strabo, &c.), the Bithynians were an immigrant Thracian tribe. The existence of a tribe called Thyni in Thrace is well attested, and the two cognate tribes of the Thyni and Bithyni appear to have settled simultaneously in the adjoining parts of Asia, where they expelled or subdued the Mysians, Caucones, and other petty tribes, the Mariandyni alone maintaining themselves in the north-east. Herodotus mentions the Thyni and Bithyni as existing side by side; but ultimately the latter must have become the more important, as they gave their name to the country. They were incorporated by Croesus with the Lydian monarchy, with which they fell under the dominion of Persia (546 B.C.), and were included in the satrapy of Phrygia, which comprised all the countries up to the Hellespont and Bosporus. But even before the conquest by Alexander the Bithynians appear to have asserted their independence, and successfully maintained it under two native princes, Bas and Zipoetes, the last of whom transmitted his power to his son Nicomedes I., the first to assume the title of king. This monarch founded Nicomedia, which soon rose to great prosperity, and during his long reign (278-250 B.C.), as well as those of his successors, Prusias I., Prusias II. and Nicomedes II. (149-91 B.C.), the kingdom of Bithynia held a considerable place among the minor monarchies of Asia. But the last king, Nicomedes III., was unable to maintain himself against Mithradates of Pontus, and, after being restored to his throne by the Roman senate, he bequeathed his kingdom by will to the Romans (74 B.C.). Bithynia now became a Roman province. Its limits were frequently varied, and it was commonly united for administrative purposes with the province of Pontus. This was the state of things in the time of Trajan, when the younger Pliny was appointed governor of the combined provinces (103-105 A.D.), a circumstance to which we are indebted for valuable information concerning the Roman provincial administration. Under the Byzantine empire Bithynia was again divided into two provinces, separated by the Sangarias, to the west of which the name of Bithynia was restricted.

The most important cities were Nicomedia and Nicaea, which disputed with one another the rank of capital. Both of these were founded after Alexander the Great; but at a much earlier period the Greeks had established on the coast the colonies of Cius (afterwards Prusias, mod. Gemlik); Chalcedon, at the entrance of the Bosporus, nearly opposite Constantinople; and Heraclea Pontica, on the Euxine, about 120 m. east of the Bosporus. All these rose to be flourishing places of trade, as also Prusa at the foot of M. Olympus (see Brusa). The only other places of importance at the present day are Ismid (Nicomedia) and Scutari.

See C. Texier, *Ásie Mineure* (Paris, 1839); G. Perrot, *Calatie et Bithynie* (Paris, 1862); W. von Diest in *Petermanns Mittheilungen*, Ergansungshelt, 116 (Gotha, 1895).

(E. H. B.; F. W. Ha.)

BITLIS, or Betlis (Arm. *Paghesh*), the chief town of a vilayet of the same name in Asiatic Turkey, situated at an altitude of 4700 ft. in the deep, narrow valley of the Bitlis Chai, a tributary of the Tigris. The main part of the town and the bazaars are crowded alongside the stream, while suburbs with scattered houses among orchards and gardens extend up two tributary streams. The houses are massive and well built of a soft volcanic tufa, and with their courtyards and gardens climbing up the hillsides afford a striking picture. At the junction of two streams in the centre of the town is a fine old castle, partly ruined, which, according to local tradition, occupies the site of a fortress built by Alexander the Great. It is apparently an Arab building, as Arabic inscriptions appear on the walls, but as the town stands on the principal highway between the Van plateau and the Mesopotamian plain it must always have been of strategic importance. The bazaars are crowded, covered across with branches in summer, and typical of a Kurdish town. The population numbers 35,000, of whom about 12,000 are Armenians and the remainder are Kurds or of Kurdish descent.

Kurdish beys and sheids have much influence in the town and wild mountain districts adjoining, while the Sasun mountains, the scene of successive Armenian revolutions of late years, are not far off to the west. The town was ruled by a semi-independent Kurdish bey as late as 1836. There are some fine old mosques and *medresses* (colleges), and the Armenians have a large monastery and churches. There are British, French and Russian consuls in the town, and a branch of the American Mission with schools is established also. The climate is healthy and the thermometer rarely falls below 0° Fahr., but there is a heavy snowfall and the narrow streets are blocked for some five months in the year.

A good road runs southward down the pass, passing after a few miles some large chalybeate and sulphur springs. Roads also lead north to Mush and Erzerum and along the lake to Van. Postal communication is through Erzerum with Trebizond. Tobacco of an inferior quality is largely grown, and the chief industry is the weaving of a coarse red cloth. Manna and gum tragacanth are also collected. Fruit is also plentiful, and there are many vineyards close by.

The Bitlis vilayet comprises a very varied section of Asiatic Turkey, as it includes the Mush plain and the plateau country west of Lake Van, as well as a large extent of wild mountain districts inhabited by turbulent Kurds and Armenians on either side of the central town of Bitlis, also some of the lower country about Sairt along the left bank of the main stream of the Tigris. The mountains have been little explored, but are believed to be rich in minerals, iron, lead, copper, traces of gold and many mineral springs are known to exist.

(F. R. M.)

BITONTO (anc. *Butunti*), a town and episcopal see of Apulia, Italy, in the province of Bari, 10 m. west by steam tramway from Bari. Pop. (1901) 30,617. It was a place of no importance in classical times. Its medieval walls are still preserved. Its cathedral is one of the finest examples of the Romanesque architecture of Apulia, and has escaped damage from later restorations. The palazzo Sylos-Labini has a fine Renaissance court of 1502.

BITSCH (Fr. *Bitche*), a town of Germany, in Alsace-Lorraine, on the Horn, at the foot of the northern slope of the Vosges between Hagenau and Saargemund. Pop. (1905) 4000. There are a Roman Catholic and a Protestant church, a classical school and an academy of forestry. The industries include shoe-making and watch-making, and there is some trade in grain and timber. The town of Bitsch, which was formed out of the villages of Rohr and Kaltenhausen in the 17th century, derives its name from the old stronghold (mentioned in 1172 as Bytis Castrum) standing on a rock some 250 ft. above the town. This had long given its name to the countship of Bitsch, which was originally in the possession of the dukes of Lorraine. In 1297 it passed by marriage to Eberhard I. of Zweibrücken, whose line became extinct in 1569, when the countship reverted to Lorraine. It passed with that duchy to France in 1766. After that date the town rapidly increased in population. The citadel, which had been constructed by Vauban on the site of the old castle after the capture of Bitsch by

the French in 1624, had been destroyed when it was restored to Lorraine in 1698. This was restored and strengthened in 1740 into a fortress that proved impregnable in all succeeding wars. The attack upon it by the Prussians in 1793 was repulsed; in 1815 they had to be content with blockading it; and in 1870, though it was closely invested by the Germans after the battle of Wörth, it held out until the end of the war. A large part of the fortification is excavated in the red sandstone rock, and rendered bomb-proof; a supply of water is secured to the garrison by a deep well in the interior.

BITTER, KARL THEODORE FRANCIS (1867-), American sculptor, was born in Vienna on the 6th of December 1867. After studying art there, in 1889 he removed to the United States, where he became naturalized. In America he gained great popularity as a sculptor, and in 1906-1907 was president of the National Sculpture Society, New York. Among his principal works are: the Astor memorial gates, Trinity church, New York; “Elements Controlled and Uncontrolled,” on the Administration Building at the Chicago Exposition; a large relief, “Triumph of Civilization,” in the waiting-room of the Broad Street station of the Pennsylvania railway in Philadelphia; decorations for the Dewey Naval Arch in New York City; the “Standard Bearers,” at the Pan-American Exposition grounds; a sitting statue and a bust of Dr Pepper, provost of the University of Pennsylvania; and the Villard and Hubbard memorials in the New York chamber of commerce.

BITTERFELD, a town of Germany, in the Prussian province of Saxony, 26 m. N. from Leipzig by rail, on the river Mulde, and an important junction of railways from Leipzig and Halle to Berlin. Pop. (1900) 11,839. It manufactures drain-pipes, paper-roofing and machinery, and has saw-mills. Several coal-mines are in the vicinity. The town was built by a colony of Flemish immigrants in 1153. It was captured by the landgrave of Meissen in 1476, and belonged thenceforth to Saxony, until it was ceded to Prussia in 1815. Owing to its pleasant situation and accessibility, it has become a favourite residence of business men of Leipzig and Halle.

BITTERLING (*Rhodeus amarus*), a little carp-like fish of central Europe, belonging to the Cyprinid family. In it we have a remarkable instance of symbiosis. The genital papilla of the female acquires a great development during the breeding season and becomes produced into a tube nearly as long as the fish itself; this acts as an ovipositor by means of which the comparatively few and large eggs (3 millimetres in diameter) are introduced through the gaping valves between the branchiae of pond mussels (*Unio* and *Anodonta*), where, after being inseminated, they undergo their development, the fry leaving their host about a month later. The mollusc reciprocates by throwing off its embryos on the parent fish, in the skin of which they remain encysted for some time, the period of reproduction of the fish and the mussel coinciding.

BITTERN, a genus of wading birds, belonging to the family *Ardeidae*, comprising several species closely allied to the herons, from which they differ chiefly in their shorter neck, the back of which is covered with down, and the front with long feathers, which can be raised at pleasure. They are solitary birds, frequenting countries possessing extensive swamps and

marshy grounds, remaining at rest by day, concealed among the reeds and bushes of their haunts, and seeking their food, which consists of fish, reptiles, insects and small quadrupeds, in the twilight. The common bittern (*Botaurus stellaris*) is nearly as large as the heron, and is widely distributed over the eastern hemisphere. Formerly it was common in Britain, but extensive drainage and persecution have greatly dimished its numbers and it is now only an uncertain visitor. Not a winter passes without its appearing in some numbers, when its uncommon aspect, its large size, and beautifully pencilled plumage cause it to be regarded as a great prize by the lucky gun-bearer to whom it falls a victim. Its value as a delicacy for the table, once so highly esteemed, has long vanished. The old fable of this bird inserting its beak into a reed or plunging it into the ground, and so causing the booming sound with which its name will always be associated, is also exploded, and nowadays indeed so few people in Britain have ever heard its loud and awful voice, which seems to be uttered only in the breeding-season, and is therefore unknown in a country where it no longer breeds, that incredulity as to its booming at all has in some quarters succeeded the old belief in this as in other reputed peculiarities of the species. The bittern in the days of falconry was strictly preserved, and afforded excellent sport. It sits crouching on the ground during the day, with its bill pointing in the air, a position from which it is not easily roused, and even when it takes wing, its flight is neither swift nor long sustained. When wounded it requires to be approached with caution, as it will then attack either man or dog with its long sharp bill and its acute claws. It builds a rude nest among the reeds and flags, out of materials which surround it, and the female lays four or five eggs of a brownish olive. During the breeding season it utters a booming noise, from which it probably derives its generic name, *Botaurus*, and which has made it in many places an object of superstitious dread. Its plumage for the most part is of a pale buff colour, rayed and speckled with black and reddish brown. The American bittern (*Botaurus lentiginosus*) is somewhat smaller than the European species, and is found throughout the central and southern portions of North America. It also occurs in Britain as an occasional straggler. It is distinguishable by its uniform greyish-brown primaries, which want the tawny bars that characterize *B. stellaris*. Both species are good eating.

Bittern.

BITTERN (from “bitter”), the mother liquor obtained from sea-water or brines after the separation of the sodium chloride (common salt) by crystallization. It contains various magnesium salts (sulphate, chloride, bromide and iodide) and is employed commercially for

the manufacture of Epsom salts (magnesium sulphate) and bromine. The same term is applied to a mixture of quassia, iron sulphate, *cocculus indicus*, liquorice, &c., used in adulterating beer.

BITTERS, the name given to aromatized (generally alcoholic) beverages containing a bitter substance or substances, used as tonics, appetizers or digestives. The bitterness is imparted by such substances as bitter orange rind, gentian, rhubarb, quassia, cascarilla, angostura, quinine and cinchona. Juniper, cinnamon, carraway, camomile, cloves and other flavouring agents are also employed in conjunction with the bitter principles, alcohol and sugar. Some bitters are prepared by simple maceration and subsequent filtration (see LIQUEURS), others by the more complicated distillation process. Those prepared by the latter process are the finer commercial articles. Bitters are usually sold under the name of the substance which has been used to give them the predominant flavour, such as orange, angostura or peach bitters, &c. The alcoholic strength of bitters varies, but is generally in the neighbourhood of 40% of alcohol. Some bitters, although possessing tonic properties, may be regarded as beverages pure and simple, notwithstanding the fact that they are seldom consumed in an undiluted state; others again, are obviously medicinal preparations and should be treated as such.

BITUMEN, the name applied by the Romans to the various descriptions of natural hydrocarbons, the word *petroleum* not being used in classical Latin. In its widest sense it embraces the whole range of these substances, including *natural gas*, the more or less liquid descriptions of *petroleum*, and the solid forms of *asphalt, albertite, gilsonite* or *uintahite, elaterite, ozokerite* and *hatchettite*. To distinguish bitumen intermediate in consistency between asphalt and the more liquid kinds of crude petroleum, the term *maltha* (Latin) is frequently employed. The bitumens of chief commercial importance may be grouped under the three headings of (1) *natural gas*, (2) *petroleum*, and (3) *asphalt*, and will be found fully described under these titles. In the scriptures there are numerous references to bitumen, among which the following may be quoted:—In Genesis ix. 3, we are told that in the building of the tower of Babel “slime had they for mortar,” and in Genesis xiv. 10, that the vale of Siddim “was full of slime-pits,” the word slime in the latter quotation from our version appearing as *bitumen* in the Vulgate. Herodotus alludes to the use of the bitumen brought down by the Is, a tributary of the Euphrates, as mortar in building the walls of Babylon. Diodorus, Curtius, Josephus, Bochart and others make similar mention of this use of bitumen, and Vitruvius tells us that it was employed in admixture with clay.

In its various forms, bitumen is one of the most widely distributed of substances. It occurs, though sometimes only in small quantity, in almost every part of the globe, and throughout the whole range of geological strata, from the Laurentian rocks to the most recent members of the Quaternary period. Although the gaseous and liquid forms of bitumen may be regarded as having been formed in the strata in which they are found or as having been received into such strata shortly after formation, the semi-solid and solid varieties may be considered to have been produced by the oxidation and evaporation of liquid petroleum escaping from underlying or better preserved deposits into other strata, or into fissures where atmospheric action and loss of the more volatile constituents can take place. It should, however, be stated that there is some difference of opinion as to the precise manner of production of some of the solid forms of bitumen, and especially of ozokerite.

(B. R.)

BITURIGES, a Celtic people, according to Livy (v. 34) the most powerful in Gaul in the

time of Tarquinius Priscus. At some period unknown they split up into two branches—Bituriges Cubi and Bituriges Vivisci. The name is supposed to mean either “rulers of the world” or “perpetual kings.”

The Bituriges Cubi, called simply Bituriges by Caesar, in whose time they acknowledged the supremacy of the Aedui, inhabited the modern diocese of Bourges, including the departments of Cher and Indre, and partly that of Allier. Their chief towns were Avaricum (Bourges), Argentomagus (Argenton-sur-Creuse), Neriomagus (Néris-les-Bains), Noviodunum (perhaps Villate). At the time of the rebellion of Vercingetoix (52 B.C.), Avaricum, after a desperate resistance, was taken by assault, and the inhabitants put to the sword. In the following year, the Bituriges submitted to Caesar, and under Augustus they were incorporated (in 28 B.C.) in Aquitania. Pliny (*Nat. Hist.* iv. 109) speaks of them as *liberi*, which points to their enjoying a certain amount of independence under Roman government. The district contained a number of iron works, and Caesar says they were skilled in driving galleries and mining operations.

The Biturgies Vivisci occupied the strip of land between the sea and the left bank of the Garonne, comprising the greater part of the modern department of Gironde. Their capital was Burdigala (Bordeaux), even then a place of considerable importance and a wine-growing centre. Like the Cubi, they also are called *liberi* by Pliny.

See A. Desjardins, *Géographie historique de la Gaule romaine*, ii. (1876-1893); A. Longnon, *Géographie de la Gaule on VI^e siècle* (1878); A. Hohler, *Alt-celtischer Sprachschatz*; T.R. Holmes, *Caesar’s Conquest of Gaul* (1899).

BITZIUS, ALBRECHT (1797-1854), Swiss novelist, best known by his pet name of “Jeremias Gotthelf,” was born on the 4th of October 1797 at Morat, where his father was pastor. In 1804 the home was moved to Utzenstorf, a village in the Bernese Emmenthal. Here young Bitzius grew up, receiving his early education and consorting with the boys of the village, as well as helping his father to cultivate his glebe. In 1812 he went to complete his education at Bern, and in 1820 was received as a pastor. In 1821 he visited the university of Göttingen, but returned home in 1822 to act as his father’s assistant. On his father’s death (1824) he went in the same capacity to Herzogenbuchsee, and later to Bern (1829). Early in 1831 he went as assistant to the aged pastor of the village of Lützelflüh, in the Upper Emmenthal (between Langnau and Burgdorf), being soon elected his successor (1832) and marrying one of his granddaughters (1833). He spent the rest of his life there, dying on the 22nd of October 1854, and leaving three children (the son was a pastor, the two daughters married pastors). His first work, the *Bauernspiegel*, appeared in 1837. It purported to be the life of Jeremias Gotthelf, narrated by himself, and this name was later adopted by the author as his pen name. It is a living picture of Bernese (or, strictly speaking, Emmenthal) village life, true to nature, and not attempting to gloss over its defects and failings. It is written (like the rest of his works) in the Bernese dialect of the Emmenthal, though it must be remembered that Bitzius was not (like Auerbach) a peasant by birth, but belonged to the educated classes, so that he reproduces what he had seen and learnt, and not what he had himself personally experienced. The book was a great success, as it was a picture of real life, and not of fancifully beribboned 18th-century villagers. Among his later tales are the *Leiden und Freuden eines Schulmeisters* (1838-1839), *Uli der Knecht* (1841), with its continuation, *Uli der Pachter* (1849), *Anne Babi Jowager* (1843-1844), *Käthi die Grossmutter* (1847), *Die Käserei in der Vehfreude* (1850), and the *Erlebnisse eines Schuldenbauers* (1854). He published also several volumes of shorter tales. One slight drawback to some of his writings is the echo of local political controversies, for Bitzius was a Whig and strongly opposed to the Radical party in the canton, which carried the day in 1846.

Lives by C. Manuel, in the Berlin edition of Bitzius’s works (Berlin, 1861), and by J. Ammann in vol. i. (Bern, 1884) of the *Sammlung Bernischer Biographien*. His works were issued in 24 vols. at Berlin, 1856-1861, while 10 vols., giving the original text of each story, were issued at Bern, 1898-1900 (edition not to be completed).

(W. A. B. C.)

BIVOUAC (a French word generally said to have been introduced during the Thirty Years' War, perhaps derived from *Beiwacht*, extra guard), originally, a night-watch by a whole army under arms to prevent surprise. In modern military parlance the word is used to mean a temporary encampment in the open field without tents, as opposed to "billets" or "cantonment" on the one hand and "camp" on the other. The use of bivouacs permits an army to remain closely concentrated for all emergencies, and avoids the necessity for numerous wagons carrying tents. Constant bivouacs, however, are trying to the health of men and horses, and this method of quartering is never employed except when the military situation demands concentration and readiness. Thus the outposts would often have to bivouac while the main body of the army lay in billets.

BIWA, a lake in the province of Omi, Japan. It measures 36 m. in length by 12 m. in extreme breadth, has an area of 180 sq. m., is about 330 ft. above sea-level, and has an extreme depth of some 300 ft. There are a few small islands in the lake, the principal being Chikubu-shima at the northern end.

Tradition alleges that Lake Biwa and the mountain of Fuji were produced simultaneously by an earthquake in 286 B.C. On the west of the lake the mountains Hiei-zan and Hira-yama slope down almost to its margin, and on the east a wide plain extends towards the boundaries of the province of Mino. It is drained by a river flowing out of its southern end, and taking its course into the sea at Osaka. This river bears in succession the names of Seta-gawa, Uji-gawa and Yodo-gawa. The lake abounds with fish, and the beauty of its scenery is remarkable. Small steamboats ply constantly to the points of chief interest, and around its shores are to be viewed the *Omi-no-hakkei*, or "eight landscapes of Omi"; namely, the lake silvering under an autumn moon as one looks down from Ishi-yama; the snow at eve on Hira-yama; the glow of sunset at Seta; the groves and classic temple of Mii-dera as the evening bell sounds; boats sailing home from Yabase; cloudless peaks at Awazu; rain at nightfall over Karasaki; and wild geese sweeping down to Katata. The lake is connected with Kyoto by a canal constructed in 1890, and is thus brought into water communication with Osaka.

BIXIO, NINO (1821-1873), Italian soldier, was born on the 2nd of October 1821. While still a boy he was compelled by his parents to embrace a maritime career. After numerous adventures he returned to Italy in 1846, joined the Giovine Italia, and, on 4th November 1847, made himself conspicuous at Genoa by seizing the bridle of Charles Albert's horse and crying, "Pass the Ticino, Sire, and we are all with you." He fought through the campaign of 1848, became captain under Garibaldi at Rome in 1849, taking prisoners an entire French battalion, and gaining the gold medal for military valour. In 1859 he commanded a Garibaldian battalion, and gained the military cross of Savoy. Joining the Marsala expedition in 1860, he turned the day in favour of Garibaldi at Calatafimi, was wounded at Palermo, but recovered in time to besiege Reggio in Calabria (21st of August 1860), and, though again wounded, took part in the battle of Volturno, where his leg was broken. Elected deputy in 1861, he endeavoured to reconcile Cavour and Garibaldi. In 1866, at the head of the seventh division, he covered the Italian retreat from Custozza, ignoring the Austrian summons to surrender. Created senator in February 1870, he was in the following September given command of a division during the movement against Rome, took Cività Vecchia, and participated in the general attack upon Rome (20th September 1870). He died of cholera at Achin Bay in Sumatra *en route* for Batavia, whither he had gone in command of a commercial expedition (16th December 1873).

BIZERTA (properly pronounced Ben Zert; Fr. *Bizerte*), a seaport of Tunisia, in 37° 17′ N., 9° 50′ E. Pop. about 12,000. Next to Toulon, Bizerta is the most important naval port of France in the Mediterranean. It occupies a commanding strategical position in the narrowest part of the sea, being 714 m. E. of Gibraltar, 1168 m. W.N.W. of Port Said, 240 m. N.W. of Malta, and 420 m. S. by E. of Toulon. It is 60 m. by rail N.N.W. of Tunis. The town is built on the shores of the Mediterranean at the point where the Lake of Bizerta enters the sea through a natural channel, the mouth of which has been canalized. The modern town lies almost entirely on the north side of the canal. A little farther north are the ancient citadel, the walled "Arab" town and the old harbour (disused). The present outer harbour covers about 300 acres and is formed by two converging jetties and a breakwater. The north jetty is 4000 ft. long, the east jetty 3300 ft., and the breakwater—which protects the port from the prevalent north-east winds—2300 ft. long. The entrance to the canal is in the centre of the outer harbour. The canal is 2600 ft. long and 787 ft. wide on the surface. Its banks are lined with quays, and ships drawing 26 ft. of water can moor alongside. At the end of the canal is a large commercial harbour, beyond which the channel opens into the lake—in reality an arm of the sea—roughly circular in form and covering about 50 sq. m., two-thirds of its waters having a depth of 30 to 40 ft. The lake, which merchant vessels are not allowed to enter, contains the naval port and arsenal. There is a torpedo and submarine boat station on the north side of the channel at the entrance to the lake, but the principal naval works are at Sidi Abdallah at the south-west corner of the lake and 10 m. from the open sea. Here is an enclosed basin covering 123 acres with ample quayage, dry docks and everything necessary to the accommodation, repair, revictualling and coaling of a numerous fleet. Barracks, hospitals and waterworks have been built, the military town, called Ferryville, being self-contained.

Fortifications have been built for the protection of the port. They comprise (a) the older works surrounding the town; (b) a group of coast batteries on the high ground of Cape Bizerta or Guardia, 4 m. north-north-west of the town; these are grouped round a powerful fort called Jebel Kebir, and have a command of 300 to 800 ft. above sea-level; (c) another group of batteries on the narrow ground between the sea and the lake to the east of the town; the highest of these is the Jebel Tuila battery 265 ft. above sea-level.

The Lake of Bizerta, called Tinja by the Arabs, abounds in excellent fish, especially mullets, the dried roe of which, called *botargo*, is largely exported, and the fishing industry employs a large proportion of the inhabitants. The western shore of the lake is low, and in many places is covered with olive trees to the water's edge. The south-eastern shores are hilly and wooded, and behind them rises a range of picturesque hills. A narrow and shallow channel leads from the western side of the lake into another sheet of water, the Lake of Ishkul, so called from Jebel Ishkul, a hill on its southern bank 1740 ft. high. The Lake of Ishkul is nearly as large as the first lake, but is very shallow. Its waters are generally sweet.

Bizerta occupies the site of the ancient Tyrian colony, Hippo Zarytus or Diarrhytus, the harbour of which, by means of a spacious pier, protecting it from the north-east wind, was rendered one of the safest and finest on this coast. The town became a Roman colony, and was conquered by the Arabs in the 7th century. The place thereafter was subject either to the rulers of Tunis or of Constantine, but the citizens were noted for their frequent revolts. They threw in their lot (c. 1530) with the pirate Khair-ed-Din, and subsequently received a Turkish garrison. Bizerta was captured by the Spaniards in 1535, but not long afterwards came under the Tunisian government. Centuries of neglect followed, and the ancient port was almost choked up, though the value of the fisheries saved the town from utter decay. Its strategical importance was one of the causes which led to the occupation of Tunisia by the French in 1881. In 1890 a concession for a new canal and harbour was granted to a company, and five years later the new port was formally opened. Since then the canal has been widened and deepened, and the naval port at Sidi Abdallah created.

BIZET [Alexandre César Léopold] **GEORGES** (1838-1875), French musical composer, was born at Bougival, near Paris, on the 25th of October 1838, the son of a singing-master. He displayed musical ability at an early age, and was sent to the Paris Conservatoire, where he studied under Halévy and speedily distinguished himself, carrying off prizes for organ and fugue, and finally in 1857, after an ineffectual attempt in the previous year, the Grand Prix de Rome for a cantata called *Cloris et Clotilde*. A success of a different kind also befell him

at this time. Offenbach, then manager of the Théâtre des Bouffes-Parisiens, had organized a competition for an operetta, in which young Bizet was awarded the first prize in conjunction with Charles Lecocq, each of them writing an operetta called *Docteur Miracle*. After the three years spent in Rome, an obligation imposed by the French government on the winners of the first prize at the Conservatoire, Bizet returned to Paris, where he achieved a reputation as a pianist and accompanist. On the 23rd of September 1863 his first opera, *Les Pêcheurs de perles*, was brought out at the Théâtre Lyrique, but owing possibly to the somewhat uninteresting nature of the story, the opera did not enjoy a very long run. The qualities displayed by the composer, however, were amply recognized, although the music was stated, by some critics, to exhibit traces of Wagnerian influence. Wagnerism at that period was a sort of spectre that haunted the imagination of many leading members of the musical press. It sufficed for a work to be at all out of the common for the epithet "Wagnerian" to be applied to it. The term, it may be said, was intended to be condemnatory, and it was applied with little understanding as to its real meaning. The score of the *Pêcheurs de perles* contains several charming numbers; its dreamy melodies are well adapted to fit a story laid in Eastern climes, and the music reveals a decided dramatic temperament. Some of its dances are now usually introduced into the fourth act of *Carmen*.

On the 3rd of June 1865 Bizet married a daughter of his old master, Halévy. His second opera, *La Jolie Fitte de Perth*, produced at the Théâtre Lyrique on 26th December 1867, was scarcely a step in advance. The libretto was founded on Sir Walter Scott's novel, but the opera lacks unity of style, and its pages are marred by concessions to the vocalist. One number has survived, the characteristic Bohemian dance which has been interpolated into the fourth act of *Carmen*. In his third opera Bizet returned to an oriental subject. *Djamileh*, a one-act opera given at the Opéra Comique on the 22nd of May 1872, is certainly one of his most individual efforts. Again were accusations of Wagnerism hurled at the composer's head, and *Djamileh* did not achieve the success it undoubtedly deserved. The composer was more fortunate with the incidental music he wrote to Alphonse Daudet's drama, *L'Arlésienne*, produced in October 1872. Different numbers from this, arranged in the form of suites, have often been heard in the concert-room. Rarely have poetry and imagination been so well allied as in these exquisite pages, which seem to reflect the sunny skies of Provence.

Bizet's masterpiece, *Carmen*, was brought out at the Opéra Comique on the 3rd of March 1875. It was based on a version by Meilhac and Halévy of a study by Prosper Mérimée—in which the dramatic element was obscured by much descriptive writing. The detection of the drama underlying this psychological narrative was in itself a brilliant discovery, and in reconstructing the story in dramatic form the authors produced one of the most famous libretti in the whole range of opera. Still more striking than the libretto was the music composed by Bizet, in which the peculiar use of the flute and of the lowest notes of the harp deserves particular attention.

On the 3rd of June, three months after the production of *Carmen* in Paris, the genial composer expired after a few hours' illness from a heart affection. Before dying he had the satisfaction of knowing that *Carmen* had been accepted for production at Vienna. After the Austrian capital came Brussels, Berlin and, in 1878, London, when *Carmen* was brought out at Her Majesty's theatre with immense success. The influence exercised by Bizet on dramatic music has been very great, and may be discerned in the realistic works of the young Italian school, as well as in those of his own countrymen.

BJÖRNEBORG (Finnish, *Pori*), a district town of Finland, province of Åbo-Björneborg, on the E. coast of the Gulf of Bothnia, at the mouth of the Kumo. Lat. 51° 8′ N., long. 46° 0′ E. Pop. (1904) 16,053, mostly Swedes. Large vessels cannot enter its roadstead, and stop at Räfsö. The town has shipbuilding wharves, machine works, and several tanneries and brick-works, and has a total trade of over 16,000,000 marks, the chief export being timber.

BJÖRNSON, BJÖRNSTJERNE (1832-1910), Norwegian poet, novelist and dramatist, was born on the 8th of December 1832 at the farmstead of Björngen, in Kvikne, in Österdal, Norway. In 1837 his father, who had been pastor of Kvikne, was transferred to the parish of Noesset, in Romsdal; in this romantic district the childhood of Björnson was spent. After some teaching at the neighbouring town of Molde, he was sent at the age of seventeen to a well-known school in Christiania to study for the university; his instinct for poetry was already awakened, and indeed he had written verses from his eleventh year. He matriculated at the university of Christiania in 1852, and soon began to work as a journalist, especially as a dramatic critic. In 1857 appeared *Synnöve Solbakken*, the first of Björnson's peasant-novels; in 1858 this was followed by *Arne*, in 1860 by *A Happy Boy*, and in 1868 by *The Fisher Maiden*. These are the most important specimens of his *bonde-fortaellinger* or peasant-tales—a section of his literary work which has made a profound impression in his own country, and has made him popular throughout the world. Two of the tales, *Arne* and *Synnöve Solbakken*, offer perhaps finer examples of the pure peasant-story than are to be found elsewhere in literature.

Björnson was anxious "to create a new saga in the light of the peasant," as he put it, and he thought this should be done, not merely in prose fiction, but in national dramas or *folke-stykker*. The earliest of these was a one-act piece the scene of which is laid in the 12th century, *Between the Battles*, was written in 1855, but not produced until 1857. He was especially influenced at this time by the study of Baggesen and Ochlenschläger, during a visit to Copenhagen 1856-1857. *Between the Battles* was followed by *Lame Hulda* in 1858, and *King Sverre* in 1861. All these efforts, however, were far excelled by the splendid trilogy of *Sigurd the Bastard*, which Björnson issued in 1862. This raised him to the front rank among the younger poets of Europe. His *Sigurd the Crusader* should be added to the category of these heroic plays, although it was not printed until 1872.

At the close of 1857 Björnson had been appointed director of the theatre at Bergen, a post which he held, with much journalistic work, for two years, when he returned to the capital. From 1860 to 1863 he travelled widely throughout Europe. Early in 1865 he undertook the management of the Christiania theatre, and brought out his popular comedy of *The Newly Married* and his romantic tragedy of *Mary Stuart in Scotland*. Although Björnson has introduced into his novels and plays songs of extraordinary beauty, he was never a very copious writer of verse; in 1870 he published his *Poems and Songs* and the epic cycle called *Arnljot Gelline*; the latter volume contains the magnificent ode called "Bergliot," Björnson's finest contribution to lyrical poetry. Between 1864 and 1874, in the very prime of life, Björnson displayed a slackening of the intellectual forces very remarkable in a man of his energy; he was indeed during these years mainly occupied with politics, and with his business as a theatrical manager. This was the period of Björnson's most fiery propaganda as a radical agitator. In 1871 he began to supplement his journalistic work in this direction by delivering lectures over the length and breadth of the northern countries. He possessed to a surprising degree the arts of the orator, combined with a magnificent physical prestige. From 1873 to 1876 Björnson was absent from Norway, and in the peace of voluntary exile he recovered his imaginative powers. His new departure as a dramatic author began with *A Bankruptcy* and *The Editor* in 1874, social dramas of an extremely modern and realistic cast.

The poet now settled on his estate of Aulestad in Gausdal. In 1877 he published another novel, *Magnhild*—an imperfect production, in which his ideas on social questions were seen to be in a state of fermentation, and gave expression to his republican sentiments in the polemical play called *The King*, to a later edition of which he prefixed an essay on "Intellectual Freedom," in further explanation of his position. *Captain Mansana*, an episode of the war of Italian independence, belongs to 1878. Extremely anxious to obtain a full success on the stage, Björnson concentrated his powers on a drama of social life, *Leonardo* (1879), which raised a violent controversy. A satirical play, *The New System*, was produced a few weeks later. Although these plays of Björnson's second period were greatly discussed, none of them (except *A Bankruptcy*) pleased on the boards. When once more he produced a social drama, *A Gauntlet*, in 1883, he was unable to persuade any manager to stage it, except in a modified form, though this play gives the full measure of his power as a dramatist. In the autumn of the same year, Björnson published a mystical or symbolic drama *Beyond our Powers*, dealing with the abnormal features of religious excitement with extraordinary force; this was not acted until 1899, when it achieved a great success.

Meanwhile, Björnson's political attitude had brought upon him a charge of high treason, and he took refuge for a time in Germany, returning to Norway in 1882. Convinced that the theatre was practically closed to him, he turned back to the novel, and published in 1884, *Flags are Flying in Town and Port*, embodying his theories on heredity and education. In

1889 he printed another long and still more remarkable novel, *In God's Way*, which is chiefly concerned with the same problems. The same year saw the publication of a comedy, *Geography and Love*, which continues to be played with success. A number of short stories, of a more or less didactic character, dealing with startling points of emotional experience, were collected in 1894; among them those which produced the greatest sensation were *Dust, Mother's Hands*, and *Absalom's Hair*. Later plays were a political tragedy called *Paul Lange and Tora Parsberg* (1898), a second part of *Beyond our Powers* (1895), *Laboremus* (1901), *At Storhove* (1902), and *Daglannet* (1904). In 1899, at the opening of the National theatre, Björnson received an ovation, and his saga-drama of *Sigurd the Crusader* was performed.

A subject which interested him greatly, and on which he occupied his indefatigable pen, was the question of the *bonde-maal*, the adopting of a national language for Norway distinct from the *dansk-norsk* (Dano-Norwegian), in which her literature has hitherto been written. Björnson's strong and sometimes rather narrow patriotism did not blind him to the fatal folly of such a proposal, and his lectures and pamphlets against the *maal-straev* in its extreme form did more than anything else to save the language in this dangerous moment. Björnson was one of the original members of the Nobel committee, and was re-elected in 1900. In 1903 he was awarded the Nobel prize for literature. Björnson had done as much as any other man to rouse Norwegian national feeling, but in 1903, on the verge of the rupture between Norway and Sweden, he preached conciliation and moderation to the Norwegians. He was an eloquent advocate of Pan-Germanism, and, writing to the *Figaro* in 1905, he outlined a Pan-Germanic alliance of northern Europe and North America. He died on the 26th of April 1910.

See Björnson's *Samlede Vaerker* (Copenhagen, 1900-1902, 11 vols.); *The Novels of Björnstjerne Björnson* (1894, &c.), edited by Edmund Gosse; G. Brandes, *Critical Studies* (1899); E. Tissot, *Le drame norvégien* (1893); C.D. af Wirsén, *Kritiker* (1901); Chr. Collin, *Björnstjerne Björnson* (2 vols., German ed., 1903), the most complete biography and criticism at present available; and B. Halvorsen, *Norsk Forfatter Lexikon* (1885).

(E. G.)

BLACHFORD, FREDERIC ROGERS, Baron (1811-1889), British civil servant, eldest son of Sir Frederick Leman Rogers, 7th Bart. (whom he succeeded in the baronetcy in 1851), was born in London on the 31st of January 1811. He was educated at Eton and Oriel college, Oxford, where he had a brilliant career, winning the Craven University scholarship, and taking a double first-class in classics and mathematics. He became a fellow of Oriel (1833), and won the Vinerian scholarship (1834), and fellowship (1840). He was called to the bar in 1837, but never practised. At school and at Oxford he was a contemporary of W.E. Gladstone, and at Oxford he began a lifelong friendship with J.H. Newman and R.W. Church; his classical and literary tastes, and his combination of liberalism in politics with High Church views in religion, together with his good social position and interesting character, made him an admired member of their circles. For two or three years (1841-1844) he wrote for *The Times*, and he helped to found *The Guardian* in 1846; he also did a good deal to assist the Tractarian movement. But he eventually settled down to the life of a government official. He began in 1844 as registrar of joint-stock companies, and in 1846 became commissioner of lands and emigration. Between 1857 and 1859 he was engaged in government missions abroad, connected with colonial questions, and in 1860 he was appointed permanent under-secretary of state for the colonies. Sir Frederic Rogers was the guiding spirit of the colonial office under six successive secretaries of state, and on his retirement in 1871 was raised to the peerage as Baron Blachford of Wisdome, a title taken from his place in Devonshire. He died on the 21st of November 1889.

A volume of his letters, edited by G.E. Marindin (1896), contains an interesting Life, partly autobiographical.

BLACK, ADAM (1784-1874), Scottish publisher, founder of the firm of A. & C. Black, the son of a builder, was born in Edinburgh on the 20th of February 1784. After serving his apprenticeship to the bookselling trade in Edinburgh and London, he began business for himself in Edinburgh in 1808. By 1826 he was recognized as one of the principal booksellers in the city; and a few years later he was joined in business by his nephew Charles. The two most important events connected with the history of the firm were the publication of the 7th, 8th and 9th editions of the *Encyclopaedia Brittannica*, and the purchase of the stock and copyright of the Waverley Novels. The copyright of the *Encyclopaedia* passed into the hands of Adam Black and a few friends in 1827. In 1851 the firm bought the copyright of the Waverley Novels for £27,000; and in 1861 they became the proprietors of De Quincey's works. Adam Black was twice lord provost of Edinburgh, and represented the city in parliament from 1856 to 1865. He retired from business in 1865, and died on the 24th of January 1874. He was succeeded by his sons, who removed their business in 1895 to London. There is a bronze statue of Adam Black in East Princes Street Gardens, Edinburgh.

See *Memoirs of Adam Black*, edited by Alexander Nicholson (2nd ed., Edinburgh, 1885).

BLACK, JEREMIAH SULLIVAN (1810-1883), American lawyer and statesman, was born in Stony Creek township, Somerset county, Pennsylvania, on the 10th of January 1810. He was largely self-educated, and before he was of age was admitted to the Pennsylvania bar. He gradually became one of the leading American lawyers, and in 1851-1857 was a member of the supreme court of Pennsylvania (chief-justice 1851-1854). In 1857 he entered President Buchanan's cabinet as attorney-general of the United States. In this capacity he successfully contested the validity of the "California land claims"—claims to about 19,000 sq. m. of land, fraudulently alleged to have been granted to land-grabbers and others by the Mexican government prior to the close of the Mexican War. From the 17th of December 1860 to the 4th of March 1861 he was secretary of state. Perhaps the most influential of President Buchanan's official advisers, he denied the constitutionality of secession, and urged that Fort Sumter be properly reinforced and defended. "For ... the vigorous assertion at last in word and in deed that the United States is a nation," says James Ford Rhodes, "for pointing out the way in which the authority of the Federal government might be exercised without infringing on the rights of the states, the gratitude of the American people is due to Jeremiah S. Black." He became reporter to the Supreme Court of the United States in 1861, but after publishing the reports for the years 1861 and 1862 he resigned, and devoted himself almost exclusively to his private practice, appearing in such important cases before the Supreme Court as the one known as *Ex-Parte Milligan*, in which he ably defended the right of trial by jury, the McCardle case and the *United States* v. *Blyew et al*. After the Civil War he vigorously opposed the Congressional plan of reconstructing the late Confederate states, and himself drafted the message of President Johnson, vetoing the Reconstruction Act of the 2nd of March 1867. Black was also for a short time counsel for President Andrew Johnson, in his trial on the article of impeachment, before the United States Senate, and for William W. Belknap (1829-1890), secretary of war from 1869 to 1876, who in 1876 was impeached on a charge of corruption; and with others he represented Samuel J. Tilden during the contest for the presidency between Tilden and Hayes (see Electoral Commission). He died at Brockie, Pennsylvania, on the 19th of August 1883.

See *Essays and Speeches of Jeremiah S. Black, with a Biographical Sketch* (New York, 1885), by his son, C.F. Black.

BLACK, JOSEPH (1728-1799), Scottish chemist and physicist, was born in 1728 at Bordeaux, where his father—a native of Belfast but of Scottish descent—was engaged in the wine trade. At the age of twelve he was sent to a grammar school in Belfast, whence he removed in 1746 to study medicine in Glasgow. There he had William Cullen for his instructor in chemistry, and the relation between the two soon became that of professor and assistant rather than of master and pupil. The action of lithontriptic medicines, especially

lime-water, was one of the questions of the day, and through his investigations of this subject Black was led to the chemical discoveries associated with his name. The causticity of alkaline bodies was explained at that time as depending on the presence in them of the principle of fire, “phlogiston”; quicklime, for instance, was chalk which had taken up phlogiston, and when mild alkalis such as sodium or potassium carbonate were causticized by its aid, the phlogiston was supposed to pass from it to them. Black showed that on the contrary causticization meant the loss of something, as proved by loss of weight; and this something he found to be an “air,” which, because it was fixed in the substance before it was causticized, he spoke of as “fixed air.” Taking *magnesia alba*, which he distinguished from limestone with which it had previously been confused, he showed that on being heated it lost weight owing to the escape of this fixed air (named carbonic acid by Lavoisier in 1781), and that the weight was regained when the calcined product was made to reabsorb the fixed air with which it had parted. These investigations, by which Black not only gave a great impetus to the chemistry of gases by clearly indicating the existence of a gas distinct from common air, but also anticipated Lavoisier and modern chemistry by his appeal to the balance, were described in the thesis *De humore acido a cibis orto, et magnesia alba*, which he presented for his doctor’s degree in 1754; and a fuller account of them was read before the Medical Society of Edinburgh in June 1753, and published in the following year as *Experiments upon magnesia, quicklime and some other alkaline substances*.

It is curious that Black left to others the detailed study of this “fixed air” he had discovered. Probably the explanation is pressure of other work. In 1756 he succeeded Cullen as lecturer in chemistry at Glasgow, and was also appointed professor of anatomy, though that post he was glad to exchange for the chair of medicine. The preparation of lectures thus took up much of his time, and he was also gaining an extensive practice as a physician. Moreover, his attention was engaged on studies which ultimately led to his doctrine of latent heat. He noticed that when ice melts it takes up a quantity of heat without undergoing any change of temperature, and he argued that this heat, which as was usual in his time he looked upon as a subtle fluid, must have combined with the particles of ice and thus become latent in its substance. This hypothesis he verified quantitatively by experiments, performed at the end of 1761. In 1764, with the aid of his assistant, William Irvine (1743-1787), he further measured the latent heat of steam, though not very accurately. This doctrine of latent heat he taught in his lectures from 1761 onwards, and in April 1762 he described his work to a literary society in Glasgow. But he never published any detailed account of it, so that others, such as J.A. Deluc, were able to claim the credit of his results. In the course of his inquiries he also noticed that different bodies in equal masses require different amounts of heat to raise them to the same temperature, and so founded the doctrine of specific heats; he also showed that equal additions or abstractions of heat produced equal variations of bulk in the liquid of his thermometers. In 1766 he succeeded Cullen in the chair of chemistry in Edinburgh, where he devoted practically all his time to the preparation of his lectures. Never very robust, his health gradually became weaker and ultimately he was reduced to the condition of a valetudinarian. In 1795 he received the aid of a coadjutor in his professorship, and two years later he lectured for the last time. He died in Edinburgh on the 6th of December 1799 (not on the 26th of November as stated in Robison’s life).

As a scientific investigator, Black was conspicuous for the carefulness of his work and his caution in drawing conclusions. Holding that chemistry had not attained the rank of a science—his lectures dealt with the “effects of heat and mixture”—he had an almost morbid horror of hasty generalization or of anything that had the pretensions of a fully fledged system. This mental attitude, combined with a certain lack of initiative and the weakness of his health, probably prevented him from doing full justice to his splendid powers of experimental research. Apart from the work already mentioned he published only two papers during his life-time—“The supposed effect of boiling on water, in disposing it to freeze more readily” (*Phil. Trans.*, 1775), and “An analysis of the waters of the hot springs in Iceland” (*Trans. Roy. Soc. Ed.*, 1794).

> After his death his lectures were written out from his own notes, supplemented by those of some of his pupils, and published with a biographical preface by his friend and colleague, Professor John Robison (1739-1805), in 1803 as *Lectures on the Elements of Chemistry, delivered in the University of Edinburgh*.

BLACK, WILLIAM (1841-1898), British novelist, was born at Glasgow on the 9th of November 1841. His early ambition was to be a painter, but he made no way, and soon had recourse to journalism for a living. He was at first employed in newspaper offices in Glasgow, but obtained a post on the *Morning Star* in London, and at once proved himself a descriptive writer of exceptional vivacity. During the war between Prussia and Austria in 1866 he represented the *Morning Star* at the front, and was taken prisoner. This paper shortly afterwards failed, and Black joined the editorial staff of the *Daily News*. He also edited the *Examiner*, at a time when that periodical was already moribund. After his first success in fiction, he gave up journalism, and devoted himself entirely to the production of novels. For nearly thirty years he was successful in retaining the popular favour. He died at Brighton on the 10th of December 1898, without having experienced any of that reaction of the public taste which so often follows upon conspicuous successes in fiction. Black's first novel, *James Merle*, published in 1864, was a complete failure; his second, *Love or Marraige* (1868), attracted but very slight attention. *In Silk Attire* (1869) and *Kilmeny* (1870) marked a great advance on his first work, but in 1871 *A Daughter of Heth* suddenly raised him to the height of popularity, and he followed up this success by a string of favourites. Among the best of his books are *The Strange Adventures of a Phaeton* (1872); *A Princess of Thule* (1874); *Madcap Violet* (1876); *Macleod of Dare* (1878); *White Wings* (1880); *Sunrise* (1880); *Shandon Bells* (1883); *Judith Shakespeare* (1884); *White Heather* (1885); *Donald Ross of Heimra* (1891); *Highland Cousins* (1894); and *Wild Eelin* (1898). Black was a thoroughgoing sportsman, particularly fond of fishing and yachting, and his best stories are those which are laid amid the breezy mountains of his native land, or upon the deck of a yacht at sea off its wild coast. His descriptions of such scenery are simple and picturesque. He was a word-painter rather than a student of human nature. His women are stronger than his men, and among them are many wayward and lovable creatures; but subtlety of intuition plays no part in his characterization. Black also contributed a life of Oliver Goldsmith to the *English Men of Letters* series.

BLACK APE, a sooty, black, short-tailed, and long-faced representative of the macaques, inhabiting the island of Celebes, and generally regarded as forming a genus by itself, under the name of *Cynopithecus niger*, but sometimes relegated to the rank of a subgenus of *Macacus*. The nostrils open obliquely at some distance from the end of the snout, and the head carries a crest of long hair. There are several local races, one of which was long regarded as a separate species under the name of the Moor macaque, *Macacus maurus*. (See PRIMATES.)

BLACKBALL, a token used for voting by ballot against the election of a candidate for membership of a club or other association. Formerly white and black balls about the size of pigeons' eggs were used respectively to represent votes for and against a candidate for such election; and although this method is now generally obsolete, the term "blackball" survives both as noun and verb. The rules of most clubs provide that a stated proportion of "blackballs" shall exclude candidates proposed for election, and the candidates so excluded are said to have been "blackballed"; but the ballot (*q.v.*) is now usually conducted by a method in which the favourable and adverse votes are not distinguished by different coloured balls at all. Either voting papers are employed, or balls—of which the colour has no significance—are cast into different compartments of a ballot-box according as they are favourable or adverse to the candidate.

BLACKBERRY, or BRAMBLE, known botanically as *Rubus fruticosus* (natural order

Rosaceae), a native of the north temperate region of the Old World, and abundant in the British Isles as a copse and hedge-plant. It is characterized by its prickly stem, leaves with usually three or five ovate, coarsely toothed stalked leaflets, many of which persist through the winter, white or pink flowers in terminal clusters, and black or red-purple fruits, each consisting of numerous succulent drupels crowded on a dry conical receptacle. It is a most variable plant, exhibiting many more or less distinct forms which are regarded by different authorities as sub-species or species. In America several forms of the native blackberry, *Rubus nigrobaccus* (formerly known as *R. villosus*), are widely cultivated; it is described as one of the most important and profitable of bush-fruits.

For details see F.W. Card in L.H. Bailey's *Cyclopedia of American Horticulture* (1900).

BLACKBIRD (*Turdus merula*), the name commonly given to a well-known British bird of the *Turdidae* family, for which the ancient name was ousel (*q.v.*), Anglo-Saxon *ósle*, equivalent of the German *Amsel*, a form of the word found in several old English books. The plumage of the male is of a uniform black colour, that of the female various shades of brown, while the bill of the male, especially during the breeding season, is of a bright gamboge yellow. The blackbird is of a shy and restless disposition, courting concealment, and rarely seen in flocks, or otherwise than singly or in pairs, and taking flight when startled with a sharp shrill cry. It builds its nest in March, or early in April, in thick bushes or in ivy-clad trees, and usually rears at least two broods each season. The nest is a neat structure of coarse grass and moss, mixed with earth, and plastered internally with mud, and here the female lays from four to six eggs of a blue colour speckled with brown. The blackbird feeds chiefly on fruits, worms, the larvae of insects and snails, extracting the last from their shells by dexterously chipping them on stones; and though it is generally regarded as an enemy of the garden, it is probable that the amount of damage by it to the fruit is largely compensated for by its undoubted services as a vermin-killer. The notes of the blackbird are rich and full, but monotonous as compared with those of the song-thrush. Like many other singing birds it is, in the wild state, a mocking-bird, having been heard to imitate the song of the nightingale, the crowing of a cock, and even the cackling of a hen. In confinement it can be taught to whistle a variety of tunes, and even to imitate the human voice.

The blackbird is found in every country of Europe, even breeding—although rarely—beyond the arctic circle, and in eastern Asia as well as in North Africa and the Atlantic islands. In most parts of its range it is migratory, and in Britain every autumn its numbers receive considerable accession from passing visitors. Allied species inhabit most parts of the world, excepting Africa south of the Sahara, New Zealand and Australia proper, and North America. In some of these the legs as well as the bill are yellow or orange; and in a few both sexes are glossy black. The ring-ousel, *Turdus torquatus*, has a dark bill and conspicuous white gorget, whence its name. It is rarer and more local than the common blackbird, and occurs in England only as a temporary spring and autumn visitor.

BLACK BUCK (*Antilope cervicapra*), the Indian Antelope, the sole species of its genus. This antelope, widely distributed in India, with the exception of Ceylon and the region east of the Bay of Bengal, stands about 32 in. high at the shoulder; the general hue is brown deepening with age to black; chest, belly and inner sides of limbs pure white, as are the muzzle and chin, and an area round the eyes. The horns are long, ringed, and form spirals with from three to five turns. The doe is smaller in size, yellowish-fawn above, and this hue obtains also in young males. These antelopes frequent grassy districts and are usually found in herds. Coursing black-buck with the cheeta (*q.v.*) is a favourite Indian sport.

BLACKBURN, COLIN BLACKBURN, Baron (1813-1896), British judge, was born in Selkirkshire in 1813, and educated at Eton and at Trinity College, Cambridge, taking high mathematical honours in 1835. He was called to the bar in 1838, and went the northern circuit. His progress was at first slow, and he employed himself in reporting and editing, with T.F. Ellis, eight volumes of the highly-esteemed Ellis and Blackburn reports. His deficiency in all the more brilliant qualities of the advocate almost confined his practice to commercial cases, in which he obtained considerable employment in his circuit; but he continued to belong to the outside bar, and was so little known to the legal world that his promotion to a puisne judgeship in the court of queen's bench in 1859 was at first ascribed to Lord Campbell's partiality for his countrymen, but Lord Lyndhurst, Lord Wensleydale and Lord Cranworth came forward to defend the appointment. Blackburn himself is said to have thought that a county court judgeship was about to be offered him, which he had resolved to decline. He soon proved himself one of the soundest lawyers on the bench, and when he was promoted to the court of appeal in 1876 was considered the highest authority on common law. In 1876 he was made a lord of appeal and a life peer. Both in this capacity and as judge of the queen's bench he delivered many judgments of the highest importance, and no decisions have been received with greater respect. In 1886 he was appointed a member of the commission charged to prepare a digest of the criminal law, but retired on account of indisposition in the following year. He died at his country residence, Doonholm in Ayrshire, on the 8th of January 1896. He was the author of a valuable work on the *Law of Sales*.

See *The Times*, 10th of January 1896; E. Manson, *Builders of our Law* (1904).

BLACKBURN, JONATHAN (*c.* 1700-*c.* 1765), American portrait painter, was born in Connecticut. He seems to have been the son of a painter, and to have had a studio in Boston in 1750-1765; among his patrons were many important early American families, including the Apthorps, Amorys, Bulfinches, Lowells, Ewings, Saltonstalls, Winthrops, Winslows and Otises of Boston. Some of his portraits are in the possession of the public library of Lexington, Massachusetts, and of the Massachusetts Historical Society, but most of them are privately owned and are scattered over the country, the majority being in Boston. John Singleton Copley was his pupil, and it is said that he finally left his studio in Boston, through jealousy of Copley's superior success. He was a good portrait painter, and some of his pictures were long attributed to Copley.

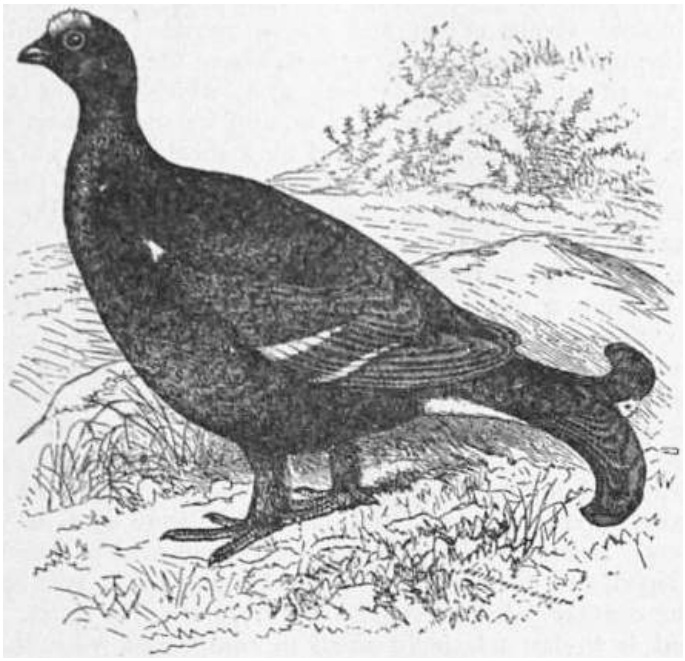
BLACKBURN, a municipal, county and parliamentary borough of Lancashire, England, 210 m. N.W. by N. from London, and 24½ N.N.W. from Manchester, served by the Lancashire & Yorkshire and the London & North Western railways, with several lines from all parts of the county. Pop. (1891) 120,064; (1901) 127,626. It lies in the valley of a stream called in early times the Blackeburn, but now known as the Brook. The hills in the vicinity rise to some 900 ft., and among English manufacturing towns Blackburn ranks high in beauty of situation. Besides numerous churches and chapels the public buildings comprise a large town hall (1856), market house, exchange, county court, municipal offices, chamber of commerce, free library, and, outside the town, an infirmary. There are an Elizabethan grammar school, in modern buildings (1884) and an excellent technical school. The Corporation Park and Queen's Park are well laid out, and contain ornamental waters. There is an efficient tramway service, connecting the town with Darwen, 5 m. south. The cotton industry employs thousands of operatives, the iron trade is also very considerable, and many are engaged in the making of machines; but a former woollen manufacture is almost extinct. Blackburn's speciality in the cotton industry is weaving. Coal, lime and building stone are abundant in the neighbourhood. Blackburn received a charter of incorporation in 1851, and is governed by a mayor, 14 aldermen and 42 councillors. The county borough was created in 1888. The parliamentary borough, which returns two members, is coextensive with the municipal, and lies between the Accrington and Darwen divisions of the county. Area, 7432 acres.

Blackburn is of considerable antiquity; indeed, the 6th century is allocated to the original foundation of a church on the site of the present parish church. Of another church on this site Cranmer was rector after the Reformation. Blackburn was for some time the chief town of a district called Blackburnshire, and as early as the reign of Elizabeth ranked as a flourishing market town. About the middle of the 17th century it became famous for its “checks,” which were afterwards superseded by a similar linen-and-cotton fabric known as “Blackburn greys.” In the 18th century the ability of certain natives of the town greatly fostered its cotton industry; thus James Hargreaves here probably invented his spinning jenny about 1764, though the operatives, fearing a reduction of labour, would have none of it, and forced him to quit the town for Nottingham. He was in the employment of Robert Peel, grandfather of the prime minister of that name, who here instituted the factory system, and as the director of a large business carefully fostered the improvement of methods.

See W.A. Abram, *History of Blackburn* (Blackburn, 1897).

BLACKBURNE, FRANCIS (1782-1867), lord chancellor of Ireland, was born at Great Footstown, Co. Meath, Ireland, on the 11th of November 1782. Educated at Trinity College, Dublin, he was called to the English bar in 1805, and practised with great success on the home circuit. Called to the Irish bar in 1822, he vigorously administered the Insurrection Act in Limerick for two years, effectually restoring order in the district. In 1826 he became a serjeant-at-law, and in 1830, and again, in 1841, was attorney-general for Ireland. In 1842 he became master of the rolls in Ireland, in 1846 chief-justice of the queen’s bench, and in 1852 (and again in 1866) lord chancellor of Ireland. In 1856 he was made a lord justice of appeal in Ireland. He is remembered as having prosecuted O’Connell and presided at the trial of Smith O’Brien. He died on the 17th of September 1867.

BLACKCOCK (*Tetrao tetrix*), the English name given to a bird of the family *Tetraonidae* or grouse, the female of which is known as the grey hen and the young as poults. In size and plumage the two sexes offer a striking contrast, the male weighing about 4 lb, its plumage for the most part of a rich glossy black shot with blue and purple, the lateral tail feathers curved outwards so as to form, when raised, a fan-like crescent, and the eyebrows destitute of feathers and of a bright vermilion red. The female, on the other hand, weighs only 2 lb, its plumage is of a russet brown colour irregularly barred with black, and its tail feathers are but slightly forked. The males are polygamous, and during autumn and winter associate together, feeding in flocks apart from the females; but with the approach of spring they separate, each selecting a locality for itself, from which it drives off all intruders, and where morning and evening it seeks to attract the other sex by a display of its beautiful plumage, which at this season attains its greatest perfection, and by a peculiar cry, which Selby describes as “a crowing note, and another similar to the noise made by the whetting of a scythe.” The nest, composed of a few stalks of grass, is built on the ground, usually beneath the shadow of a low bush or a tuft of tall grass, and here the female lays from six to ten eggs of a dirty-yellow colour speckled with dark brown. The blackcock then rejoins his male associates, and the female is left to perform the labours of hatching and rearing her young brood. The plumage of both sexes is at first like that of the female, but after moulting the young males gradually assume the more brilliant plumage of their sex. There are also many cases on record, and specimens may be seen in the principal museums, of old female birds assuming, to a greater or less extent, the plumage of the male. The blackcock is very generally distributed over the highland districts of northern and central Europe, and in some parts of Asia. It is found on the principal heaths in the south of England, but is specially abundant in the Highlands of Scotland.



Blackcock.

BLACK COUNTRY, THE, a name commonly applied to a district lying principally in S. Staffordshire, but extending into Worcestershire and Warwickshire, England. This is one of the chief manufacturing centres in the United Kingdom, and the name arises from the effect of numerous collieries and furnaces, which darken the face of the district, the buildings and the atmosphere. Coal, ironstone and clay are mined in close proximity, and every sort of iron and steel goods is produced. The district extends 15 m. N.W. from Birmingham, and includes Smethwick, West Bromwich, Dudley, Oldbury, Sedgley, Tipton, Bilston, Wednesbury, Wolverhampton and Walsall as its most important centres. The ceaseless activity of the Black Country is most readily realized when it is traversed, or viewed from such an elevation as Dudley Castle Hill, at night, when the glare of furnaces appears in every direction. The district is served by numerous branches of the Great Western, London & North Western, and Midland railways, and is intersected by canals, which carry a heavy traffic, and in some places are made to surmount physical obstacles with remarkable engineering skill, as in the case of the Castle Hill tunnels at Dudley. Among the numerous branches of industry there are several characteristic of certain individual centres. Thus, locks are a specialty at Wolverhampton and Willenhall, and keys at Wednesfield; horses' bits, harness-fittings and saddlery at Walsall and Bloxwich, anchors and cables at Tipton, glass at Smethwick, and nails and chains at Cradley.

BLACK DROP, in astronomy, an apparent distortion of the planet Mercury or Venus at the time of internal contact with the limb of the sun at the beginning or end of a transit. It has been in the past a source of much perplexity to observers of transits, but is now understood to be a result of irradiation, produced by the atmosphere or by the aberration of the telescope.

BLACKFOOT (*Siksika*), a tribe and confederacy of North American Indians of Algonquian stock. The name is explained as an allusion to their leggings being observed by the whites to

have become blackened by marching over the freshly burned prairie. Their range was around the headwaters of the Missouri, from the Yellowstone northward to the North Saskatchewan and westward to the Rockies. The confederacy consisted of three tribes, the Blackfoot or Siksika proper, the Kaina and the Piegan. During the early years of the 19th century the Blackfoots were one of the strongest Indian confederacies of the north-west, numbering some 40,000. At the beginning of the 20th century there were about 5000, some in Montana and some in Canada.

See Jean L'Heureux, *Customs and Religious Ideas of Blackfoot Indians in J.A.I.*, vol. xv. (1886); G.B. Grinnell, *Blackfoot Lodge Tales* (1892); G. Catlin, *North American Indians* (1876); *Handbook of American Indians* (Washington, 1907), under "Siksika."

BLACK FOREST (Ger. *Schwarzwald*; the *Silva Marciana* and *Abnoba* of the Romans), a mountainous district of south-west Germany, having an area of 1844 sq. m., of which about two-thirds lie in the grand duchy of Baden and the remaining third in the kingdom of Württemberg. Bounded on the south and west by the valley of the Rhine, to which its declivities abruptly descend, and running parallel to, and forming the counterpart of the Vosges beyond, it slopes more gently down to the valley of the Neckar in the north and to that of the Nagold (a tributary of the Neckar) on the north-east. Its total length is 100 m., and its breadth varies from 36 m. in the south to 21 in the centre and 13 in the north. The deep valley of the Kinzig divides it laterally into halves, of which the southern, with an average elevation of 3000 ft., is the wilder and contains the loftiest peaks, which again mostly lie towards the western side. Among them are the Feldberg (4898 ft.), the Herzogenhorn (4600), the Blössling (4260) and the Blauen (3820). The northern half has an average height of 2000 ft. On the east side are several lakes, and here the majority of the streams take their rise. The configuration of the hills is mainly conical and the geological formation consists of gneiss, granite (in the south) and red sandstone. The district is poor in minerals; the yield of silver and copper has almost ceased, but there are workable coal seams near Offenburg, where the Kinzig debouches on the plain. The climate in the higher districts is raw and the produce is mostly confined to hardy cereals, such as oats. But the valleys, especially those on the western side, are warm and healthy, enclose good pasture land and furnish fruits and wine in rich profusion. They are clothed up to a height of about 2000 ft. with luxuriant woods of oak and beech, and above these again and up to an elevation of 4000 ft., surrounding the hills with a dense dark belt, are the forests of fir which have given the name to the district. The summits of the highest peaks are bare, but even on them snow seldom lies throughout the summer.

The Black Forest produces excellent timber, which is partly sawn in the valleys and partly exported down the Rhine in logs. Among other industries are the manufactures of watches, clocks, toys and musical instruments. There are numerous mineral springs, and among the watering places Baden-Baden and Wildbad are famous. The towns of Freiburg, Rastatt, Offenburg and Lahr, which lie under the western declivities, are the chief centres for the productions of the interior.

The Black Forest is a favourite tourist resort and is opened up by numerous railways. In addition to the main lines in the valleys of the Rhine and Neckar, which are connected with the towns lying on its fringe, the district is intersected by the Schwarzwaldbahn from Offenburg to Singen, from which various small local lines ramify.

BLACK HAWK [Ma'katawimesheka'ka, "Black Sparrow Hawk"], (1767-1838), American Indian warrior of the Sauk and Fox tribes, was born at the Sauk village on Rock river, near the Mississippi, in 1767. He was a member of the Thunder gens of the Sauk tribe, and, though neither an hereditary nor an elected chief, was for some time the recognized war leader of the Sauk and Foxes. From his youth he was intensely bloodthirsty and hostile to the Americans. Immediately after the acquisition of "Louisiana," the Federal government took steps for the removal of the Sauk and Foxes, who had always been a disturbing element

among the north-western Indians, to the west bank of the Mississippi river. As early as 1804, by a treaty signed at St Louis on the 3rd of November, they agreed to the removal in return for an annuity of $1000. British influences were still strong in the upper Mississippi valley and undoubtedly led Black Hawk and the chiefs of the Sauk and Fox confederacy to repudiate this agreement of 1804, and subsequently to enter into the conspiracy of Tecumseh and take part with the British in the war of 1812. The treaties of 1815 at Portage des Sioux (with the Foxes) and of 1816 at St Louis (with the Sauk) substantially renewed that of 1804. That of 1816 was signed by Black Hawk himself, who declared, however, when in 1823 Chief Keokuk and a majority of the two nations crossed the river, that the consent of the chiefs had been obtained by fraud. In 1830 a final treaty was signed at Prairie du Chien, by which all title to the lands of the Sauk and Foxes east of the Mississippi was ceded to the government, and provision was made for the immediate opening of the tract to settlers. Black Hawk, leading the party in opposition to Keokuk, at once refused to accede to this cession and threatened to retaliate if his lands were invaded. This precipitated what is known as the Black Hawk War. Settlers began pouring into the new region in the early spring of 1831, and Black Hawk in June attacked several villages near the Illinois-Wisconsin line. After massacring several isolated families, he was driven off by a force of Illinois militia. He renewed his attack in the following year (1832), but after several minor engagements, in most of which he was successful, he was defeated (21st of July) at Wisconsin Heights on the Wisconsin river, opposite Prairie du Sac, by Michigan volunteers under Colonels Henry Dodge and James D. Henry, and fleeing westward was again decisively defeated on the Mississippi at the mouth of the Bad Axe river (on the 1st and 2nd of August) by General Henry Atkinson. His band was completely dispersed, and he himself was captured by a party of Winnebagoes. At Fort Armstrong, Rock Island, on the 21st of September, a treaty was signed, by which a large tract of the Sauk and Fox territory was ceded to the United States; and the United States granted to them a reservation of 400 sq. m., the payment of $20,000 a year for thirty years, and the settlement of certain traders' claims against the tribe. With several warriors Black Hawk was sent to Fortress Monroe, Virginia, where he was confined for a few weeks; afterwards he was taken by the government through the principal Eastern cities. On his release he settled in 1837 on the Sauk and Fox reservation on the Des Moines river, in Iowa, where he died on the 3rd of October 1838.

See Frank E. Stevens, *The Black Hawk War* (Chicago, 1903); R.G. Thwaites, "The Story of the Black Hawk War" in vol. xii. of the *Collections of the State Historical Society of Wisconsin*; J.B. Patterson, *Life of Ma-ka-tai-me-she-kia-kiak or Black Hawk* (Boston, 1834), purporting to be Black Hawk's story as told by himself; and Benjamin Drake, *Life of Black Hawk* (Cincinnati, 1846).

BLACKHEATH, an open common in the south-east of London, England, mainly in the metropolitan borough of Lewisham. This high-lying tract was crossed by the Roman Watling Street from Kent, on a line approximating to that of the modern Shooter's Hill; and was a rallying ground of Wat Tyler (1381), of Jack Cade (1450), and of Audley, leader of the Cornish rebels, defeated and captured here by the troops of Henry VII. in 1497. It also witnessed the acclamations of the citizens of London on the return of Henry V. from the victory of Agincourt, the formal meeting between Henry VIII. and Anne of Cleves, and that between the army of the restoration and Charles II. The introduction into England of the game of golf is traditionally placed here in 1608, and attributed to King James I. and his Scottish followers. The common, the area of which is 267 acres, is still used for this and other pastimes. For the residential district to which Blackheath gives name, see Lewisham.

BLACK HILLS, an isolated group of mountains, covering an area of about 6000 sq. m. in the adjoining corners of South Dakota and Wyoming, U.S.A. They rise on an average some 2000 ft. above their base, the highest peak, Harney, having an altitude above the sea of 7216 ft. They are drained and in large part enclosed by the North (or Belle Fourche) and

South forks of the Cheyenne river (at whose junction a fur-trading post was established about 1830); and are surrounded by semi-arid, alkaline plains lying 3000 to 3500 ft. above the sea. The mass has an elliptical shape, its long axis, which extends nearly N.N.W.-S.S.E., being about 120 m. and its shorter axis about 40 m. long. The hills are formed by a short, broad, anticlinal fold, which is flat or nearly so on its summit. From this fold the stratified beds have in large part been removed, the more recent having been almost entirely eroded from the elevated mass. The edges of these are now found encircling the mountains and forming a series of fairly continuous rims of hog-backs. The carboniferous and older stratified beds still cover the west half of the hills, while from the east half they have been removed, exposing the granite. Scientific exploration began in 1849, and systematic geological investigation about 1875. Rich gold placers had already been discovered, and in 1875 the Sioux Indians within whose territory the hills had until then been included, were removed, and the lands were open to white settlers. Subsequently low-grade quartz mines were found and developed, and have furnished a notable part of the gold supply of the country (about $100,000,000 from 1875 to 1901). The output is to-day relatively small in comparison with that of many other fields, but there are one or two permanent gold mines of great value working low-grade ore. The silver product from 1879 to 1901 was about $4,154,000. Deposits of copper, tin, iron and tungsten have been discovered, and a variety of other mineral products (graphite, mica, spodumene, coal, petroleum, &c.). In sharp contrast to the surrounding plains the climate is subhumid, especially in the higher Harney region. There is an abundance of fertile soil and magnificent grazing land. A third of the total area is covered with forests of pine and other trees, which have for the most part been made a forest-reserve by the national government. Jagged crags, sudden abysses, magnificent canyons, forests with open parks, undulating hills, mountain prairies, freaks of weathering and erosion, and the enclosing lines of the successive hog-backs afford scenery of remarkable variety and wild beauty. There are several interesting limestone caverns, and Sylvan Lake, in the high mountain district, is an important resort.

See the publications of the United States Geological Survey (especially Professional Paper No. 26, *Economic Resources of the Northern Black Hills*, 1904), and of the South Dakota School of Mines (Bulletin No. 4, containing a history and bibliography of Black Hills investigations); also R.L. Dodge, *The Black Hills: A Minute Description ...* (New York, 1876).

BLACKIE, JOHN STUART (1809-1895), Scottish scholar and man of letters, was born in Glasgow on the 28th of July 1809. He was educated at the New Academy and afterwards at the Marischal College, in Aberdeen, where his father was manager of the Commerical Bank. After attending classes at Edinburgh University (1825-1826), Blackie spent three years at Aberdeen as a student of theology. In 1829 he went to Germany, and after studying at Göttingen and Berlin (where he came under the influence of Heeren, Ottfried Müller, Schleiermacher, Neander and Böckh) he accompanied Bunsen to Italy and Rome. The years spent abroad extinguished his former wish to enter the Church, and at his father’s desire he gave himself up to the study of law. He had already, in 1824, been placed in a lawyer’s office, but only remained there six months. By the time he was admitted a member of the Faculty of Advocates (1834) he had acquired a strong love of the classics and a taste for letters in general. A translation of *Faust*, which he published in 1834, met with considerable success. After a year or two of desultory literary work he was (May 1839) appointed to the newly-instituted chair of Humanity (Latin) in the Marischal College.

Difficulties arose in the way of his installation, owing to the action of the Presbytery on his refusing to sign unreservedly the Confession of Faith; but these were eventually overcome, and he took up his duties as professor in November 1841. In the following year he married. From the first his professorial lectures were conspicuous for the unconventional enthusiasm with which he endeavoured to revivify the study of the classics; and his growing reputation, added to the attention excited by a translation of Aeschylus which he published in 1850, led to his appointment in 1852 to the professorship of Greek at Edinburgh University, in succession to George Dunbar, a post which he continued to hold for thirty years. He was somewhat erratic in his methods, but his lectures were a triumph of influential personality. A journey to Greece in 1853 prompted his essay *On the Living Language of the Greeks*, a favourite theme of his, especially in his later years; he adopted for himself a modern Greek pronunciation, and before his death he endowed a travelling scholarship to enable students

to learn Greek at Athens. Scottish nationality was another source of enthusiasm with him; and in this connexion he displayed real sympathy with Highland home life and the grievances of the crofters. The foundation of the Celtic chair at Edinburgh University was mainly due to his efforts. In spite of the many calls upon his time he produced a considerable amount of literary work, usually on classical or Scottish subjects, including some poems and songs of no mean order. He died in Edinburgh on the 2nd of March 1895. Blackie was a Radical and Scottish nationalist in politics, but of a fearlessly independent type; he was one of the "characters" of the Edinburgh of the day, and was a well-known figure as he went about in his plaid, worn shepherd-wise, wearing a broad-brimmed hat, and carrying a big stick. His published works include (besides several volumes of verse) *Homer and the Iliad* (1866), maintaining the unity of the poems; *Four Phases of Morals: Socrates, Aristotle, Christianity, Utilitarianism* (1871); *Essay on Self-Culture* (1874); *Horae Hellenicae* (1874); *The Language and Literature of the Scottish Highlands* (1876); *The Natural History of Atheism* (1877); *The Wise Men of Greece* (1877); *Lay Sermons* (1881); *Altavona* (1882); *The Wisdom of Goethe* (1883); *The Scottish Highlanders and the Land Laws* (1885); *Life of Burns* (1888); *Scottish Song* (1889); *Essays on Subjects of Moral and Social Interest* (1890); *Christianity and the Ideal of Humanity* (1893). Amongst his political writings may be mentioned a pamphlet *On Democracy* (1867), *On Forms of Government* (1867), and *Political Tracts* (1868).

See Anna M. Stoddart, *John Stuart Blackie* (1895); A. Stodart-Walker, *Selected Poems of J.S. Blackie*, with an appreciation (1896); Howard Angus Kennedy, *Professor Blackie* (1895).

BLACK ISLE, The, a district in the east of the county of Ross and Cromarty, Scotland, bounded N. by Cromarty Firth, E. by Moray Firth, S. by Inner Moray Firth (or Firth of Inverness) and Beauly Firth, and W. by the river Conon and the parish of Urray. It is a diamond-shaped peninsula jutting out from the mainland in a north-easterly direction, the longer axis, from Muir of Ord station to the South Sutor at the entrance to Cromarty Firth, measuring 20 m., and the shorter, from Ferryton Point to Craigton-Point, due north and south, 12 m., and it has a coastline of 52 m. Originally called Ardmeanach (Gaelic *ard*, height; *manaich*, monk, "the monk's height," from an old religious house on the finely-wooded ridge of Mulbuie), it derived its customary name from the fact that, since snow does not lie in winter, the promontory looks black while the surrounding country is white. Within its limits are comprised the parishes of Urquhart and Logie Wester, Killearnan, Knockbain (Gaelic *cnoc*, hill; *bàn*, white), Avoch (pron. Auch), Rosemarkie, Resolis (Gaelic *rudha* or *ros soluis*, "cape of the light") or Kirkmichael and Cromarty. The Black Isle branch of the Highland railway runs from Muir of Ord to Fortrose; steamers connect Cromarty with Invergordon and Inverness, and Fortrose with Inverness; and there are ferries, on the southern coast, at North Kessock (for Inverness) and Chanonry (for Fort George), and, on the northern coast, at Alcaig (for Dingwall), Newhallpoint (for Invergordon), and Cromarty (for Nigg). The principal towns are Cromarty and Fortrose. Rosehaugh, near Avoch, belonged to Sir George Mackenzie, founder of the Advocates' library in Edinburgh, who earned the sobriquet of "Bloody" from his persecution of the Covenanters. Redcastle, on the shore, near Killearnan church, dates from 1179 and is said to have been the earliest inhabited house in the north of Scotland. On the forfeiture of the earldom of Ross it became a royal castle (being visited by Queen Mary), and afterwards passed for a period into the hands of the Mackenzies of Gairloch. The chief industries are agriculture—high farming flourishes owing to the great fertility of the peninsula—sandstone-quarrying and fisheries (mainly from Avoch). The whole district, though lacking water, is picturesque and was once forested. The Mulbuie ridge, the highest point of which is 838 ft. above the sea, occupies the centre and is the only elevated ground. Antiquarian remains are somewhat numerous, such as forts and cairns in Cromarty parish, and stone circles in Urquhart and Logie Wester and Knockbain parishes, the latter also containing a hut circle and rock fortress.

BLACKLOCK, THOMAS (1721-1791), Scottish poet, the son of a bricklayer, was born at

Annan, in Dumfriesshire, in 1721. When not quite six months old he lost his sight by smallpox, and his career is largely interesting as that of one who achieved what he did in spite of blindness. Shortly after his father's death in 1740, some of Blacklock's poems began to be handed about among his acquaintances and friends, who arranged for his education at the grammar-school, and subsequently at the university of Edinburgh, where he was a student of divinity. His first volume of Poems was published in 1746. In 1754 he became deputy librarian for the Faculty of Advocates, by the kindness of Hume. He was eventually estranged from Hume, and defended James Beattie's attack on that philosopher. Blacklock was among the first friends of Burns in Edinburgh, being one of the earliest to recognize his genius. He was in 1762 ordained minister of the church of Kirkcudbright, a position which he soon resigned; in 1767 the degree of doctor in divinity was conferred on him by Marischal College, Aberdeen. He died on the 7th of July 1791.

An edition of his poems in 1793 contains a life by Henry Mackenzie.

BLACKMAIL, a term, in English law, used in three special meanings, at different times. The usual derivation of the second half of the word is from Norman Fr. *maille (medalia*; cf. "medal"), small copper coin; the *New English Dictionary* derives from "mail" (*q.v.*), meaning rent or tribute. (1) The primary meaning of "blackmail" was rent paid in labour, grain or baser metal (*i.e.* money other than sterling money), called *reditus nigri,* in contradistinction to rent paid in silver or white money (*mailles blanches*). (2) In the northern counties of England (Northumberland, Westmorland and the bishopric of Durham) it signified a tribute in money, corn, cattle or other consideration exacted from farmers and small owners by freebooters in return for immunity from robbers or moss-troopers. By a statute of 1601 it was made a felony without benefit of clergy to receive or pay such tribute, but the practice lingered until the union of England and Scotland in 1707. (3) The word now signifies extortion of money or property by threats of libel, presecution, exposure, &c. See such headings as Coercion, Conspiracy, Extortion, and authorities quoted under Criminal Law.

BLACKMORE, SIR RICHARD (c. 1650-1729), English physician and writer, was born at Corsham, in Wiltshire, about 1650. He was educated at Westminster school and St Edmund Hall, Oxford. He was for some time a schoolmaster, but finally, after graduating in medicine at Padua, he settled in practice as a physician in London. He supported the principles of the Revolution, and was accordingly knighted in 1697. He held the office of physician in ordinary both to William III. and Anne, and died on the 9th of October 1729. Blackmore had a passion for writing epics. *Prince Arthur, an Heroick Poem in X Books* appeared in 1695, and was followed by six other long poems before 1723. Of these *Creation* ... (1712), a philosophic poem intended to refute the atheism of Vanini, Hobbes and Spinoza, and to unfold the intellectual philosophy of Locke, was the most favourably received. Dr Johnson anticipated that this poem would transmit the author to posterity "among the first favourites of the English muse," while John Dennis went so far as to describe it as "a philosophical poem, which has equalled that of Lucretius in the beauty of its versification, and infinitely surpassed it in the solidity and strength of its reasoning." These opinions have not been justified, for the poem, like everything else that Blackmore wrote, is dull and tedious. His *Creation* appears in Johnson's and Anderson's collections of the British poets. He left also works on medicine and on theological subjects.

BLACKMORE, RICHARD DODDRIDGE (1825-1900), English novelist, was born on the 7th of June 1825 at Longworth, Berkshire, of which village his father was curate in charge. He was educated at Blundell's school, Tiverton, and Exeter College, Oxford, where he

obtained a scholarship. In 1847 he took a second class in classics. Two years later he entered as a student at the Middle Temple, and was called to the bar in 1852. His first publication was a volume of *Poems by Melanter* (1854), which showed no particular promise, nor did the succeeding volume, *Epullia* (1855), suggest that Blackmore had the makings of a poet. He was nevertheless enthusiastic in his pursuit of literature; and when, a few years later, the complete breakdown of his health rendered it clear that he must remove from London, he determined to combine a literary life in the country with a business career as a market-gardener. He acquired land at Teddington, and set earnestly to work, the literary fruits of his new surroundings being a translation of the *Georgics*, published in 1862. In 1864 he published his first novel, *Clara Vaughan*, the merits of which were promptly recognized. *Cradock Nowell* (1866) followed, but it was in 1869 that he suddenly sprang into fame with *Lorna Doone*. This fine story was a pioneer in the romantic revival; and appearing at a jaded hour, it was presently recognized as a work of singular charm, vigour and imagination. Its success could scarcely be repeated, and though Blackmore wrote many other capital stories, of which the best known are *The Maid of Sker* (1872), *Christowell* (1880), *Perlycross* (1894), *Tales from the Telling House* (1896) and *Dariel* (1897), he will always be remembered almost exclusively as the author of *Lorna Doone*. He continued his quiet country life to the last, and died at Teddington on the 20th of January 1900, in his seventy-fifth year. *Lorna Doone* has the true out-of-door atmosphere, is shot through and through with adventurous spirit, and in its dramatic moments shows both vigour and intensity. The heroine, though she is invested with qualities of faëry which are scarcely human, is an idyllic and haunting figure; and John Ridd, the bluff hero, is, both in purpose and achievement, a veritable giant of romance. The story is a classic of the West country, and the many pilgrimages that are made annually to the Doone Valley (the actual characteristics of which differ materially from the descriptions given in the novel) are entirely inspired by the buoyant imagination of Richard Blackmore. A memorial window and tablet to his memory were erected in Exeter cathedral in 1904.

BLACK MOUNTAIN, a mountain range and district on the Hazara border of the North-West Frontier Province of India. It is inhabited by Yusafzai Pathans. The Black Mountain itself has a total length of 25 to 30 m., and an average height of 8000 ft. above the sea. It rises from the Indus basin near the village of Kiara, up to its watershed by Bruddur; thence it runs north-west by north to the point on the crest known as Chittabut. From Chittabut the range runs due north, finally descending by two large spurs to the Indus again. The tribes which inhabit the western face of the Black Mountain are the Hassanzais (2300 fighting men), the Akazais (1165 fighting men) and the Chagarzais (4890 fighting men), all sub-sections of the Yusafzai Pathans. It was in this district that the Hindostani Fanatics had their stronghold, and they were responsible for much of the unrest on this part of the border.

The Black Mountain is chiefly notable for four British expeditions:—

1. Under Lieut.-Colonel F. Mackeson, in 1852-53, against the Hassanzais. The occasion was the murder of two British customs officers. A force of 3800 British troops traversed their country, destroying their villages and grain, &c.

2. Under Major-General A.T. Wilde, in 1868. The occasion was an attack on a British police post at Oghi in the Agror Valley by all three tribes. A force of 12,500 British troops entered the country and the tribes made submission.

3. The First Hazara Expedition in 1888. The cause was the constant raids made by the tribes on villages in British territory, culminating in an attack on a small British detachment, in which two English officers were killed. A force of 12,500 British troops traversed the country of the tribes, and severely punished them. Punishment was also inflicted on the Hindostani Fanatics of Palosi.

4. The Second Hazara Expedition of 1891. The Black Mountain tribes fired on a force within British limits. A force of 7300 British troops traversed the country. The tribesmen made their submission and entered into an agreement with government to preserve the peace of the border.

The Black Mountain tribes took no part in the general frontier rising of 1897, and after the disappearance of the Hindostani Fanatics they sank into comparative unimportance.

BLACKPOOL, a municipal and county borough and seaside resort in the Blackpool parliamentary division of Lancashire, England, 46 m. N. of Liverpool, served by the Lancashire & Yorkshire, and London & North Western railways. Pop. (1891) 23,846; (1901) 47,346. The town, which is quite modern, contains many churches and chapels of all denominations, a town hall, public libraries, the Victoria hospital, three piers, theatres, ball-rooms, and other places of public amusement, including a lofty tower, resembling the Eiffel Tower of Paris. The municipality maintains an electric tram service. There are handsome promenades along the sea front, which command fine views. Extensive works upon these, affording a sea front unsurpassed by that of any English watering-place, were completed in 1905. The beach is sandy and the bathing good. The borough was created in 1876 (county borough, 1904), and is governed by a mayor, 12 aldermen and 36 councillors. Area, exclusive of foreshore, 3496 acres; including foreshore, 4244 acres.

BLACK ROD (more fully, “Gentleman Usher of the Black Rod “), an official of the House of Lords, instituted in 1350. His appointment is by royal letters patent, and his title is due to his staff of office, an ebony stick surmounted with a gold lion. He is a personal attendant of the sovereign in the Upper House, and is also usher of the order of the Garter, being doorkeeper at the meetings of the knights’ chapter. He is responsible for the maintenance of order in the House of Lords, and on him falls the duty of arresting any peer guilty of breach of privilege or other offence of which the House takes cognizance. But the duty which brings him most into prominence is that of summoning the Commons and their speaker to the Upper House to hear a speech from the throne or the royal assent given to bills. If the sovereign is present in parliament, Black Rod *commands* the attendance of the gentlemen of the Commons, but when lords commissioners represent the king, he only *desires* such attendance. Black Rod is on such occasions the central figure of a curious ceremony of much historic significance. As soon as the attendants of the House of Commons are aware of his approach, they close the doors in his face. Black Rod then strikes three times with his staff, and on being asked “Who is there?” replies “Black Rod.” Being then admitted he advances to the bar of the House, makes three obeisances and says, “Mr Speaker, the king commands this honourable House to attend his majesty immediately in the House of Lords.” This formality originated in the famous attempt of Charles I. to arrest the five members, Hampden, Pym, Holies, Hesilrige and Strode, in 1642. Indignant at this breach of privilege, the House of Commons has ever since maintained its right of freedom of speech and uninterrupted debate by the closing of the doors on the king’s representative.

BLACK SEA (or Euxine; anc. *Pontus Euxinus*),[1] a body of water lying almost entirely between the latitudes 41º and 45º N., but extending to about 47º N. near Odessa. It is bounded N. by the southern coast of Russia; W. by Rumania, Turkey and Bulgaria; S. and E. by Asia Minor. The northern boundary is broken at Kertch by a strait entering into the Sea of Azov, and at the junction of the western and southern boundary is the Bosporus, which unites the Black Sea with the Mediterranean through the Sea of Marmora and the Dardanelles. The 100-fathom line is about 10 to 20 m. from the shore except in the north-west corner between Varna and Sevastopol, where it extends 140 m. seawards. The greatest depth is 1030 fathoms (1227 Russian fathoms) near the centre, there being only one basin. The steepest incline outside 100 fathoms is to the south-east of the Crimea and at Amastra; the incline to the greater depths is also steep off the Caucasus and between Trebizond and Batum. The conditions that prevail in the Black Sea are very different from those of the Mediterranean or any other sea. The existence of sulphuretted hydrogen in great quantities below 100 fathoms, the extensive chemical precipitation of calcium carbonate, the stagnant

nature of its deep waters, and the absence of deep-sea life are conditions which make it impossible to discuss it along with the physical and biological conditions of the Mediterranean proper.

The depths of the Black Sea are lifeless, higher organic life not being known to exist below 100 fathoms. Fossiliferous remains of *Dreissena*, *Cardium* and other molluscs have, however, been dredged up, which help to show that conditions formerly existed in the Black Sea similar to those that exist at the present day in the Caspian Sea. According to N. Andrusov, when the union of the Black Sea with the Mediterranean through the Bosporus took place, salt water rushed into it along the bottom of the Bosporus and killed the fauna of the less saline waters. This gave rise to a production of sulphuretted hydrogen which is found in the deposits, as well as in the deeper waters.

Observations in temperature and salinity have only been taken during summer. During summer the surface salinity of the Black Sea is from 1.70 to 2.00% down to 50 fathoms, whereas in the greater depths it attains a salinity of 2.25%. The temperature is rather remarkable, there being an intermediate cold layer between 25 and 50 fathoms. This is due to the sinking of the cold surface water (which in winter reaches freezing-point) on to the top of the denser more saline water of the greater depths. There is thus a minimum circulation in the greater depths causing there uniformity of temperature, an absence of the circulation of oxygen by other means than diffusion, and a protection of the sulphuretted hydrogen from the oxidation which takes place in homologous situations in the open ocean. The temperature down to 25 fathoms is from 78.3º to 46.2º F., and in the cold layer, between 25 and 50 fathoms, is from 46.2º to 43.5º F., rising again in greater depths to 48.2º F.

The *Sea of Marmora* may be looked upon as an arm of the Aegean Sea and thus part of the Mediterranean proper. Its salinity is comparable to that of the eastern basin of the Mediterranean, which is greater than that of the Black Sea, viz. 4%. Similar currents exist in the Bosporus to those of the Strait of Gibraltar. Water of less salinity flows outwards from the Black Sea as an upper current, and water of greater salinity from the Sea of Marmora flows into the Black Sea as an under-current. This under-current flows towards Cape Tarhangut, where it divides into a left and right branch. The left branch is appreciably noticed near Odessa and the north-west corner; the right branch sweeps past the Crimea, strikes the Caucasian shore (where it comes to the surface running across, but not into, the south-east corner of the Black Sea), and finally disperses flowing westwards along the northern coast of Asia Minor between Cape Jason and Sinope. This current causes a warmer climate where it strikes. So marked is this current that it has to be taken into account in the navigation of the Black Sea.

The *Sea of Azov* is exceedingly shallow, being only about 6 fathoms in its deepest part, and it is largely influenced by the river Don. Its water is considerably fresher than the Black Sea, varying from 1.55 to 0.68%. It freezes more readily and is not affected by the Mediterranean current.

See N. Andrusov, “Physical Exploration of the Black Sea,” in *Geographical Journal*, vol. i. p. 49.

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1 The early Greek navigators gave it the epithet of *axenus*, *i.e.* unfriendly to strangers, but as Greek colonies sprang up on the shores this was changed to *euxinus*, friendly to strangers.

BLACK SEA (Russ. *Chernomorskaya*), a military district of the province of Kuban, formerly an independent province of Transcaucasia, Russia; it includes the narrow strip of land along the N.E. coast of the Black Sea from Novorossiysk to the vicinity of Pitsunda, between the sea and the crest of the main range of the Caucasus. Area, 2836 sq. m. Pop. (1897) 54,228; (1906, estimate) 71,900. It is penetrated by numerous spurs of this range, which strike the sea abruptly at right angles to the coast, and in many cases plunge down into it sheer. Owing to its southern exposure, its sheltered position, and a copious rainfall, vegetation, in part of a sub-tropical character, grows in great profusion. In consequence, however, of the mountainous character of the region, it is divided into a large number of more or less isolated districts, and there is little intercourse with the country north of the Caucasus, the passes over the range being few and difficult (see Caucasus). But since the

Russians became masters of this region, its former inhabitants (Circassian tribes) have emigrated in thousands, so that the country is now only thinly inhabited. It is divided into three districts—Novorossiysk, with the town (pop. in 1897, 16,208) of the same name, which acts as the capital of the Black Sea district; Velyaminovsk; and Sochi. Novorossiysk is connected by rail, at the west end of the Caucasus, with the Rostov-Vladikavkaz line, and a mountain road leads from Velyaminovsk (or Tuapse) to Maikop in the province of Kuban.

BLACKSTONE, SIR WILLIAM (1723-1780), English jurist, was born in London, on the 10th of July 1723. His parents having died when he was young, his early education, under the care of his uncle, Dr Thomas Bigg, was obtained at the Charterhouse, from which, at the age of fifteen, he was sent to Pembroke College, Oxford. He was entered in the Middle Temple in 1741. In 1744 he was elected a fellow of All Souls' College. From this period he divided his time between the university and the Temple, where he took chambers in order to attend the law courts. In 1746 he was called to the bar. Though but little known or distinguished as a pleader, he was actively employed, during his occasional residences at the university, in taking part in the internal management of his college. In May 1749, as a small reward for his services, and to give him further opportunities of advancing the interests of the college, Blackstone was appointed steward of its manors. In the same year, on the resignation of his uncle, Seymour Richmond, he was elected recorder of the borough of Wallingford in Berkshire. In 1750 he became doctor of civil law. In 1753 he decided to retire from London work to his fellowship and an academical life, still continuing the practice of his profession as a provincial counsel.

His lectures on the laws of England appear to have been an early and favourite idea; for in the Michaelmas term immediately after he abandoned London, he entered on the duty of reading them at Oxford; and we are told by the author of his *Life*, that even at their commencement, the high expectations formed from the acknowledged abilities of the lecturer attracted to these lectures a very crowded class of young men of the first families, characters and hopes. Bentham, however, declares that he was a "formal, precise and affected lecturer—just what you would expect from the character of his writings—cold, reserved and wary, exhibiting a frigid pride." It was not till the year 1758 that the lectures in the form they now bear were read in the university. Blackstone, having been unanimously elected to the newly-founded Vinerian professorship, on the 25th of October read his first introductory lecture, afterwards prefixed to the first volume of his celebrated *Commentaries*. It is doubtful whether the *Commentaries* were originally intended for the press; but many imperfect and incorrect copies having got into circulation, and a pirated edition of them being either published or preparing for publication in Ireland, the author thought proper to print a correct edition himself, and in November 1765 published the first volume, under the title of *Commentaries on the Laws of England*. The remaining parts of the work were given to the world in the course of the four succeeding years. It may be remarked that before this period the reputation which his lectures had deservedly acquired for him had induced him to resume practice in London; and, contrary to the general order of the profession, he who had quitted the bar for an academic life was sent back from the college to the bar with a considerable increase of business. He was likewise elected to parliament, first for Hindon, and afterwards for Westbury in Wilts; but in neither of these departments did he equal the expectations which his writings had raised. The part he took in the Middlesex election drew upon him many attacks as well as a severe animadversion from the caustic pen of "Junius." This circumstance probably strengthened the aversion he professed to parliamentary attendance, "where," he said, "amidst the rage of contending parties, a man of moderation must expect to meet with no quarter from any side." In 1770 he declined the place of solicitor-general; but shortly afterwards, on the promotion of Sir Joseph Yates to a seat in the court of common pleas, he accepted a seat on the bench, and on the death of Sir Joseph succeeded him there also. He died on the 14th of February 1780.

The design of the *Commentaries* is exhibited in his first Vinerian lecture printed in the introduction to them. The author there dwells on the importance of noblemen, gentlemen and educated persons generally being well acquainted with the laws of the country; and his treatise, accordingly, is as far as possible a popular exposition of the laws of England. Falling into the common error of identifying the various meanings of the word law, he advances from the law of nature (being either the revealed or the inferred will of God) to

municipal law, which he defines to be a rule of civil conduct prescribed by the supreme power in a state commanding what is right and prohibiting what is wrong. On this definition he founds the division observed in the *Commentaries*. The objects of law are rights and wrongs. Rights are either rights of persons or rights of things. Wrongs are either public or private. These four headings form respectively the subjects of the four books of the *Commentaries*.

Blackstone was by no means what would now be called a scientific jurist. He has only the vaguest possible grasp of the elementary conceptions of law. He evidently regards the law of gravitation, the law of nature, and the law of England, as different examples of the same principle—as rules of action or conduct imposed by a superior power on its subjects. He propounds in terms the doctrine that municipal or positive laws derive their validity from their conformity to the so-called law of nature or law of God. “No human laws,” he says, “are of any validity if contrary to this.” His distinction between rights of persons and rights of things, implying, as it would appear, that things as well as persons have rights, is attributable to a misunderstanding of the technical terms of the Roman law. In distinguishing between private and public wrongs (civil injuries and crimes) he fails to seize the true principle of the division. Austin, who accused him of following slavishly the method of Hale’s *Analysis of the Law*, declares that he “blindly adopts the mistakes of his rude and compendious model; missing invariably, with a nice and surprising infelicity, the pregnant but obscure suggestions which it proffered to his attention, and which would have guided a discerning and inventive writer to an arrangement comparatively just.” By the want of precise and closely-defined terms, and his tendency to substitute loose literary phrases, he falls occasionally into irreconcilable contradictions. Even in discussing a subject of such immense importance as equity, he hardly takes pains to discriminate between the legal and popular senses of the word, and, from the small place which equity jurisprudence occupies in his arrangement, he would scarcely seem to have realized its true position in the law of England. Subject, however, to these strictures the completeness of the treatise, its serviceable if not scientific order, and the power of lucid exposition possessed by the author demand emphatic recognition. Blackstone’s defects as a jurist are more conspicuous in his treatment of the underlying principles and fundamental divisions of the law than in his account of its substantive principles.

Blackstone by no means confines himself to the work of a legal commentator. It is his business, especially when he touches on the framework of society, to find a basis in history and reason for all the most characteristic English institutions. There is not much either of philosophy or fairness in this part of his work. Whether through the natural conservatism of a lawyer, or through his own timidity and subserviency as a man and a politician, he is always found to be a specious defender of the existing order of things. Bentham accuses him of being the enemy of all reform, and the unscrupulous champion of every form of professional chicanery. Austin says that he truckled to the sinister interests and mischievous prejudices of power, and that he flattered the overweening conceit of the English in their own institutions. He displays much ingenuity in giving a plausible form to common prejudices and fallacies; but it is by no means clear that he was not imposed upon himself. More undeniable than the political fairness of the treatise is its merits as a work of literature. It is written in a most graceful and attractive style, and although no opportunity of embellishment has been lost, the language is always simple and clear. Whether it is owing to its literary graces, or to its success in flattering the prejudices of the public to which it was addressed, the influence of the book in England has been extraordinary. Not lawyers only, and lawyers perhaps even less than others, accepted it as an authoritative revelation of the law. It performed for educated society in England much the same service as was rendered to the people of Rome by the publication of their previously unknown laws. It is more correct to regard it as a handbook of the law for laymen than as a legal treatise; and as the first and only book of the kind in England it has been received with somewhat indiscriminating reverence. It is certain that a vast amount of the constitutional sentiment of the country has been inspired by its pages. To this day Blackstone’s criticism of the English constitution would probably express the most profound political convictions of the majority of the English people. Long after it has ceased to be of much practical value as an authority in the courts, it remains the arbiter of all public discussions on the law or the constitution. On such occasions the *Commentaries* are apt to be construed as strictly as if they were a code. It is curious to observe how much importance is attached to the *ipsissima verba* of a writer who aimed more at presenting a picture intelligible to laymen than at recording the principles of the law with technical accuracy of detail.

See also the article English Law.

BLACK VEIL, in the Roman Catholic Church, the symbol of the most complete renunciation of the world and adoption of a nun's life. On the appointed day the nun goes through all the ritual of the marriage ceremony, after a solemn mass at which all the inmates of the convent assist. She is dressed in bridal white with wreath and veil, and receives a wedding-ring, as spouse of the Church. Afterwards she presides at a wedding-breakfast, at which a bride-cake is cut. She thus bids adieu to all her friends, and having previously taken the white veil, the betrothal, she now assumes the black, and for ever forswears the world and its pleasures. Her hair is cut short, and her bridal robes are exchanged for the sombre religious habit. Her wedding-ring, however, she continues to wear, and it is buried with her.

BLACKWATER, the name of a number of rivers and streams in England, Scotland and Ireland. The Blackwater in Essex, which rises near Saffron Walden, has a course of about 40 m. to the North Sea. The most important river of the name is in southern Ireland, rising in the hills on the borders of the counties Cork and Kerry, and flowing nearly due east for the greater part of its course, as far as Cappoquin, where it turns abruptly southward, and discharges through an estuary into Youghal Bay. The length of its valley (excluding the lesser windings of the river) is about 90 m., and the drainage area about 1300 sq. m. It is navigable only for a few miles above the mouth, but its salmon fisheries are both attractive to sportsmen and of considerable commercial value. The scenery of its banks is at many points very beautiful.

BLACKWATER FEVER, a disease occurring in tropical countries and elsewhere, which is often classed with malaria (*q.v.*). It is characterized by irregular febrile paroxysms, accompanied by rigors, bilious vomiting, jaundice and haemoglobinuria (Sambon). It has a wide geographical distribution, including tropical Africa, parts of Asia, the West Indies, the southern United States, and—in Europe—Greece, Sicily and Sardinia; but its range is not coextensive with malaria. Malarial parasites have occasionally been found in the blood. Some authorities believe it to be caused by the excessive use of quinine, taken to combat malaria. This theory has had the support of Koch, but it is not generally accepted. If it were correct, one would expect blackwater fever to be regularly prevalent in malarial countries and to be more or less coextensive with the use of quinine, which is not at all the case. It often resembles yellow fever, but the characteristic black vomit of yellow fever rarely occurs in blackwater fever, while the black urine from which the latter derives its name is equally rare in the former. According to the modern school of tropical parasitology, blackwater fever is neither a form of malaria nor produced by quinine, but a specific disease due to a protozoal parasite akin to that which causes the redwater fever of cattle.

BLACKWELL, THOMAS (1701-1757), Scottish classical scholar, was born at Aberdeen on the 4th of August 1701. He took the degree of M.A. at the Marischal College in 1718. He was appointed professor of Greek in 1723, and was principal of the institution from 1748 until his death on the 8th of March 1757. In 1735 his first work, *An Inquiry into the Life and Writings of Homer*, was published anonymously. It was reprinted in 1736, and followed (in 1747) by *Proofs of the Enquiry into Homer's Life and Writings*, a translation of the copious

notes in foreign languages which had previously appeared. This work, intended to explain the causes of the superiority of Homer to all the poets who preceded or followed him, shows considerable research, and contains many curious and interesting details; but its want of method made Bentley say that, when he had gone through half of it, he had forgotten the beginning, and, when he had finished the reading of it, he had forgotten the whole. Blackwell's next work (also published anonymously in 1748) was *Letters Concerning Mythology*. In 1752 he took the degree of doctor of laws, and in the following year published the first volume of *Memoirs of the Court of Augustus*; the second volume appeared in 1755, the third in 1764 (prepared for the press, after Blackwell's death, by John Mills). This work shows considerable originality and erudition, but is even more unmethodical than his earlier writings and full of unnecessary digressions. Blackwell has been called the restorer of Greek literature in the north of Scotland; but his good qualities were somewhat spoiled by pomposity and affectation, which exposed him to ridicule.

BLACKWOOD, WILLIAM (1776-1834), Scottish publisher, founder of the firm of William Blackwood & Sons, was born of humble parents at Edinburgh on the 20th of November 1776. At the age of fourteen he was apprenticed to a firm of booksellers in Edinburgh, and he followed his calling also in Glasgow and London for several years. Returning to Edinburgh in 1804, he opened a shop in South Bridge Street for the sale of old, rare and curious books. He undertook the Scottish agency for John Murray and other London publishers, and gradually drifted into publishing on his own account, removing in 1816 to Princes Street. On the 1st of April 1817 was issued the first number of the *Edinburgh Monthly Magazine*, which on its seventh number, bore the name of *Blackwood's* as the leading part of the title. "Maga," as this magazine soon came to be called, was the organ of the Scottish Tory party, and round it gathered a host of able writers. William Blackwood died on the 16th of September 1834, and was succeeded by his two sons, Alexander and Robert, who added a London branch to the firm. In 1845 Alexander Blackwood died, and shortly afterwards Robert.

A younger brother, John Blackwood (1818-1879), succeeded to the business; four years later he was joined by Major William Blackwood, who continued in the firm until his death in 1861. In 1862 the major's elder son, William Blackwood (b. 1836), was taken into partnership. John Blackwood was a man of strong personality and great business discernment; it was in the pages of his magazine that George Eliot's first stories, *Scenes of Clerical Life*, appeared. He also inaugurated the "Ancient Classics for English readers" series. On his death Mr William Blackwood was left in sole control of the business. With him were associated his nephews, George William and J.H. Blackwood, sons of Major George Blackwood, who was killed at Maiwand in 1880.

> See *Annals of a Publishing House; William Blackwood and his Sons* ... (1897-1898), the first two volumes of which were written by Mrs Oliphant; the third, dealing with John Blackwood, by his daughter, Mrs Gerald Porter.

BLADDER (from A.S. *blaēddre*, connected with *blāwan*, to blow, cf. Ger. *blase*), the membranous sac in animals which receives the urine secreted from the kidneys. The word is also used for any similar sac, such as the gall-bladder, the swim-bladder in fishes, or the small vesicle in various seaweeds.

BLADDER AND PROSTATE DISEASES. The urinary bladder in man (for the anatomy see URINARY SYSTEM), being the temporary reservoir of the renal secretion, and, as such,

containing the urine for longer or shorter periods, is liable to various important affections. These are dealt with in the first part of this article. The diseases of the prostate are so intimately allied that they are best considered, as in the subsequent section, as part of the same subject.

Diseases of the Bladder.

Cystitis.

Cystitis, or inflammation of the bladder, which may be acute or chronic, is due to the invasion of the mucous lining by micro-organisms, which gain access either from the urethra, the kidneys or the blood-stream. It is easy to see how the diplococci of gonorrhoea may infect the bladder-membrane by direct extension of the inflammation, and how the bacilli which are swarming in the neighbouring bowel may find access to the urethra or bladder when the intervening tissues have been rendered penetrable by a wound or by inflammation. Sometimes, however, especially in the female, the germs from the large intestine enter the bladder by way of the vulva and the urethra.

Any condition leading to disturbance of the function of the bladder, such as enlargement of the prostate, stricture of the urethra, stone, or injury, may cause cystitis by preparing the way for bacillary invasion. The bacilli of tuberculosis and of typhoid fever may set up cystitis by coming down into the bladder from the kidneys with the urine, or they reach it by the blood-stream, or invade it by the urethra. Another way of cystitis being set up is by the introduction of the germs of suppuration by a catheter or bougie sweeping them in from the urethra; or the instrument itself may be unsterilized and dirty and so may introduce them. It used formerly to be thought that wet or cold was enough to cause inflammation of the bladder, but the probability is that this acts only by lowering the resistance of the lining membrane of the bladder, and preparing it for the invasion of the germs which were merely waiting for an opportunity. In the same way, gout or injury may lead to the lurking bacilli being enabled to effect their attack. But in every case disease-germs are the cause of the trouble, and they may be found in the urine. The first effect of inflammation is to render the bladder irritable, so that as soon as a few drops of urine have collected, the individual has intense or uncontrollable desire to micturate. The effort may be very painful and may be accompanied by bleeding from the overloaded blood-vessels of the inflamed membrane. In addition to blood, pus is likely to be found in the urine, which by this time is alkaline and ammoniacal, and teeming with micro-organisms. As regards *treatment*, the patient should be at once sent to bed in a warm room, and should sit several times a day in a very hot hip-bath. When he has got back to bed, a fomentation under oil-silk, or some other waterproof material, should be placed over the lower part of the abdomen. The diet should be milk (diluted with hot or cold water), barley-water, and bread and butter; no alcoholic drink should be allowed. If the urine is acid, bicarbonate of soda may be given, or citrate of soda; if alkaline, urotropine—a derivative of formic aldehyde—may prove a useful urinary disinfectant. If the straining and distress are great, a suppository of ¼ or ½ a grain of morphia may be introduced into the rectum every two or three hours. The bowels must be kept freely open. If the urine is foul, the bladder should be frequently washed out by a soft catheter and two or three feet of india-rubber tubing with a funnel at the other end, weak and abundant hot lotions of Sanitas or Condy’s fluid being used.

Chronic cystitis is the condition left when the acute symptoms have passed away, but it is liable at any moment to resume the acute condition. If the cystitis is very intractable, refusing to yield to hot irrigations, and to washings with nitrate of silver lotion, it may be advisable to open the bladder from the front, and to explore, treat, drain and rest it.

In *tuberculous cystitis* there is added to the symptoms the discovery of the bacilli of tuberculosis in the urine, and cystoscopic examination may reveal the presence of tubercles of the mucous membrane or even of ulceration. The patient is probably losing weight, and he may present foci of tuberculosis at the back of the testicle, the lung or kidney, or in a joint or bone, or in a lymphatic gland. *Treatment* is rebellious and unpromising. Washings and lotions give but temporary relief, and if the bladder is opened for rest, and for a more direct treatment, the germs of suppuration may enter, and, working in conjunction with the bacilli, may cause great havoc. Koch’s tuberculin treatment should certainly be given a trial. This consists of the injection into the body of an emulsion of dead tubercle bacilli which have been sterilized by heat. As a result of this injection the blood sets to work to form an “opsonin”—a protective material which so modifies the disease-germs as to render them attractive to the white corpuscles of the patient’s blood (phagocytes), which then seize upon and destroy them. Sir A.E. Wright has devised a delicate method of examination of the blood

(the calculation of the opsonic index) which tells when the tuberculin injections should be resorted to and when withheld (see BLOOD).

Stone.

Calculi and Gravel.—Uric acid is deposited from the urine either as small crystals resembling cayenne pepper, or else, in combination with soda and ammonia, as an amorphous "brick-dust" deposit, which, on cooling, leaves a red stain on the bottom of the vessel, soluble in hot water. These substances are derived from the disintegration of nitrogenized food taken in excess of demand, and from the breaking down of the human tissues. They occur therefore in fevers, in wasting diseases, and in the normal subject after excessive muscular exercises, especially if these exercises have been accompanied with so much perspiration that the excess of water from the blood has escaped by the skin rather than by the kidneys. The abundance of this deposit is in accordance with the amount of heat developed and work done in the body, and corresponds with the dust and ashes raked out of the fire-box of the locomotive after a long run. But supposing that the uric acid débris continues to be excessive, the risk of the formation of renal or vesical calculi becomes considerable, and it may be advisable to place the patient on a restricted nitrogenized diet, to induce him to drink large quantities of water, and to keep his bowels so loose with watery laxatives, such as Epsom salts or sulphate of soda, that the waste products of his body are made to escape by the bowels rather than by the kidneys. In addition to the salts just mentioned, an occasional dose of blue pill will prove helpful. A course of treatment at Contrexéville or Carlsbad may be taken with advantage.

Alkaline urine is unable to hold the phosphates of ammonia and magnesia in solution, so they are deposited in abundance either in the kidney or bladder. If the voided urine is allowed to stand in a tall glass they sink to the bottom with pus and mucus in a cloudy deposit. To remedy this condition it is necessary to treat the cystitis with which the bacterial decomposition of the urine is associated. It may be that a calculus of acid urine, such as one of uric acid or oxalate of lime, has been resting in the bladder and keeping up incessant irritation, and that the micro-organisms of decomposition or suppuration have found their way to the mucous lining of the bladder from either the bowel, the urethra or the blood-stream; undergoing cultivation there they break up the urea into carbonate of ammonia and so render the urine alkaline. This alkaline urine deposits its phosphates, which light upon the calculus and encrust it with a mortary shell, which may go on increasing in size until it may even fill the bladder. Sometimes the nucleus of a calculus is a chip of bone or a blood-clot, or some foreign substance which has been introduced into the bladder. Sooner or later the urine becomes alkaline and the calculus is encrusted with lime salts.

When urine contains a larger amount of chemical constituents than it can conveniently hold in solution, a certain quantity crystallizes out, and may be deposited in the kidney or in the bladder. If the crystals run together in the kidney the resulting concretion may either remain in that organ or may find its way into the bladder, where it may remain to form the nucleus of a larger vesical calculus, or, especially in the case of females, it may, while still small, escape from the bladder during micturition.

In children, in whom there is a rapid disintegration of nitrogenized tissues, a uric acid calculus in escaping from the bladder may block the urethra and give rise to sudden retention of urine. On introducing a metal "sound," the surgeon may strike the stone, and if it happens to be near the bladder he may push it back and subsequently remove it by crushing. But if it has made its way some distance along the urethra, so that he can feel it from the outside, he should remove it by a clean incision.

A stone in the bladder worries the nerves of the mucous membrane, and, giving them the impression that the bladder contains much water, causes the desire and need for micturition to be constant. The irritation causes an excessive secretion of mucus, just as a piece of grit under the eyelid causes a constant running from the eye. So the urine, if allowed to stand, gives a copious deposit. During micturition the contracting bladder bruises its congested blood-vessels against the stone, so that towards the end of micturition blood appears in the urine. Lastly, cystitis occurs, and the urine contains fetid pus. A stone in the bladder gives rise to pain at the end of the penis, and it is apt suddenly to stop the flow of urine during micturition.

The association of any of these symptoms leads the surgeon to suspect the presence of a stone in the bladder, and he confirms his suspicions by introducing a slender steel rod, a "sound," by which he strikes and feels the stone. Further confirmation may be obtained by the help of the X-rays, or, in the adult, by using a cystoscope. In a child the stone may often be felt by a finger in the rectum, the front of the bladder being pressed by a hand on the

lower part of the abdomen. The *cystoscope* is a straight, hollow metal tube about the size of a long cedar pencil, which the surgeon introduces into the adult bladder, which has already been filled with warm boracic lotion. Down the tube run two fine wires which control a minute electric lamp at the bladder end of the instrument. At that end also is a small glass window which prevents the fluid escaping by the tube, and also a prism; at the other end of the tube is an eye-piece. By the use of this slender speculum the practised surgeon can recognize the presence of tubercle or tuberculous ulceration of the bladder, stone, or other foreign material, and innocent or malignant growths. He can also watch the urine entering the bladder by the openings of the ureters, and determine from which kidney blood or pus is coming.

The *treatment* of stone in the bladder is governed by various conditions. Speaking generally, the surgeon prefers to introduce a lithotrite and crush the stone into small fragments, and then to flush out the fragments by using a full-sized, hollow metal catheter and an india-rubber wash-bottle. Even in children this operation may generally be adopted with success, the stone being crushed to atoms and the fragments being washed out to the last small chip. But if the stone is a very hard one (as are some of the oxalate of lime calculi), or if it is very large, or if the bladder or the prostate gland is in a state of advanced disease, or if the urethra is not roomy enough to admit instruments of adequate calibre, the crushing operation (*lithotrity*) must be deemed unsuitable, and the stone must be removed by a cutting operation (*lithotomy*).

Lithotomy.—Cutting for stone has been long practised; but up to the beginning of the 19th century it was performed only by a few men, who, bolder than their contemporaries, had specially worked at that operation and had attained celebrity as skilful lithotomists. Patients went long distances to be operated on by them, and certain of the older surgeons, as William Cheselden, performed a large number of operations with most excellent results. The operation was by an incision from the perineum, and is ordinarily spoken of as *lateral* lithotomy. It was splendidly designed, and gave good results, especially in children. But it is now a thing of the past, having almost entirely given place to the *high* or *supra-pubic* operation. In the high operation the patient, being duly prepared, is placed upon his back and the bladder is washed out with hot boracic lotion, and when the lotion returns quite clean a final injection is made until the bladder is felt rising above the pubes. Then the india-rubber tube is removed from the silver catheter by which the injection has been made, and the end of the catheter is plugged by a spigot. An incision is then made in the middle line of the abdomen over the bladder region. The incision must be kept as low as possible, so that the bladder may be reached below the peritoneum, which, higher up, gives it an external, serous coat. As the bladder is approached, a good many veins are seen to be in the way, some of which have to be wounded. The bladder-wall is recognized by its coarse network of pale muscular fibres, through which, on each side of the middle line, a strong suture is passed, so that when the bladder is opened and the lotion comes rushing out, the opening which has been made into the bladder may not sink into the depths of the pelvis. A finger introduced into the bladder makes out the exact size and position of the stone, or stones, and the removal is effected by special forceps. Bleeding having ceased, the bladder-wound is partly or entirely closed by sutures and allowed to fall into the pelvis, the catheter having been removed. It is advisable to leave a drainage tube in the abdominal wound for a while, so that if urine leaks from the bladder-wound it may find a ready escape to the dressings.

Litholapaxy.—Lithotrity consists of two parts—the crushing of the stone, and the removal of the detritus. The two stages are now carried out at one “sitting,” without an interval being allowed between them, as was formerly the practice, and the term “litholapaxy” designates this method. The patient having been anaesthetized, 10 oz. of hot boracic lotion are injected, and the crushing instrument, the lithotrite, is then passed into the bladder. The lithotrite has two blades, a “male” and a “female,” the latter fenestrated, the former solid with its surface notched. When the stone is fixed between the blades the screw is used, and great pressure is applied evenly, gradually and continuously to the stone. The lithotrite is made of very tough steel, so that hard stones may be crushed without danger of the instrument breaking or bending. Care must be taken not to catch the bladder-wall with the lithotrite. This danger is avoided by raising the point of the lithotrite immediately after grasping the stone and before crushing. The stone breaks into two or more pieces, and these fragments must be crushed, one by one, until they are powdered fine enough to escape by the large evacuating catheter. If the stone be large and hard, half an hour or longer may be required to crush it sufficiently fine. When the surgeon fails to catch any more large pieces, the presumption is that the stone has been thoroughly broken up. The lithotrite is then withdrawn and the detritus is washed out by an “aspirator,” which consists of a stiff elastic ball which is connected with a trap, into which fragments of stone fall so as not to pass out on the

instrument being used at later periods in the operation. A large catheter, with the eye very near the end of the short curve, is passed into the bladder; the aspirator, full of boracic lotion, is attached to the catheter, and a few ounces of the fluid are expressed from the aspirator into the bladder by squeezing the rubber ball. When the pressure is taken off the ball, it dilates and draws the fluid out of the bladder, and with it some of the detritus, which falls into the trap. This is repeated until all the fragments have been removed. After the operation the patient sometimes suffers from discomfort. His urine should be drawn off by a soft catheter at regular intervals for a few days. If the pain be severe, it can generally be relieved by fomentations. The patient must be kept in bed after the operation, and in cases where the stone has been large and the bladder irritable, the surgeon should insist on his remaining there for at least a week; in those cases which go on favourably the patients are soon able to perform their ordinary duties. Fatal terminations, however, do now and again occur from suppression of urine, the result of the old-standing kidney disease which so often complicates these cases.

To Brigade-Surgeon Lieutenant-Colonel Dennis Francis Keegan, of the Indian Medical Service, is due the fact that the operation of crushing and promptly removing all fragments of a vesical calculus is as well suited for boys as for men. In entire opposition to long-standing European prejudices, Keegan's operation is now firmly and permanently established. The old operation (Cheselden's) of cutting a stone out through the bottom of a boy's bladder is now seldom resorted to, and if a stone in a boy is found too large or too hard to lend itself to the crushing operation, it is removed by a vertical incision through the lower part of the anterior wall of the abdomen, as described above. For a successful performance of the crushing operation in a boy a small lithotrite has, of course, to be used, and it must be of the very best English make. The operation has to be done with the utmost gentleness and thoroughness, not a particle of the crushed stone being left in the bladder, since otherwise the piece left becomes the nucleus of a fresh stone and the trouble recurs.

The treatment of vesical calculi by other means than operative surgery is of little value. Attempts have been made to dissolve them by internal remedies, or by the injection of chemical agents into the bladder; but, although such methods have for a time been apparently successful, they have invariably been found worthless for removing calculi once actually formed. Nevertheless, much can be done towards *preventing* the formation of calculi in those who have a tendency to their formation, by attention to diet, by taking proper exercise, and by the internal administration of drugs.

Rupture of the bladder may be caused by a kick or blow over the upper part of the abdomen, or by a wheel passing over it; or it may be a complication of fracture of the pelvis. If the rupture is in that part of the bladder which is uncovered by the peritoneum, the extravasated urine may be cut down upon and let out with good prospect of success; but if the rupture is in the upper or hinder part of the bladder the urine is let loose into the general peritoneal cavity and sets up peritonitis, which is more than likely to prove fatal. If the surgeon knows that the bladder is ruptured he should operate at once in order to provide escape for the urine, and also to sew up the rent. If the possibility of the bladder being ruptured be even suspected, the surgeon should pass a catheter. Perhaps he draws off an ounce or two of blood-stained urine. This makes him doubly suspicious, so he injects into the bladder five, eight or ten ounces of warm boracic lotion, and, leaving it there for a few minutes, he measures the amount which he is able afterwards to withdraw; if he finds that a certain amount is lost he is assured that a leakage has taken place and he at once proceeds to operate. If only the diagnosis is made promptly, and the operation is at once undertaken, the outlook is not unfavourable. A generation or so back nearly all the cases of rupture of bladder ended fatally.

Villous disease of the bladder is innocent; that is to say, it does not spread to the neighbouring structures or implicate the lymphatic glands. The villi are slender, branched, filamentous processes which, springing from the floor of the bladder, float in the urine like seaweed. They are freely supplied with blood-vessels, so that when a piece of a villus is broken off there is likely to be blood in the urine. Indeed, painless haemorrhage is one of the characteristic features of the disease, and when fragments of the "seaweed" are found in the urine the diagnosis is clear. If the bladder is opened from the front, as already described, the villi may be nipped off by special forceps and the disease permanently cured.

Malignant disease of the bladder is almost always the warty form of cancer known as epithelioma. It springs as a sessile growth from the mucous membrane of the floor near the opening of one of the ureters, and, worrying the sensory nerves, causes irritability of the bladder and incontinence of urine. In due course septic germs reach the bladder, either from the urethra, the bowel, the kidneys or the blood-stream, and cystitis sets in. When ulceration has taken place, blood occurs in the urine, and the patient—generally beyond middle age—

suffers dull or lancinating pains. Eventually the rectum may also be involved and the distress becomes extreme. The presence of the growth may be determined by sounding the bladder, by the cystoscope, and by the finger in the rectum. If the growth invades the outlet, retention of urine may occur, and the surgeon may be compelled to open the bladder from the front of the abdomen. In cases where operation is out of the question, washing the bladder with hot boracic lotion may give great relief. The treatment of cancer of the bladder by operation is, as a rule, unsatisfactory, because of the close proximity of the growth to the ureters and to the rectum. If, however, the disease were recognized early and had not invaded the neighbouring structures, and if it were upon the upper or the anterior part of the bladder, its removal might be hopefully undertaken.

Hypertrophy and Dilatation.—When there is long-continued obstruction to the flow of urine, as in stricture of the urethra, or enlargement of the prostate, the bladder-wall becomes much thickened, the muscular fibres increasing both in size and number; the condition is known as “hypertrophy.” Hypertrophy may be accompanied by dilatation of the bladder, a condition which the bladder may assume when the voiding of its contents is interfered with for a length of time.

Paralysis of the bladder is a want of contractile power in the muscular fibres of the bladder-wall. It may result from injuries whereby the spinal cord is lacerated or pressed upon, so that the micturition centre, which is situated in the lumbar region, is thrown out of working order. The result may be either retention or incontinence of urine; sometimes there is at first retention, which later is followed by incontinence. Paralysis is also met with in certain nervous diseases, as in locomotor ataxia, and in various cerebral lesions, as in apoplexy.

Atony of the bladder is a paresis or partial paralysis. It is due to a want of tone in the muscular fibres, and is frequently the result of over-distension of the bladder, such as may occur in cases of enlargement of the prostate. The patient is unable to empty the bladder, and the condition of atony gets increasingly worse.

In both paralysis and atony the indication is carefully to prevent over-distension by the urine being retained too long, and at the same time to treat by appropriate means the cause which has produced or is keeping up the condition.

Incontinence of urine may occur in the adult or in the child, but is due to widely different causes in the two cases. In the child it may be simply a bad habit, the child not having been properly trained; but more frequently there is a want of control in the micturition-centre, so that the child passes its water unwittingly, especially during the night. In adults it is not so much a condition of incontinence in the sense of water being passed against the will, but is a suggestion that the bladder is already full, the water which passes being the overflow from a too full reservoir. It is usually caused by an obstruction external to the bladder, *e.g.* enlarged prostate or stricture of the urethra; a calculus may produce the condition. In the child an attempt must be made to improve the tone of the micturition-centre by the use of belladonna or strychnine internally, and of a blister or faradism externally over the lumbar region, and every effort should be made to train the child to pass water at stated times and regular intervals. In the adult the cause which produces the over-distension must be removed if possible; but, as a rule, the patient has to be provided with a catheter, which he can pass before the bladder has filled to overflowing. A soft flexible catheter should be given in preference to a rigid or semi-rigid one. The best form is the red-rubber catheter, and he should be taught the need of keeping it absolutely clean. In the case of children incontinence of urine means irritability; in adults it means overflow.

The condition termed by Sir James Paget *stammering micturition* is analogous to speech stammering, and occurs in those who are nervous and easily put out. It would seem to be due to the sphincter of the bladder not relaxing synchronously with the contraction of the detrusor, and is sometimes caused by external irritation, such as preputial adhesions. Occasionally not a drop of urine can be passed, or a little passes and then a sudden stoppage occurs; the more the patient strains the worse he becomes, until at last there is complete retention of urine. The trouble can sometimes be cured by the removal of irritating causes, and in these cases, as well as in those in which no such cause can be discovered, care should be taken to avoid those difficulties which have given rise to the patient’s worst failures. If at any time he should fail to perform the act of micturition, he ought not to strain, but should quietly wait for a little before making any further effort. Regularity in the times of making water is also of much importance.

Retention of urine may occur in paralysis of the bladder, or in conditions where the patient is suffering from an illness which blunts the nervous sensibility, such as apoplexy, concussion of the brain, or typhoid fever. It is, however, more commonly due to obstruction anterior to the bladder, as in stricture of the urethra or enlargement of the prostate. The distended bladder can be felt as a rounded swelling above the pubes, and perhaps reaching

to the level of the navel. Percussion over it gives a dull note. When the bladder is distended, it is necessary to evacuate it as soon as possible. If there is no obstruction to the flow of urine, the retention being due to atony or paralysis, a soft catheter is passed and the water drawn off. But when there is an obstruction which cannot be overcome, aspiration has to be resorted to, the needle of the aspirator being pushed through the abdominal wall into the bladder. The point of puncture in the abdominal wall is in the middle line a few inches above the symphysis pubis. The bladder may be emptied in this way very many times in the same person with only good result.

Diseases of Prostate Gland.

The prostate gland may become acutely inflamed as the result of the backward extension of gonorrhoeal inflammation of the urethra; it may also be attacked by the germs of ordinary suppuration as well as by the bacilli of tuberculosis. A sudden enlargement of a large gland lying against the outlets of the bladder and the bowel renders micturition difficult, painful or impossible, and interferes with defaecation. Pressure of the seat of the chair upon the perineum also causes distress, so the man sits sideways and on the edge of the seat. If abscess forms, it should be incised from the perineum; if allowed to run its course it may burst into the bladder, the urethra or the rectum, and set up serious complication. The treatment of prostatitis (inflammation of the prostate) consists in rest in bed, sitz-baths and fomentations. If retention of urine takes place a soft catheter must be passed. In the early stage of an acute attack a dozen leeches upon the perineum may do good. The bowels must be kept freely open, and from time to time, as the pain demands, a morphia suppository may be introduced into the bowel.

Chronic prostatitis is a legacy from a recent or long-past attack of gonorrhoea. The enlargement gives rise to a feeling of weight and fulness in the perineum, irritability of the bladder, and a gleety urethral discharge. Manual examination reveals the presence of a large, hard mass in front of the bladder, and in the mass there can often be felt softish or tender areas which seem to threaten abscess. On urine being passed into a glass, a cloudiness is seen, and material like pieces of vermicelli or broken threads may be noticed. These are the castings from the long tubular glands, and are characteristic of chronic inflammation of the prostate. The occasional passage of a large metal bougie, the use of weak lotions of nitrate of silver, the administration of quinine and iron, and the application of blisters to the perineum, may be tried as circumstances direct. The patient should lead a quiet life, free from sexual excitement. Horse-exercise, cycle-riding, rough games and alcohol should be avoided.

Enlargement of the prostate exists in a considerable proportion of men of about sixty years of age and onward. It consists of an uncontrolled growth of the normal muscular and glandular tissue of the prostate, interfering with, or absolutely stopping, the outflow of the urine. Gently pushing the bladder upwards and backwards, it increases the length of the urethra, so that in order to draw off retained urine the catheter must be longer than ordinary, but inasmuch as there is no actual narrowing of the passage it may be of full calibre. The beak should be well turned up so that it may ride in front of, and surmount, the median enlargement. Because of the thick, ring-like mass of new tissue around the outlet of the bladder, there is difficulty in micturition, and because the muscular bladder wall is now unable to contract upon all its contents a certain amount of urine is retained. As the enlarged prostate bulges up in the floor of the bladder, a pouch or hollow forms behind it, from which the muscular wall is unable to dislodge the stagnant urine. This keeps up constant irritation, and if by chance the germs of decomposition find their way thither, cystitis sets in and the patient’s condition becomes serious, not only because of the risk to which his tired and irritated kidneys are submitted, but because of the possibility of a phosphatic stone being formed in the bladder. The seriousness of enlargement of the prostate does not depend upon the size of the growth so much as upon the inability of the patient to empty his bladder completely.

The surgeon forms his estimate of the size of the prostate by rectal examination. But sometimes a patient has retention of urine from enlarged prostate, when by this method of manual examination the amount of increase appears quite unimportant. The explanation is that the enlargement is chiefly confined to a small piece of the gland which protrudes like a tongue into the water-way. Robert McGill of Leeds was the first surgeon to remove by a supra-pubic operation this tongue-like process of new prostatic growth. Attempts had sometimes been made to get rid of it by instrumentation through the urethra, but they had not met with much success.

When the surgeon has made out the existence of an enlargement of the prostate, the next

thing is to find to what extent this interferes with the bladder being emptied. To do this, he asks the patient to pass as much water as he is able, and then with due precautions introduces a soft catheter and measures the amount of urine which he thus draws off—half an ounce, an ounce, two ounces, however much it may be. It is this “residual urine” which causes the annoyance and the danger of enlarged prostate, and unless arrangements can be made for its regular withdrawal serious trouble is almost certain to ensue. The passing of a large catheter may have the effect of so opening up the water-way that, at any rate for a time, the irritability of the bladder may cease, in which case the patient may be instructed in the art of passing a catheter for himself. Or the surgeon may find that in addition to the regular passing of a large catheter an occasional washing-out of the bladder with hot boracic lotion is all that is needed in the way of active treatment. At the same time, however, the patient is placed upon a plain and wholesome diet with little or no alcohol, and he is instructed to lead in every respect a regular and quiet life. To many men with enlarged prostate the passing of an instrument night and morning is no great hardship, while to others the idea of leading what is called a “catheter life” appears intolerable, or, having for a time been patiently carried out, is found not only severely trying but greatly disappointing.

In some people the very first passing of a catheter sets up a local and constitutional disturbance, the bladder being rendered irritable and intolerant, the temperature going up, and shiverings and perspirations manifesting themselves. This condition was formerly called “catheter fever,” and was looked upon as something mysterious and peculiar. It is now generally understood to be the result of septic inoculation of the interior of the bladder.

Lastly, in other persons the passing of the catheter is attended with so much difficulty, distress or bleeding, that something more helpful and effectual is urgently called for.

Operative Treatment.—It has long been known that large tumours of the uterus sometimes dwindle if the ovaries are removed by operation, and Professor William White of Philadelphia thought that prostatic growths might be similarly influenced by the removal of the testicles. Beyond question considerable improvement has followed this operation in cases of enlargement of the prostate, especially where the enlargement seemed to be general, soft and vascular. A similar though perhaps a slower effect is produced when the duct of the testis, the vas deferens, is divided on each side of the body. If there is no great urgency about the case this treatment may well be tried, the bladder being all the while duly emptied by catheter and washed by irrigation. But if the case is urgent, there being difficulty or bleeding with the passing of the catheter, the bladder being excessively irritable and the urine foul, a more radical measure is needed. The best operation is that upon the lines laid down by Robert McGill, who opened the bladder through the anterior abdominal wall and removed that part of the prostate gland which was blocking the water-way. McGill’s operation was improved upon by Eugene Fuller of New York, who, in 1895, published a full account of his procedure.[1] Having opened the bladder from the front (as in supra-pubic lithotomy), he introduced his left index finger into the rectum and thrust the prostate gland towards the right index finger, which was then in the bladder. With the nail of that finger, or with the end of a pair of scissors, he made a rent in the mucous membrane of the bladder and the capsule of the gland, and then shelled out the mass of new tissue which had caused the prostatic enlargement. This operation is called “prostatectomy,” which means the removal of the prostate gland. The prostate gland, however, is not removed, but only a muscular and glandular mass (adenoma), which, growing within the prostatic capsule, encircles the urethra and squeezes the original gland tissue out of existence. Following on the lines of McGill and Fuller, P.J. Freyer has done excellent work in England towards placing this operation upon a sound basis.

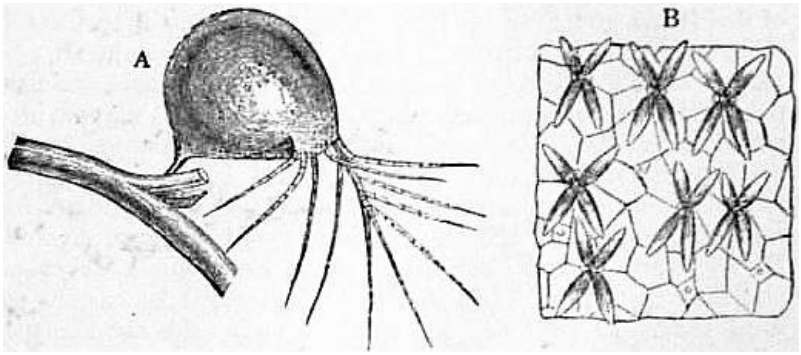
Subsequently to the operation the bladder enjoys complete and needful rest, and the kidneys, which previously were in a condition of perpetual disturbance, improve in working power. The wound in the bladder and in the abdominal wall gradually closes; the function of the bladder returns, and the patient is soon able to go back to his usual occupation in greatly improved health and vigour. The operation is, necessarily, a serious one, and the age of the patient, the condition of his bladder, of his kidneys, and of his blood-vessels, require to be taken into consideration; still, the operation gives an excellent account of itself in statistics, and if a practical surgeon advises a patient to accept its risks his counsel may well be followed.

Malignant disease of the prostate is distinguished from senile glandular enlargement by the rapidity of its growth, by the freeness of the bleeding which is associated with the introduction of a catheter, and by the marked wasting which the individual undergoes. Unfortunately, by the time that the cancerous nature of the disease is definitely recognized, the prospect of relief being afforded by operation is small.

(E. O.*)

1 *Diseases of the Genito-urinary System*, by Eugene Fuller, M.D. (London and New York, 1900).

BLADDER-WORT, the name given to a submerged water plant, *Utricularia vulgaris*, with finely divided leaves upon which are borne small bladders provided with trap-door entrances which open only inwards. Small crustaceans and other aquatic animals push their way into the bladders and are unable to escape. The products of the decay of the organisms thus captured are absorbed into the plant by star-shaped hairs which line the interior of the bladder. In this way the plant is supplied with nitrogenous food from the animal kingdom. Bladder-wort bears small, yellow, two-lipped flowers on a stem which rises above the surface of the water. It is found in pools and ditches in the British Isles, and is widely distributed in the north temperate zone. The genus contains about two hundred species in tropical and temperate regions.



A, Bladder of *Utricularia neglecta* (after Darwin), enlarged. B, stellate hairs from interior of bladder of *U. vulgaris*.

BLADES, WILLIAM (1824-1890), English printer and bibliographer, was born at Clapham, London, on the 5th of December 1824. In 1840 he was apprenticed to his father's printing business in London, being subsequently taken into partnership. The firm was afterwards known as Blades, East & Blades. His interest in printing led him to make a study of the volumes produced by Caxton's press, and of the early history of printing in England. His *Life and Typography of William Caxton, England's First Printer*, was published in 1861-1863, and the conclusions which he set forth were arrived at by a careful examination of types in the early books, each class of type being traced from its first use to the time when, spoilt by wear, it passed out of Caxton's hands. Some 450 volumes from the Caxton Press were thus carefully compared and classified in chronological order. In 1877 Blades took an active part in organizing the Caxton celebration, and strongly supported the foundation of the Library Association. He was a keen collector of old books, prints and medals. His publications relate chiefly to the early history of printing, the *Enemies of Books*, his most popular work, being produced in 1881. He died at Sutton in Surrey on the 27th of April 1890.

BLAENAVON, or Blaenafon, an urban district in the northern parliamentary division of Monmouthshire, England, 15 m. N. by W. of Newport, on the Great Western, London & North Western and Rhymney railways. Pop. (1901) 10,869. It lies in the uppermost part of the Afon Lwyd valley, at an elevation exceeding 1000 ft., in a wild and mountainous district, on the eastern edge of the great coal and iron mining region of Glamorganshire and

Monmouthshire. There are very extensive iron and steel works, with blast furnaces and rolling mills in the district, which employ the large industrial population.

BLAGOVYESHCHENSK, a town of East Siberia, chief town of the Amur government, on the left bank of the Amur, near its confluence with the Zeya in 50° 15′ N. lat. and 127° 38′ E. long., 610 m. by river above Khabarovsk. Founded in 1856, the town had, in 1900, 37,368 inhabitants, and is the seat of the bishop of Amur and Kamchatka. There are steam flour-mills and ironworks. It is a centre for tea exported to Russia, cattle brought from Transbaikalia and Mongolia for the Amur, and for grain.

BLAIKIE, WILLIAM GARDEN (1820-1899), Scottish divine, was born on the 5th of February 1820, at Aberdeen, where his father had been the first provost of the reformed corporation. After studying at the Marischal College, where Alexander Bain and David Masson were among his contemporaries, he went in 1839 to Edinburgh to complete his theological course under Thomas Chalmers. In 1842 he was presented to the living of Drumblade by Lord Kintore, with whose family he was connected. The Disruption controversy reached its climax immediately afterwards, and Blaikie, whose sympathies were entirely with Chalmers, was one of the 474 ministers who signed the deed of demission and gave up their livings. He was Free Church minister at Pilrig, between Edinburgh and Leith, from 1844 to 1868. Keenly interested in questions of social reform, his first publication was a pamphlet, which was afterwards enlarged into a book called *Better Days for Working People*. It received public commendation from Lord Brougham, and 60,000 copies were sold. He formed an association for providing better homes for working people, and the Pilrig Model Buildings were erected. He also undertook the editorship of the *Free Church Magazine*, and then that of the *North British Review*, which he carried on until 1863. In 1864 he was asked to undertake the Scottish editorship of the *Sunday Magazine*, and for this magazine much of his most characteristic literary work was done, especially in the editorial notes, then a new feature in magazine literature.

In 1868 Blaikie was called to the chair of apologetics and pastoral theology at New College, Edinburgh. In dealing with the latter subject he was seen at his very best. He had wide experience, a comprehensive grasp of facts, abundant sympathy, an extensive knowledge of men, and a great capacity for teaching. In 1870 he was one of two representatives chosen from the Free Church of Scotland to attend the united general assembly of the Presbyterian churches of the United States. He prolonged his visit to make a thorough acquaintance with American Presbyterianism, and this, followed by a similar tour in Europe, fitted him to become the real founder of the Presbyterian Alliance. Much of his strength in the later years of life was given to this work. In 1892 he was elected to the chairmanship of the general assembly, the last of the moderators who had entered the church before the disruption. In 1897 he resigned his professorship, and died on the 11th of June 1899.

Blaikie was an ardent philanthropist, and an active and intelligent temperance reformer, in days when this was far from easy. He raised £14,000 for the relief of the Waldensian churches. Although he took an active part in the affairs of his denomination, he was not a mere ecclesiastic. He had a keen eye for the evidences of spiritual growth or decline, and emphasized the need of maintaining a high level of spiritual life. He welcomed Moody to Scotland, and the evangelist made his headquarters with him during his first visit. His best books are *The Work of the Ministry—A Manual of Homiletic and Pastoral Theology* (1873); *The Books of Samuel* in the *Expositors' Bible Series* (2 vols.); *The Personal Life of David Livingstone* (1880); *After Fifty Years* (1893), an account of the Disruption Movement in the form of letters of a grandfather; *Thomas Chalmers* (1896).

(D. Mn.)

BLAINE, JAMES GILLESPIE (1830-1893), American statesman, was born in West Brownsville, Pennsylvania, on the 31st of January 1830, of sturdy Scottish-Irish stock on the side of his father. He was the great-grandson of Colonel Ephraim Blaine (1741-1804), who during the War of Independence served in the American army, from 1778 to 1782 as commissary-general of the Northern Department. With many early evidences of literary capacity and political aptitude, J.G. Blaine graduated at Washington College in Washington, Pennsylvania, in 1847, and subsequently taught successively in the Military Institute, Georgetown, Kentucky, and in the Institution for the Blind at Philadelphia. During this period, also, he studied law. Settling in Augusta, Maine, in 1854, he became editor of the *Kennebec Journal*, and subsequently of the *Portland Advertiser*. But his editorial work was soon abandoned for a more active public career. He was elected to the lower house of the state legislature in 1858, and served four years, the last two as speaker. He also became chairman of the Republican state committee in 1859, and for more than twenty years personally directed every campaign of his party.

In 1862 he was elected to Congress, serving in the House thirteen years (December 1863 to December 1876), followed by a little over four years in the Senate. He was chosen speaker of the House in 1869 and served three terms. The House was the fit arena for his political and parliamentary ability. He was a ready and powerful debater, full of resource, and dexterous in controversy. The tempestuous politics of the war and reconstruction period suited his aggressive nature and constructive talent. The measures for the rehabilitation of the states that had seceded from the Union occupied the chief attention of Congress for several years, and Blaine bore a leading part in framing and discussing them. The primary question related to the basis of representation upon which they should be restored to their full rank in the political system. A powerful section contended that the basis should be the body of legal voters, on the ground that the South could not then secure an increment of political power on account of the emancipated blacks unless these blacks were admitted to political rights. Blaine, on the other hand, contended that representation should be based on population instead of voters, as being fairer to the North, where the ratio of voters varied widely, and he insisted that it should be safeguarded by security for impartial suffrage. This view prevailed, and the Fourteenth Amendment to the Constitution was substantially Blaine’s proposition. In the same spirit he opposed a scheme of military governments for the southern states, unless associated with a plan by which, upon the acceptance of prescribed conditions, they could release themselves from military rule and resume civil government. He was the first in Congress to oppose the claim, which gained momentary and widespread favour in 1867, that the public debt, pledged in coin, should be paid in greenbacks. The protection of naturalized citizens who, on return to their native land, were subject to prosecution on charges of disloyalty, enlisted his active interest and support, and the agitation, in which he was conspicuous, led to the treaty of 1870 between the United States and Great Britain, which placed adopted and native citizens on the same footing.

As the presidential election of 1876 approached, Blaine was clearly the popular favourite of his party. His chance for securing the nomination, however, was materially lessened by persistent charges which were brought against him by the Democrats that as a member of Congress he had been guilty of corruption in his relations with the Little Rock & Fort Smith and the Northern Pacific railways.[1] By the majority of Republicans, at least, he was considered to have cleared himself completely, and in the Republican national convention he missed by only twenty-eight votes the nomination for president, being finally beaten by a combination of the supporters of all the other candidates. Thereupon he entered the Senate, where his activity was unabated. Currency legislation was especially prominent. Blaine, who had previously opposed greenback inflation now resisted depreciated silver coinage. He was the earnest champion of the advancement of American shipping, and advocated liberal subsidies, insisting that the policy of protection should be applied on sea as well as on land. The Republican national convention of 1880, divided between the two nearly equal forces of Blaine and General U.S. Grant—John Sherman of Ohio also having a considerable following—struggled through thirty-six ballots, when the friends of Blaine, combining with those of Sherman, succeeded in nominating General James A. Garfield. In the new administration Blaine became secretary of state, but, owing to the assassination of President Garfield and the reorganization of the cabinet by President Chester A. Arthur, he held the office only until December 1881. His brief service was distinguished by several notable steps. In order to promote the friendly understanding and co-operation of the nations on the American continents he projected a Pan-American congress, which, after being arranged for, was frustrated by his retirement. He also sought to secure a modification of the Clayton-Bulwer treaty, and in an extended correspondence with the British government strongly asserted the policy of an exclusive American control of any isthmian canal which might be built to

connect the Atlantic and Pacific oceans.

With undiminished hold on the imagination and devotion of his followers he was nominated for president in 1884. After a heated canvass, in which he made a series of brilliant speeches, he was beaten by a narrow margin in New York. By many, including Blaine himself, the defeat was attributed to the effect of a phrase, “Rum, Romanism and Rebellion,” used by a clergyman, Rev. Samuel D. Burchard (1812-1891), on the 29th of October 1884, in Blaine’s presence, to characterize what, in his opinion, the Democratic party stood for. The phrase was not Blaine’s, but his opponents made use of it to misrepresent his attitude toward the Roman Catholics, large numbers of whom are supposed, in consequence, to have withdrawn their support. Refusing to be a presidential candidate in 1888, he became secretary of state under President Harrison, and resumed his work which had been interrupted nearly eight years before. The Pan-American congress, then projected, now met in Washington, and Blaine, as its master spirit, presided over and guided its deliberation through its session of five months. Its most important conclusions were for reciprocity in trade, a continental railway and compulsory arbitration in international complications. Shaping the tariff legislation for this policy, Blaine negotiated a large number of reciprocity treaties which augmented the commerce of his country. He upheld American rights in Samoa, pursued a vigorous diplomacy with Italy over the lynching of eleven Italians, all except three of them American naturalized citizens, in New Orleans on the 14th of May 1891, held a firm attitude during the strained relations between the United States and Chile (growing largely out of the killing and wounding of American sailors of the U.S. ship “Baltimore” by Chileans in Valparaiso on the 16th of October 1891), and carried on with Great Britain a resolute controversy over the seal fisheries of Bering Sea,—a difference afterwards settled by arbitration. He resigned on the 4th of June 1892, on the eve of the meeting of the Republican national convention, wherein his name was ineffectually used, and he died at Washington, D.C., on the 27th of January 1803.

During his later years of leisure he wrote *Twenty Years of Congress* (1884-1886), a brilliant historical work in two volumes. Of singularly alert faculties, with a remarkable knowledge of the men and history of his country, and an extraordinary memory, his masterful talent for politics and state-craft, together with his captivating manner and engaging personality, gave him, for nearly two decades, an unrivalled hold upon the fealty and affection of his party.

See the *Biography of James G. Blaine* (Norwich, Conn., 1895) by Mary Abigail Dodge (“Gail Hamilton”), and, in the “American Statesmen Series,” *James G. Blaine* (Boston, 1905) by C.E. Stanwood; also Mrs Blaine’s *Letters* (1908).

(C. E. S.)

1 This attack led to a dramatic scene in the House, in which Blaine fervidly asseverated his denial.

BLAINVILLE, HENRI MARIE DUCROTAY DE (1777-1850), French naturalist, was born at Arques, near Dieppe, on the 12th of September 1777. About 1796 he went to Paris to study painting, but he ultimately devoted himself to natural history, and attracted the attention of Baron Cuvier, for whom he occasionally lectured at the Collège de France and at the Athenaeum. In 1812 he was aided by Cuvier to obtain the chair of anatomy and zoology in the Faculty of Sciences at Paris, but subsequently an estrangement grew up between the two men and ended in open enmity. In 1825 Blainville was admitted a member of the Academy of Sciences; and in 1830 he was appointed to succeed J.B. Lamarck in the chair of natural history at the museum. Two years later, on the death of Cuvier, he obtained the chair of comparative anatomy, which he continued to occupy for the space of eighteen years, proving himself no unworthy successor to his great teacher. He died at Paris on the 1st of May 1850. Besides many separate memoirs, he was the author of *Prodrome d’une nouvelle distribution méthodique du règne animal* (1816); *Ostéographic ou description iconographique comparée du squelette, &c.* (1839-1864); *Faune française* (1821-1830); *Corns de physiologie générale et comparée* (1833); *Manuel de malacologie et de conchyliologie* (1825-1827); *Histoire des sciences de l’organisme* (1845).

BLAIR, FRANCIS PRESTON (1791-1876), American journalist and politician, was born at Abingdon, Virginia, on the 12th of April 1791. He removed to Kentucky, graduated at Transylvania University in 1811, took to journalism, and was a contributor to Amos Kendall's paper, the *Argus*, at Frankfort. In 1830, having become an ardent follower of Andrew Jackson, he was made editor of the Washington *Globe*, the recognized organ of the Jackson party. In this capacity, and as a member of Jackson's "Kitchen Cabinet," he long exerted a powerful influence; the *Globe* was the administration organ until 1841, and the chief Democratic organ until 1845; Blair ceased to be its editor in 1849. In 1848 he actively supported Martin Van Buren, the Free Soil candidate, for the presidency, and in 1852 he supported Franklin Pierce, but soon afterwards helped to organize the new Republican party, and presided at its preliminary convention at Pittsburg, Pennsylvania, in February 1856. He was influential in securing the nomination of John C. Frémont at the June convention (1856), and of Abraham Lincoln in 1860. After Lincoln's re-election in 1864 Blair thought that his former close personal relations with the Confederate leaders might aid in bringing about a cessation of hostilities, and with Lincoln's consent went unofficially to Richmond and induced President Jefferson Davis to appoint commissioners to confer with representatives of the United States. This resulted in the futile "Hampton Roads Conference" of the 3rd of February 1865 (see LINCOLN, ABRAHAM). After the Civil War Blair became a supporter of President Johnson's reconstruction policy, and eventually rejoined the Democratic party. He died at Silver Spring, Maryland, on the 18th of October 1876.

His son, MONTGOMERY BLAIR (1813-1883), politician and lawyer, was born in Franklin county, Kentucky, on the 10th of May 1813. He graduated at West Point in 1835, but, after a year's service in the Seminole War, left the army, studied law, and began practice at St Louis, Missouri. After serving as United States district attorney (1839-1843), as mayor of St Louis (1842-1843), and as judge of the court of common pleas (1843-1849), he removed to Maryland (1852), and devoted himself to law practice principally in the Federal supreme court. He was United States solicitor in the court of claims from 1855 until 1858, and was associated with George T. Curtis as counsel for the plaintiff in the Dred Scott case in 1857. In 1860 he took an active part in the presidential campaign in behalf of Lincoln, in whose cabinet he was postmaster-general from 1861 until September 1864, when he resigned as a result of the hostility of the Radical Republican faction, who stipulated that Blair's retirement should follow the withdrawal of Frémont's name as a candidate for the presidential nomination in that year. Under his administration such reforms and improvements as the establishment of free city delivery, the adoption of a money order system, and the use of railway mail cars were instituted—the last having been suggested by George B. Armstrong (d. 1871), of Chicago, who from 1869 until his death was general superintendent of the United States railway mail service. Differing from the Republican party on the reconstruction policy, Blair gave his adherence to the Democratic party after the Civil War. He died at Silver Spring, Maryland, on the 27th of July 1883.

Another son, FRANCIS PRESTON BLAIR, jun. (1821-1875), soldier and political leader, was born at Lexington, Kentucky, on the 19th of February 1821. After graduating at Princeton in 1841 he practised law in St Louis, and later served in the Mexican War. He was ardently opposed to the extension of slavery and supported Martin Van Buren, the Free Soil candidate for the presidency in 1848. He served from 1852 to 1856 in the Missouri legislature as a Free Soil Democrat, in 1856 joined the Republican party, and in 1857-1860 and 1861-1862 was a member of Congress, where he proved an able debater. Immediately after South Carolina's secession, Blair, believing that the southern leaders were planning to carry Missouri into the movement, began active efforts to prevent it and personally organized and equipped a secret body of 1000 men to be ready for the emergency. When hostilities became inevitable, acting in conjunction with Captain (later General) Nathaniel Lyon, he suddenly transferred the arms in the Federal arsenal at St Louis to Alton, Illinois, and a few days later (May 10, 1861) surrounded and captured a force of state guards which had been stationed at Camp Jackson in the suburbs of St Louis with the intention of seizing the arsenal. This action gave the Federal cause a decisive initial advantage in Missouri. Blair was promoted brigadier-general of volunteers in August 1862 and a major-general in November 1862. In Congress as chairman of the important military affairs committee his services were of the greatest value. He commanded a division in the Vicksburg campaign and in the fighting about Chattanooga, and was one of Sherman's corps commanders in the final campaigns in Georgia and the Carolinas. In 1866 like his father and brother he opposed the Congressional reconstruction policy, and on that issue left the Republican party. In 1868 he was the Democratic candidate for vice-president on the ticket with Horatio Seymour. In 1871-1873 he was a United States senator from Missouri. He died in St Louis, on the 8th of July 1875.

BLAIR, HUGH (1718-1800), Scottish Presbyterian divine, was born on the 7th of April 1718, at Edinburgh, where his father was a merchant. Entering the university in 1730 he graduated M.A. in 1739; his thesis, *De Fundamentis et Obligations Legis Naturae*, contains an outline of the moral principles afterwards unfolded in his sermons. He was licensed to preach in 1741, and a few months later the earl of Leven, hearing of his eloquence, presented him to the parish of Collessie in Fife. In 1743 he was elected to the second charge of the Canongate church, Edinburgh, where he ministered until removed to Lady Yester's, one of the city churches, in 1754. In 1757 the university of St Andrews conferred on him the degree of D.D., and in the following year he was promoted to the High Church, Edinburgh, the most important charge in Scotland. In 1759 he began, under the patronage of Lord Kames, to deliver a course of lectures on composition, the success of which led to the foundation of a chair of rhetoric and *belles lettres* in the Edinburgh University. To this chair he was appointed in 1762, with a salary of £70 a year. Having long taken interest in the Celtic poetry of the Highlands, he published in 1763 a laudatory *Dissertation* on Macpherson's *Ossian*, the authenticity of which he maintained. In 1777 the first volume of his *Sermons* appeared. It was succeeded by four other volumes, all of which met with the greatest success. Samuel Johnson praised them warmly, and they were translated into almost every language of Europe. In 1780 George III. conferred upon Blair a pension of £200 a year. In 1783 he retired from his professorship and published his *Lectures on Rhetoric*, which have been frequently reprinted. He died on the 27th of December 1800. Blair belonged to the "moderate" or latitudinarian party, and his *Sermons* have been criticized as wanting in doctrinal definiteness. His works display little originality, but are written in a flowing and elaborate style. He is remembered chiefly by the place he fills in the literature of his time. *Blair's Sermons* is a typical religious book of the period that preceded the Anglican revival.

See J. Hall, *Account of Life and Writings of Hugh Blair* (1807).

BLAIR, JAMES (1656-1743), American divine and educationalist, was born in Scotland, probably at Edinburgh, in 1656. He graduated M.A. at Edinburgh University in 1673, was beneficed in the Episcopal Church in Scotland, and for a time was rector of Cranston Parish in the diocese of Edinburgh. In 1682 he left Scotland for England, and three years later was sent by the bishop of London, Henry Compton, as a missionary to Virginia. He soon gained great influence over the colonists both in ecclesiastical and in civil affairs, and, according to Prof. Moses Coit Tyler, "probably no other man in the colonial time did so much for the intellectual life of Virginia." He was the minister of Henrico parish from 1685 until 1694, of the Jamestown church from 1694 until 1710, and of Bruton church at Williamsburg from 1710 until his death. From 1689 until his death he was the commissary of the bishop of London for Virginia, the highest ecclesiastical position in the colony, his duties consisting "in visiting the parishes, correcting the lives of the clergy, and keeping them orderly." In 1693, by the appointment of King William III., he became a member of the council of Virginia, of which he was for many years the president. Largely because of charges brought against them by Blair, Governor Sir Edmund Andros, Lieutenant-governor Francis Nicholson, and Lieutenant-governor Alexander Spotswood were removed in 1698, 1705 and 1722 respectively. Blair's greatest service to the colony was rendered as the founder, and the president from 1693 until his death, of the College of William and Mary, for which he himself secured a charter in England. "Thus, James Blair may be called," says Tyler, "the creator of the healthiest and most extensive intellectual influence that was felt in the Southern group of colonies before the Revolution." He died on the 18th of April 1743, and was buried at Jamestown, Va. He published a collection of 117 discourses under the title *Our Saviour's Divine Sermon on the Mount* (4 vols., 1722; second edition, 1732), and, in collaboration with Henry Hartwell and Edward Chilton, a work entitled *The Present State of Virginia and the College* (1727; written in 1693), probably the best account of the Virginia of that time.

See Daniel E. Motley's *Life of Commissary James Blair* (Baltimore, 1901; series xix. No. 10, of the Johns Hopkins University Studies in Historical and Political Science), and, for a short

sketch and an estimate, M.C. Tyler's *A History of American Literature, 1607-1765* (New York, 1878).

BLAIR, ROBERT (1699-1746), Scottish poet, eldest son of the Rev. Robert Blair, one of the king's chaplains, was born at Edinburgh in 1699. He was educated at Edinburgh University and in Holland, and in 1731 was appointed to the living of Athelstaneford in East Lothian. He married in 1738 Isabella, daughter of Professor William Law. The possession of a small fortune gave him leisure for his favourite pursuits, gardening and the study of English poets. He died at Athelstaneford on the 4th of February 1746. His only considerable work, *The Grave* (1743), is a poem written in blank verse of great vigour and freshness, and is much less conventional than its gloomy subject might lead one to expect. Its religious subject no doubt contributed to its great popularity, especially in Scotland; but the vogue it attained was justified by its picturesque imagery and occasional felicity of expression. It inspired William Blake to undertake a series of twelve illustrative designs, which were engraved by Louis Schiavonetti, and published in 1808.

See the biographical introduction prefixed to his *Poetical Works*, by Dr Robert Anderson, in his *Poets of Great Britain*, vol. viii. (1794.)

BLAIR ATHOLL (Gaelic *blair*, "a plain"), a village and parish of Perthshire, Scotland, 35¼ m. N.W. of Perth by the Highland railway. Pop. (1901) 367; of parish, 1722. It is situated at the confluence of the Tilt and the Garry. The oldest part of Blair Castle, a seat of the duke of Atholl, dates from 1269; as restored and enlarged in 1869-1872 from the plans of David Bryce, R.S.A., it is a magnificent example of the Scottish baronial style. It was occupied by the marquess of Montrose prior to the battle of Tippermuir in 1644, stormed by the Cromwellians in 1653, and garrisoned on behalf of James II. in 1689. The Young Pretender stayed in it in 1743, and the duke of Cumberland in 1746. The body of Viscount Dundee, conveyed hither from the battlefield of Killiecrankie, was buried in the church of Old Blair, in which a monument was erected to his memory in 1889 by the 7th duke of Atholl. The grounds surrounding the castle are among the most beautiful in the Highlands. A golf course has been laid down south-east of the village, between the railway and the Garry, and every September a great display of Highland games is held. Ben-y-gloe (3671 ft. high), the scene of the hunt given in 1529 by the earl of Atholl in honour of James V. and the queen dowager, may be climbed by way of Fender Burn, a left-hand tributary of the Tilt. The falls of Fender, near the old bridge of Tilt, are eclipsed by the falls of Bruar, 4 m. west of Blair Atholl, formed by the Bruar, which, rising in Ben Dearg (3304 ft.), flows into the Garry after an impetuous course of 10 m.

BLAIRGOWRIE, a police burgh of Perthshire, Scotland, situated on the Ericht. Pop. (1901) 3378. It is the terminus of a branch line of the Caledonian railway from Coupar Angus, from which it is 4¾ m. distant, and is 16 m. N. by E. of Perth by road. The town is entirely modern, and owes its progress to the water-power supplied by the Ericht for linen and jute factories. There are also sawmills, breweries and a large factory for bee appliances. Strawberries, raspberries and other fruits are largely grown in the neighbourhood. A park was presented to the town in 1892. On the left bank of the Ericht, opposite Blairgowrie, with which it is connected by a four-arched bridge, stands the town and police burgh of Rattray (pop. 2019), where there are flax and jute mills. Donald Cargill the Covenanter, who was executed at Edinburgh, was a native of the parish. Four miles west of Blairgowrie, on the coach road to Dunkeld, lies Loch Clunie, of some interest historically. On a crannog in the lake are the ruins of a small castle which belonged to James ("the Admirable") Crichton, and

the large mound near the loch was the site of the castle in which Edward I. lodged on one of his Scottish expeditions.

BLAKE, EDWARD (1833-), Irish-Canadian statesman, eldest son of William Hume Blake of Cashel Grove, Co. Galway, who settled in Canada in 1832, and there became a distinguished lawyer and chancellor of Ontario, was born on the 13th of October 1833 at Adelaide in Middlesex county, Ontario. Educated at Upper Canada College and the university of Toronto, Blake was called to the bar in 1856 and quickly obtained a good practice, becoming Q.C. in 1864. In 1867 he was elected member for West Durham in the Dominion parliament, and for South Bruce in the provincial legislature, in which he became leader of the Liberal opposition two years later. On the defeat of John Sandfield Macdonald's government in 1871 Blake became prime minister of Ontario, but resigned this office the same year in consequence of the abolition of dual representation. He declined the leadership of the Liberal party in the Dominion parliament, but, having taken an active part in bringing about the overthrow of Sir John Macdonald's ministry in 1873, joined the Liberal cabinet of Alexander Mackenzie, though without portfolio or salary. Impaired health soon compelled him to resign, and to take the voyage to Europe; on his return in 1875 he rejoined the cabinet as minister of justice, in which office it fell to him to take the chief part in framing the constitution of the supreme court of Canada. Continued ill-health compelled him in 1877 again to seek rest in Europe, having first exchanged the portfolio of justice for the less exacting office of president of the council. During his absence the Liberal government was driven from power by the elections of 1878; and Blake himself, having failed to secure re-election, was for a short time without a seat in parliament. From 1880 to 1887 he was leader of the opposition, being succeeded on his resignation of the position in the latter year by Mr (afterwards Sir) Wilfrid Laurier. In 1892 he became a member of the British House of Commons as an Irish Nationalist, being elected for South Longford. But he did not fulfil the expectations which had been formed on the strength of his colonial reputation; he took no very prominent part in debate, and gave little evidence of his undoubted oratorical gifts. In 1907 he retired from public life. In 1858 he had married Margaret, daughter of Benjamin Cronyn, first bishop of Huron.

See John Charles Dent, *The Last Forty Years: Canada Since the Union of 1841* (2 vols., Toronto, 1881); J.S. Willison, *Sir Wilfrid Laurier and the Liberal Party* (2 vols., London, 1904).

BLAKE, ROBERT (1509-1657), English parliamentarian and admiral, was born at Bridgwater in Somersetshire. The day of his birth is not known, but he was baptized on the 27th of September 1599. Blake was the eldest son of a well-to-do merchant, and received his early education at the grammar school of Bridgwater. In 1615 he was sent to Oxford, entering at first St Alban's Hall, but removing afterwards to Wadham College, then recently founded. He remained at the university till 1625, but failed to obtain any college preferment. Nothing is known of his life with certainty for the next fifteen years. An anonymous Dutch writer, in the *Hollandische Mercurius* (1652), represents him as saying that he had lived in Schiedam "for five or six years" in his youth. He doubtless engaged in trade, and apparently with success. When, after eleven years of kingship without parliaments, a parliament was summoned to meet in April 1640, Blake was elected to represent his native borough. This parliament, named "the Short," was dissolved in three weeks, and the career of Blake as a politician was suspended. Two years later the inevitable conflict began. Blake declared for the Parliament, and served under Sir John Horner. In 1643 he was entrusted with the command of one of the forts of Bristol. This he stoutly held during the siege of the town by Prince Rupert, and earned the approval of parliament by refusing to surrender his post till duly informed of the capitulation. In 1644 he gained high distinction by the resolute defence of Lyme in Dorsetshire. The siege was raised on the 23rd of May, and on the 8th of July Blake took Taunton by surprise, and notwithstanding its imperfect defences and inadequate supplies, held the town for the Parliament against two sieges by the Royalists until July

1645, when it was relieved by Fairfax. In 1645 he re-entered parliament as member for Taunton, when the Royalist Colonel Windham was expelled.

He adhered to the Parliamentary party after the king's death, and within a month (February 1649) was appointed, with Colonels Dean and Popham, to the command of the fleet, under the title of General of the Sea. In April he was sent in pursuit of Prince Rupert, who with the Royalist fleet had entered the harbour of Kinsale in Ireland. There he blockaded the prince for six months; and when the latter, in want of provisions, and hopeless of relief, succeeded in making his escape with the fleet and in reaching the Tagus, Blake followed him thither, and again blockaded him for some months. The king of Portugal refusing permission for Blake to attack his enemy, the latter made reprisals by falling on the Portuguese fleet, richly laden, returning from Brazil. He captured seventeen ships and burnt three, bringing his prizes home without molestation. After revictualling his fleet, he sailed again, captured a French man-of-war, and then pursued Prince Rupert, who had been asked to go away by the Portuguese and had entered the Mediterranean. In November 1650 Blake destroyed the bulk of the Royalist squadron near Cartagena. The thanks of parliament were voted to Blake, and he received a grant of £1000. He was continued in his office of admiral and general of the sea; and in May following he took, in conjunction with Ayscue, the Scilly Islands. For this service the thanks of parliament were again awarded him, and he was soon after made a member of the council of state.

In 1652 war broke out with the Dutch, who had made great preparations for the conflict. In March the command of the fleet was given to Blake for nine months; and in the middle of May the Dutch fleet of forty-five ships, led by their great admiral Tromp, appeared in the Downs. Blake, who had only twenty ships, sailed to meet them, and the battle took place off Dover on the 19th of May. The Dutch were defeated in an engagement of four or five hours, lost two ships, and withdrew under cover of darkness. Attempts at accommodation were made by the states, but they failed. Early in July war was formally declared, and in the same month Blake captured a large part of the Dutch fishery-fleet and the twelve men-of-war that formed their convoy. On the 28th of September Blake and Penn again encountered the Dutch fleet, now commanded by De Ruyter and De Witt, off the Kentish Knock, defeated it, and chased it for two days. The Dutch took refuge in Goree. A third battle was fought near the end of November. By this time the ships under Blake's command had been reduced in number to forty, and nearly the half of these were useless for want of seamen. Tromp, who had been reinstated in command, appeared in the Downs, with a fleet of eighty ships besides ten fireships. Blake, nevertheless, risked a battle off Dungeness, but was defeated, and withdrew into the Thames. The English fleet having been refitted, put to sea again in February 1653; and on the 18th Blake, at the head of eighty ships, encountered Tromp in the Channel. The Dutch force, according to Clarendon, numbered 100 ships of war, but according to the official reports of the Dutch, only seventy. The battle was severe, and continued through three days, the Dutch, however, retreating, and taking refuge in the shallow waters off the French coast. In this action Blake was severely wounded. The three English admirals put to sea again in May; and on the 3rd and 4th of June another battle was fought near the North Foreland. On the first day Dean and Monk were repulsed by Tromp; but on the second day the scales were turned by the arrival of Blake, and the Dutch retreated to the Texel.

Ill-health now compelled Blake to retire from the service for a time, and he did not appear again on the seas for about eighteen months; meanwhile he sat as a member of the Little Parliament (Barebones's). In November 1654 he was selected by Cromwell to conduct a fleet to the Mediterranean to exact compensation from the duke of Tuscany, the knights of Malta, and the piratical states of North Africa, for wrongs done to English merchants. This mission he executed with his accustomed spirit and with complete success. Tunis alone dared to resist his demands, and Tunis paid the penalty of the destruction of its two fortresses by English guns. In the winter of 1655-1656, war being declared against Spain, Blake was sent to cruise off Cadiz and the neighbouring coasts, to intercept the Spanish shipping. One of his captains captured a part of the Plate fleet in September 1656. In April 1657 Blake, then in very ill health, suffering from dropsy and scurvy, and anxious to have assistance in his arduous duties, heard that the Plate fleet lay at anchor in the bay of Santa Cruz, in the island of Teneriffe. The position was a very strong one, defended by a castle and several forts with guns. Under the shelter of these lay a fleet of sixteen ships drawn up in crescent order. Captain Stayner was ordered to enter the bay and fall on the fleet. This he did. Blake followed him. Broadsides were poured into the castle and the forts at the same time; and soon nothing was left but ruined walls and charred fragments of burnt ships. The wind was blowing hard into the bay; but suddenly, and fortunately for the heroic Blake, it shifted, and carried him safely out to sea. "The whole action," says Clarendon, "was so incredible that all

men who knew the place wondered that any sober man, with what courage soever endowed, would ever have undertaken it; and they could hardly persuade themselves to believe what they had done; while the Spaniards comforted themselves with the belief that they were devils and not men who had destroyed them in such a manner." The English lost one ship and 200 men killed and wounded. The thanks of parliament were voted to officers and men; and a very costly jewel (diamond ring) was presented to Blake, "as a testimony," says Cromwell in his letter of 10th June, "of our own and the parliament's good acceptance of your carriage in this action." "This was the last action of the brave Blake."

After again cruising for a time off Cadiz, his health failing more and more, he was compelled to make homewards before the summer was over. He died at sea, but within sight of Plymouth, on the 17th of August 1657. His body was brought to London and embalmed, and after lying in state at Greenwich House was interred with great pomp and solemnity in Westminster Abbey. In 1661 Charles II. ordered the exhumation of Blake's body, with those of the mother and daughter of Cromwell and several others. They were cast out of the abbey, and were reburied in the churchyard of St Margaret's. "But that regard," says Johnson, "which was denied his body has been paid to his better remains, his name and his memory. Nor has any writer dared to deny him the praise of intrepidity, honesty, contempt of wealth, and love of his country." Clarendon bears the following testimony to his excellence as a commander:—"He was the first man that declined the old track, and made it apparent that the science might be attained in less time than was imagined. He was the first man that brought ships to contemn castles on the shore, which had ever been thought very formidable, but were discovered by him to make a noise only, and to fright those who could be rarely hurt by them."

A life of Blake is included in the work entitled *Lives, English and Foreign*. Dr Johnson wrote a short life of him, and in 1852 appeared Hepworth Dixon's fuller narrative, *Robert Blake, Admiral and General at Sea*. Much new matter for the biography of Blake will be found in the *Letters and Papers Relating to the First Dutch War*, edited by S.R. Gardiner for the Navy Records Society (1898-1899.)

BLAKE, WILLIAM (1757-1827), English poet and painter, was born in London, on the 28th of November 1757. His father, James Blake, kept a hosier's shop in Broad Street, Golden Square; and from the scanty education which the young artist received, it may be judged that the circumstances of the family were not very prosperous. For the facts of William Blake's early life the world is indebted to a little book, called *A Father's Memoirs on a Child*, written by Dr Malkin in 1806. Here we learn that young Blake quickly developed a taste for design, which his father appears to have had sufficient intelligence to recognize and assist by every means in his power. At the age of ten the boy was sent to a drawing school kept by Henry Pars in the Strand, and at the same time he was already cultivating his own taste by constant attendance at the different art sale rooms, where he was known as the "little connoisseur." Here he began to collect prints after Michelangelo, and Raphael, Dürer and Heemskerk, while at the school in the Strand he had the opportunity of drawing from the antique. After four years of this preliminary instruction Blake entered upon another branch of art study. In 1777 he was apprenticed to James Basire, an engraver of repute, and with him he remained seven years. His apprenticeship had an important bearing on Blake's artistic education, and marks the department of art in which he was made technically proficient. In 1778, at the end of his apprenticeship, he proceeded to the school of the Royal Academy, where he continued his early study from the antique, and had for the first time an opportunity of drawing from the living model.

This is in brief all that is known of Blake's artistic education. That he ever, at the academy or elsewhere, systematically studied painting we do not know; but that he had already begun the practice of water colour for himself is ascertained. So far, however, the course of his training in art schools, and under Basire, was calculated to render him proficient only as a draughtsman and an engraver. He had learned how to draw, and he had mastered besides the practical difficulties of engraving, and with these qualifications he entered upon his career. In 1780 he exhibited a picture in the Royal Academy Exhibition, conjectured to have been executed in water colours, and he continued to contribute to the annual exhibitions up to the year 1808. In 1782 he married Catherine Boucher, the daughter of a market-gardener at Battersea, with whom he lived always on affectionate terms, and the young couple after

their marriage established themselves in Green Street, Leicester Fields. Blake had already become acquainted with some of the rising artists of his time, amongst them Stothard, Flaxman and Fuseli, and he now began to see something of literary society. At the house of the Rev. Henry Mathew, in Rathbone Place, he used to recite and sometimes to sing poems of his own composition, and it was through the influence of this gentleman, combined with that of Flaxman, that Blake's first volume of poetry was printed and published in 1783. From this time forward the artist came before the world in a double capacity. By education as well as native talent, he was pledged to the life of a painter, and these *Poetical Sketches*, though they are often no more than the utterances of a boy, are no less decisive in marking Blake as a future poet.

For a while the two gifts are exhibited in association. To the close of his life Blake continued to print and publish, after a manner of his own, the inventions of his verse illustrated by original designs, but there is a certain period in his career when the union of the two gifts is peculiarly close, and when their service to one another is unquestionable. In 1784 Blake, moving from Green Street, set up in company with a fellow-pupil, Parker, as print-seller and engraver next to his father's house in Broad Street, Golden Square, but in 1787 this partnership was severed, and he established an independent business in Poland Street. It was from this house, and in 1787, that the *Songs of Innocence* were published, a work that must always be remarkable for beauty both of verse and of design, as well as for the singular method by which the two were combined and expressed by the artist. Blake became in fact his own printer and publisher. He engraved upon copper, by a process devised by himself, both the text of his poems and the surrounding decorative design, and to the pages printed from the copper plates an appropriate colouring was afterwards added by hand. The poetic genius already discernible in the first volume of *Poetical Sketches* is here more decisively expressed, and some of the songs in this volume deserve to take rank with the best things of their kind in our literature. In an age of enfeebled poetic style, when Wordsworth, with more weighty apparatus, had as yet scarcely begun his reform of English versification, Blake, unaided by any contemporary influence, produced a work of fresh and living beauty; and if the *Songs of Innocence* established Blake's claim to the title of poet, the setting in which they were given to the world proved that he was also something more. For the full development of his artistic powers we have to wait till a later date, but here at least he exhibits a just and original understanding of the sources of decorative beauty. Each page of these poems is a study of design, full of invention, and often wrought with the utmost delicacy of workmanship. The artist retained to the end this feeling for decorative effect; but as time went on, he considerably enlarged the imaginative scope of his work, and decoration then became the condition rather than the aim of his labour.

Notwithstanding the distinct and precious qualities of this volume, it attracted but slight attention, a fact perhaps not very wonderful, when the system of publication is taken into account. Blake, however, proceeded with other work of the same kind. The same year he published *The Book of Thel*, more decidedly mystic in its poetry, but scarcely less beautiful as a piece of illumination; *The Marriage of Heaven and Hell* followed in 1790; and in 1793 there are added *The Gates of Paradise*, *The Vision of the Daughters of Albion*, and some other "Prophetic Books." It becomes abundantly clear on reaching this point in his career that Blake's utterances cannot be judged by ordinary rules. The *Songs of Experience*, put forth in 1794 as a companion to the earlier *Songs of Innocence*, are for the most part intelligible and coherent, but in these intervening works of prophecy, as they were called by the author, we get the first public expression of that phase of his character and of his genius upon which a charge of insanity has been founded. The question whether Blake was or was not mad seems likely to remain in dispute, but there can be no doubt whatever that he was at different periods of his life under the influence of illusions for which there are no outward facts to account, and that much of what he wrote is so far wanting in the quality of sanity as to be without a logical coherence. On the other hand, it is equally clear that no madness imputed to Blake could equal that which would be involved in the rejection of his work on this ground. The greatness of Blake's mind is even better established than its frailty, and in considering the work that he has left we must remember that it is by the sublimity of his genius, and not by any mental defect, that he is most clearly distinguished from his fellows. With the publication of the *Songs of Experience* Blake's poetic career, so far at least as ordinary readers are concerned, may be said to close. A writer of prophecy he continued for many years, but the works by which he is best known in poetry are those earlier and simpler efforts, supplemented by a few pieces taken from various sources, some of which were of later production. But although Blake the poet ceases in a general sense at this date, Blake the artist is only just entering upon his career. In the *Songs of Innocence* and *Experience*, and even in some of the earlier *Books of Prophecy*, the two gifts worked together in perfect

balance and harmony; but at this point the supremacy of the artistic faculty asserts itself, and for the remainder of his life Blake was pre-eminently a designer and engraver. The labour of poetical composition continues, but the product passes beyond the range of general comprehension; while, with apparent inconsistency, the work of the artist gains steadily in strength and coherence, and never to the last loses its hold upon the understanding. It may almost be said without exaggeration that his earliest poetic work, *The Songs of Innocence*, and nearly his latest effort in design, the illustrations to *The Book of Job*, take rank among the sanest and most admirable products of his genius. Nor is the fact, astonishing enough at first sight, quite beyond a possible explanation. As Blake advanced in his poetic career, he was gradually hindered and finally overpowered by a tendency that was most serviceable to him in design. His inclination to substitute a symbol for a conception, to make an image do duty for an idea, became an insuperable obstacle to literary success. He endeavoured constantly to treat the intellectual material of verse as if it could be moulded into sensuous form, with the inevitable result that as the ideas to be expressed advanced in complexity and depth of meaning, his poetic gifts became gradually more inadequate to the task of interpretation. The earlier poems dealing with simpler themes, and put forward at a time when the bent of the artist's mind was not strictly determined, do not suffer from this difficulty; the symbolism then only enriches an idea of no intellectual intricacy; but when Blake began to concern himself with profounder problems the want of a more logical understanding of language made itself strikingly apparent. If his ways of thought and modes of workmanship had not been developed with an intensity almost morbid, he would probably have been able to distinguish and keep separate the double functions of art and literature. As it is, however, he remains as an extreme illustration of the ascendancy of the artistic faculty. For this tendency to translate ideas into image, and to find for every thought, however simple or sublime, a precise and sensuous form, is of the essence of pure artistic invention. If this be accepted as the dominant bent of Blake's genius, it is not so wonderful that his work in art should have strengthened in proportion as his poetic powers waned; but whether the explanation satisfies all the requirements of the case or not, the fact remains, and cannot be overlooked by any student of Blake's career.

In 1796 Blake was actively employed in the work of illustration. Edwards, a bookseller of New Bond Street, projected a new edition of Young's *Night Thoughts*, and Blake was chosen to illustrate the work. It was to have been issued in parts, but for some reason not very clear the enterprise failed, and only a first part, including forty-three designs, was given to the world. These designs were engraved by Blake himself, and they are interesting not only for their own merit but for the peculiar system by which the illustration has been associated with the text. It was afterwards discovered that the artist had executed original designs in water-colour for the whole series, and these drawings, 537 in number, form one of the most interesting records of Blake's genius. Gilchrist, the painter's biographer, in commenting upon the engraved plates, regrets the absence of colour, "the use of which Blake so well understood, to relieve his simple design and give it significance," and an examination of the original water-colour drawings fully supports the justice of his criticism. Soon after the publication of this work Blake was introduced by Flaxman to the poet Hayley, and in the year 1801 he accepted the suggestion of the latter, that he should take up his residence at Felpham in Sussex. The mild and amiable poet had planned to write a life of Cowper, and for the illustration of this and other works he sought Blake's help and companionship. The residence at Felpham continued for three years, partly pleasant and partly irksome to Blake, but apparently not very profitable to the progress of his art. One of the annoyances of his stay was a malicious prosecution for treason set on foot by a common soldier whom Blake had summarily ejected from his garden; but a more serious drawback was the increasing irritation which the painter seems to have experienced from association with Hayley. In 1804 Blake returned to London, to take up his residence in South Moulton Street, and as the fruit of his residence in Felpham, he published, in the manner already described, the prophetic books called the *Jerusalem*, *The Emanation of the Giant Albion*, and *Milton*. The first of these is a very notable performance in regard to artistic invention. Many of the designs stand out from the text in complete independence, and are now and then of the very finest quality.

In the years 1804-1805 Blake executed a series of designs in illustration of Robert Blair's *The Grave*, of much beauty and grandeur, though showing stronger traces of imitation of Italian art than any earlier production. These designs were purchased from the artist by an adventurous and unscrupulous publisher, Cromek, for the paltry sum of £21, and afterwards published in a series of engravings by Schiavonetti. Despite the ill treatment Blake received in the matter, and the other evils, including a quarrel with his friend Stothard as to priority of invention of a design illustrating the Canterbury Pilgrims, which his association with

Cromek involved, the book gained for him a larger amount of popularity than he at any other time secured. Stothard's picture of the Canterbury Pilgrims was exhibited in 1807, and in 1809 Blake, in emulation of his rival's success, having himself painted in water-colour a picture of the same subject, opened an exhibition, and drew up a *Descriptive Catalogue*, curious and interesting, and containing a very valuable criticism of Chaucer.

The remainder of the artist's life is not outwardly eventful. In 1813 he formed, through the introduction of George Cumberland of Bristol, a valuable friendship with John Linnell and other rising water-colour painters. Amongst the group Blake seems to have found special sympathy in the society of John Varley, who, himself addicted to astrology, encouraged Blake to cultivate his gift of inspired vision; and it is probably to this influence that we are indebted for several curious drawings made from visions, especially the celebrated "ghost of a flea" and the very humorous portrait of the builder of the Pyramids. In 1821 Blake removed to Fountain Court, in the Strand, where he died on the 12th of August 1827. The chief work of these last years was the splendid series of engraved designs in illustration of the book of Job. Here we find the highest imaginative qualities of Blake's art united to the technical means of expression which he best understood. Both the invention and the engraving are in all ways remarkable, and the series may fairly be cited in support of a very high estimate of his genius. None of his works is without the trace of that peculiar artistic instinct and power which seizes the pictorial element of ideas, simple or sublime, and translates them into the appropriate language of sense; but here the double faculty finds the happiest exercise. The grandeur of the theme is duly reflected in the simple and sublime images of the artist's design, and in the presence of these plates we are made to feel the power of the artist over the expressional resources of human form, as well as his sympathy with the imaginative significance of his subject.

A life of Blake, with selections from his works, by Alexander Gilchrist, was published in 1863 (new edition by W.G. Robertson, 1906); in 1868 A.C. Swinburne published a critical essay on his genius, remarkable for a full examination of the Prophetic Books, and in 1874 William Michael Rossetti published a memoir prefixed to an edition of the poems. In 1893 appeared *The Works of William Blake*, edited by E.J. Ellis and W.B. Yeats. But for a long time all the editors paid too little attention to a correct following of Blake's own MSS. The text of the poems was finally edited with exemplary care and thoroughness by John Sampson in his edition of the *Poetical Works* (1905), which has rescued Blake from the "improvements" of previous editors. See also *The Letters of William Blake, together with a Life by Frederick Tatham*; edited by A.G.B. Russell (1906); and Basil de Selincourt, *William Blake* (1909).

(J. C. C.)

BLAKELOCK, RALPH ALBERT (1847-), American painter, was born in New York, on the 15th of October, 1847. He graduated at the College of the City of New York in 1867. In art he was self-taught and markedly original. Until ill-health necessitated the abandonment of his profession, he was a most prolific worker, his subjects including pictures of North American Indian life, and landscapes—notably such canvases as "The Indian Fisherman"; "Ta-wo-koka: or Circle Dance"; "Silvery Moonlight"; "A Waterfall by Moonlight"; "Solitude"; and "Moonlight on Long Island Sound."

BLAKENEY, WILLIAM BLAKENEY, Baron (1672-1761), British soldier, was born at Mount Blakeney in Limerick in 1672. Destined by his father for politics, he soon showed a decided preference for a military career, and at the age of eighteen headed the tenants in defending the Blakeney estate against the Rapparees. As a volunteer he went to the war in Flanders, and at the siege of Venlo in 1702 won his commission. He served as a subaltern throughout Marlborough's campaigns, and is said to have been the first to drill troops by signal of drum or colour. For many years after the peace of Utrecht he served unnoticed, and was sixty-five years of age before he became a colonel. This neglect, which was said to be due to the hostility of Lord Verney, ceased when the duke of Richmond was appointed colonel of Blakeney's regiment, and thenceforward his advance was rapid. Brigadier-general

in the Cartagena expedition of 1741, and major-general a little later, he distinguished himself by his gallant and successful defence of Stirling Castle against the Highlanders in 1745. Two years later George II. made him lieutenant-general and lieutenant-governor of Minorca. The governor of that island never set foot in it, and Blakeney was left in command for ten years.

In 1756 the Seven Years' War was preluded by a swift descent of the French on Minorca. Fifteen thousand troops under marshal the duc de Richelieu, escorted by a strong squadron under the marquis de la Gallisonnière, landed on the island on the 18th of April, and at once began the siege of Fort St Philip, where Blakeney commanded at most some 5000 soldiers and workmen. The defence, in spite of crumbling walls and rotted gun platforms, had already lasted a month when a British fleet under vice-admiral the Hon. John Byng appeared. La Gallisonnière and Byng fought, on the 20th of May, an indecisive battle, after which the relieving squadron sailed away and Blakeney was left to his fate. A second expedition subsequently appeared off Minorca, but it was then too late, for after a heroic resistance of seventy-one days the old general had been compelled to surrender the fort to Richelieu (April 18-June 28, 1756). Only the ruined fortifications were the prize of the victors. Blakeney and his little garrison were transported to Gibraltar with absolute liberty to serve again. Byng was tried and executed; Blakeney, on his return to England, found himself the hero of the nation. Rewards came freely to the veteran. He was made colonel of the Enniskillen regiment of infantry, knight of the Bath, and Baron Blakeney of Mount Blakeney in the Irish peerage. A little later Van Most's statue of him was erected in Dublin, and his popularity continued unabated for the short remainder of his life. He died on the 20th of September 1761, and was buried in Westminster Abbey.

See *Memoirs of General William Blakeney* (1757).

BLAKESLEY, JOSEPH WILLIAMS (1808-1885), English divine, was born in London on the 6th of March 1808, and was educated at St Paul's school, London, and at Corpus Christi and Trinity Colleges, Cambridge. In 1831 he was elected a fellow, and in 1839 a tutor of Trinity. In 1833 he took holy orders, and from 1845 to 1872 held the college living of Ware, Hertfordshire. Over the signature "Hertfordshire Incumbent" he contributed a large number of letters to *The Times* on the leading social and political subjects of the day, and he also wrote many reviews of books for that paper. In 1863 he was made a canon of Canterbury, and in 1872 dean of Lincoln. Dean Blakesley was the author of the first English *Life of Aristotle* (1839), an edition of Herodotus (1852-1854) in the *Bibliotheca Classica*, and *Four Months in Algeria* (1859). He died on the 18th of April 1885.

BLAMIRE, SUSANNA (1747-1794), English poet, daughter of a Cumberland yeoman, was born at Cardew Hall, near Dalston, in January 1747. Her mother died while she was a child, and she was brought up by her aunt, a Mrs Simpson of Thackwood, who sent her niece to the village school at Raughton Head. Susanna Blamire's earliest poem is "Written in a Churchyard, on seeing a number of cattle grazing," in imitation of Gray. She lived an uneventful life among the farmers of the neighbourhood, and her gaiety and good-humour made her a favourite in rustic society. In 1767 her elder sister Sarah married Colonel Graham of Gartmore. "An Epistle to her friends at Gartmore" gives a playful description of the monotonous simplicity of her life. To her Perthshire visits her songs in the Scottish vernacular are no doubt partly due. Her chief friend was Catharine Gilpin of Scaleby Castle. The two ladies spent the winters together in Carlisle, and wrote poems in common. Susanna Blamire died in Carlisle on the 5th of April 1794. The poems which were not collected during her lifetime, were first published in 1842 by Henry Lonsdale as *The Poetical Works of Miss Susanna Blamire, "the Muse of Cumberland,"* with a memoir by Mr Patrick Maxwell. Some of her songs rank among the very best of north-country lyrics. "And ye shall walk in silk attire" and "What ails this heart o' mine," are well known, and were included in Johnson's *Scots' Musical Museum*.

BLANC, (Jean Joseph Charles) **LOUIS** (1811-1882), French politician and historian, was born on the 29th of October 1811 at Madrid, where his father held the post of inspector-general of finance under Joseph Bonaparte. Failing to receive aid from Pozzo di Borgo, his mother's uncle, Louis Blanc studied law in Paris, living in poverty, and became a contributor to various journals. In the *Revue du progrès*, which he founded, he published in 1839 his study on *L'Organisation du travail*. The principles laid down in this famous essay form the key to Louis Blanc's whole political career. He attributes all the evils that afflict society to the pressure of competition, whereby the weaker are driven to the wall. He demanded the equalization of wages, and the merging of personal interests in the common good—"*à chacun selon ses besoins, de chacun selon ses facultés*." This was to be effected by the establishment of "social workshops," a sort of combined co-operative society and trade-union, where the workmen in each trade were to unite their efforts for their common benefit. In 1841 he published his *Histoire de dix ans 1830-1840*, an attack upon the monarchy of July. It ran through four editions in four years.

In 1847 he published the two first volumes of his *Histoire de la Revolution Française*. Its publication was interrupted by the revolution of 1848, when Louis Blanc became a member of the provisional government. It was on his motion that, on the 25th of February, the government undertook "to guarantee the existence of the workmen by work"; and though his demand for the establishment of a ministry of labour was refused—as beyond the competence of a provisional government—he was appointed to preside over the government labour commission (*Commission du Gouvernement pour les travailleurs*) established at the Luxembourg to inquire into and report on the labour question. On the 10th of May he renewed, in the National Assembly, his proposal for a ministry of labour, but the temper of the majority was hostile to socialism, and the proposal was again rejected. His responsibility for the disastrous experiment of the national workshops he himself denied in his *Appel aux honnêtes gens* (Paris, 1849), written in London after his flight; but by the insurgent mob of the 15th of May and by the victorious Moderates alike he was regarded as responsible. Between the *sansculottes*, who tried to force him to place himself at their head, and the national guards, who maltreated him, he was nearly done to death. Rescued with difficulty, he escaped with a false passport to Belgium, and thence to London; in his absence he was condemned by the special tribunal established at Bourges, *in contumaciam*, to deportation. Against trial and sentence he alike protested, developing his protest in a series of articles in the *Nouveau Monde*, a review published in Paris under his direction. These he afterwards collected and published as *Pages de l'histoire de la revolution de 1848* (Brussels, 1850).

During his stay in England he made use of the unique collection of materials for the revolutionary period preserved at the British Museum to complete his *Histoire de la Révolution Française* 12 vols. (1847-1862). In 1858 he published a reply to Lord Normanby's *A Year of Revolution in Paris* (1858), which he developed later into his *Histoire de la révolution de 1848* (2 vols., 1870-1880). As far back as 1839 Louis Blanc had vehemently opposed the idea of a Napoleonic restoration, predicting that it would be "despotism without glory," "the Empire without the Emperor." He therefore remained in exile till the fall of the Second Empire in September 1870, after which he returned to Paris and served as a private in the national guard. On the 8th of February 1871 he was elected a member of the National Assembly, in which he maintained that the republic was "the necessary form of national sovereignty," and voted for the continuation of the war; yet, though a member of the extreme Left, he was too clear-minded to sympathize with the Commune, and exerted his influence in vain on the side of moderation. In 1878 he advocated the abolition of the presidency and the senate. In January 1879 he introduced into the chamber a proposal for the amnesty of the Communists, which was carried. This was his last important act. His declining years were darkened by ill-health and by the death, in 1876, of his wife (Christina Groh), an Englishwoman whom he had married in 1865. He died at Cannes on the 6th of December 1882, and on the 12th of December received a state funeral in the cemetery of Père-Lachaise.

Louis Blanc possessed a picturesque and vivid style, and considerable power of research; but the fervour with which he expressed his convictions, while placing him in the first rank of orators, tended to turn his historical writings into political pamphlets. His political and social ideas have had a great influence on the development of socialism in France. His *Discours politiques* (1847-1881) was published in 1882. His most important works, besides

those already mentioned, are *Lettres sur l'Angleterre* (1866-1867), *Dix années de l'histoire de l'Angleterre* (1879-1881), and *Questions d'aujourd'hui et de demain* (1873-1884).

See L. Fiaux, *Louis Blanc* (1883).

BLANC, MONT, the culminating point (15,782 ft.) of the mountain range of the same name, which forms part of the Pennine Alps, and is divided unequally between France, Italy and Switzerland. The actual highest summit is wholly French and is the loftiest peak in the Alps, and in Europe also, if certain peaks in the Caucasus be excluded. At Geneva the mountain was in former days named the Montagne Maudite, but the present name seems to have been always used locally. On the north is the valley of Chamonix, and on the east the head of the valley of Aosta. Among the great glaciers which stream from the peak the most noteworthy are those of Bossons and Taconnaz (northern slope) and of Brenva and Miage (southern slope). The first ascent was made in 1786 by two Chamonix men, Jacques Balmat and Dr Michel Paccard, and the second in 1787 by Balmat with two local men. Later in 1787 H.B. de Saussure made the third ascent, memorable in many respects, and was followed a week later by Colonel Beaufoy, the first Englishman to gain the top. These ascents were all made from Chamonix, which is still the usual starting point, though routes have been forced up the peak from nearly every side, those on the Italian side being much steeper than that from Chamonix. The ascent from Chamonix is now frequently made in summer (rarely in winter also), but, owing to the great height of the mountain, the view is unsatisfactory, though very extensive (Lyons is visible). There is an inn at the Grands Mulets (9909 ft.). In 1890 M. Vallot built an observatory and shelter hut (14,312 ft.) on the Bosses du Dromadaire (north-west ridge of the mountain), and in 1893 T.J.C. Janssen constructed an observatory just below the very summit.

See C. Durier, *Le Mont Blanc* (4th ed., Paris, 1897); C.E. Mathews, *The Annals of Mont Blanc* (London, 1898); P. Güssfeldt, *Der Montblanc,* (Berlin, 1894, also a French translation, Geneva, 1899); L. Kurz, *Climbers' Guide to the Chain of Mont Blanc*, section vi. (London, 1892); L. Kurz and X. Imfeld, *Carte de la chaine du Mont Blanc* (1896, new edition 1905).

(W. A. B. C.)

BLANCHARD, SAMUEL LAMAN (1804-1845), British author and journalist, the son of a painter and glazier, was born at Great Yarmouth on the 15th of May 1804. He was educated at St Olave's school, Southwark, and then became clerk to a proctor in Doctors' Commons. At an early age he developed literary tastes, contributing dramatic sketches to a paper called *Drama*. For a short time he was a member of a travelling dramatic company, but subsequently became a proof-reader in London, and wrote for the *Monthly Magazine*. In 1827 he was made secretary of the Zoological Society, a post which he held for three years. In 1828 he published *Lyric Offerings*, dedicated to Charles Lamb. He had a very varied journalistic experience, editing in succession the *Monthly Magazine*, the *True Sun*, the *Constitutional*, the *Court Journal*, the *Courier*, and *George Cruikshank's Omnibus*; and from 1841 till his death he was connected with the *Examiner*. In 1846 Bulwer-Lytton collected a number of his prose-essays under the title *Sketches of Life*, to which a memoir of the author was prefixed. His verse was collected in 1876 by Blanchard Jerrold. Over-work broke down his strength, and, unnerved by the death of his wife, he died by his own hand on the 15th of February 1845.

His eldest son, Sidney Laman Blanchard, who was the author of *Yesterday and To-day in India*, died in 1883.

BLANCHE, JACQUES ÉMILE (1861-), French painter, was born in Paris. He enjoyed an excellent cosmopolitan education, and was brought up at Passy in a house once belonging to the princesse de Lamballe, which still retained the atmosphere of 18th-century elegance and refinement and influenced his taste and work. Although he received some instruction in painting from Gervex, he may be regarded as self-taught. He acquired a great reputation as a portrait painter; his art is derived from French and English sources, refined, sometimes super-elegant, but full of character. Among his chief works are his portraits of his father, of Pierre Louÿs, the Thaulow family, Aubrey Beardsley and Yvette Guilbert.

BLANCHE OF CASTILE (1188-1252), wife of Louis VIII. of France, third daughter of Alphonso VIII., king of Castile, and of Eleanor of England, daughter of Henry II., was born at Valencia. In consequence of a treaty between Philip Augustus and John of England, she was betrothed to the former's son, Louis, and was brought to France, in the spring of 1200, by John's mother Eleanor. On the 22nd of May 1200 the treaty was finally signed, John ceding with his niece the fiefs of Issoudun and Graçay, together with those that André de Chavigny, lord of Châteauroux, held in Berry, of the English crown. The marriage was celebrated the next day, at Portmort on the right bank of the Seine, in John's domains, as those of Philip lay under an interdict.

Blanche first displayed her great qualities in 1216, when Louis, who on the death of John claimed the English crown in her right, invaded England, only to find a united nation against him. Philip Augustus refused to help his son, and Blanche was his sole support. The queen established herself at Calais and organized two fleets, one of which was commanded by Eustace the Monk, and an army under Robert of Courtenay; but all her resolution and energy were in vain. Although it would seem that her masterful temper exercised a sensible influence upon her husband's gentler character, her role during his reign (1223-1226) is not well known. Upon his death he left Blanche regent and guardian of his children. Of her twelve or thirteen children, six had died, and Louis, the heir—afterwards the sainted Louis IX.,—was but twelve years old. The situation was critical, for the hard-won domains of the house of Capet seemed likely to fall to pieces during a minority. Blanche had to bear the whole burden of affairs alone, to break up a league of the barons (1226), and to repel the attack of the king of England (1230). But her energy and firmness overcame all dangers. There was an end to the calumnies circulated against her, based on the poetical homage rendered her by Theobald IV., count of Champagne, and the prolonged stay in Paris of the papal legate, Romano Bonaventura, cardinal of Sant' Angelo. The nobles were awed by her warlike preparations or won over by adroit diplomacy, and their league was broken up. St Louis owed his realm to his mother, but he himself always remained somewhat under the spell of her imperious personality. After he came of age (1236) her influence upon him may still be traced. In 1248 she again became regent, during Louis IX.'s absence on the crusade, a project which she had strongly opposed. In the disasters which followed she maintained peace, while draining the land of men and money to aid her son in the East. At last her strength failed her. She fell ill at Melun in November 1252, and was taken to Paris, but lived only a few days. She was buried at Maubuisson.

Besides the works of Joinville and William of Nangis, see Élie Berger, "Histoire de Blanche de Castille, reine de France," in *Bibliothèque des écoles françaises d'Athènes et de Rome*, vol. lxx. (Paris, 1895); Le Nain de Tillemont, "Vie de Saint Louis," ed. by J. de Gaulle for the *Société de l'histoire de France* (6 vols., 1847-1851); and Paulin Paris, "Nouvelles recherches sur les moeurs de la reine Blanche et de Thibaud," in *Cabinet historique* (1858).

BLANCH FEE, or Blanch Holding (from Fr. *blanc*, white), an ancient tenure in Scottish land law, the duty payable being in silver or white money in contradistinction to gold. The phrase was afterwards applied to any holding of which the quit-rent was merely nominal, such as a penny, a peppercorn, &c.

BLANDFORD, or Blandford Forum, a market town, and municipal borough in the northern parliamentary division of Dorsetshire, England, on the Stour, 19 m. N.W. of Bournemouth by the Somerset & Dorset railway. Pop. (1901) 3649. The town is ancient, but was almost wholly destroyed by fire in the 18th century. The church of St Peter and St Paul, a classical building, was built in 1732. There are a grammar-school (founded in 1521 at Milton Abbas, transferred to Blandford in 1775), a Blue Coat school (1729), and other educational charities. Remnants of a mansion of the 14th century, Damory Court, are seen in a farmhouse, and an adjoining Perpendicular chapel is used as a barn. There are numerous early earthworks on the chalk hills in the neighbourhood. The fine modern mansion of Bryanston, in the park adjoining the town, is the seat of Lord Portman. The municipal borough is under a mayor, 4 aldermen and 12 councillors. Area, 145 acres.

BLANDRATA, or Biandrata, **GIORGIO** (c. 1515-1588), Italian physician and polemic, who came of the De Blandrate family, powerful from the early part of the 13th century, was born at Saluzzo, the youngest son of Bernardino Blandrata. He graduated in arts and medicine at Montpellier in 1533, and specialized in the functional and nervous disorders of women. In 1544 he made his first acquaintance with Transylvania; in 1553 he was with Alciati in the Grisons; in 1557 he spent a year at Geneva, in constant intercourse with Calvin, who distrusted him. He attended the English wife (Jane Stafford) of Count Celso Massimiliano Martinengo, preacher of the Italian church at Geneva, and fostered anti-trinitarian opinions in that church. In 1558 he found it expedient to remove to Poland, where he became a leader of the heretical party at the synods of Pinczów (1558) and Ksionzh (1560 and 1562). His point was the suppression of extremes of opinion, on the basis of a confession literally drawn from Scripture. He obtained the position of court physician to the queen dowager, the Milanese Bona Sforza. She had been instrumental in the burning (1539) of Catharine Weygel, at the age of eighty, for anti-trinitarian opinions; but the writings of Ochino had altered her views, which were now anti-Catholic. In 1563 Blandrata transferred his services to the Transylvanian court, where the daughters of his patroness were married to ruling princes. He revisited Poland (1576) in the train of Stephen Báthory, whose tolerance permitted the propagation of heresies; and when (1579) Christopher Báthory introduced the Jesuits into Transylvania, Blandrata found means of conciliating them. Throughout his career he was accompanied by his two brothers, Ludovico and Alphonso, the former being canon of Saluzzo. In Transylvania, Blandrata co-operated with Francis Dávid (d. 1579), the anti-trinitarian bishop, but in 1578 two circumstances broke the connexion. Blandrata was charged with “Italian vice”; Dávid renounced the worship of Christ. To influence Dávid, Blandrata sent for Faustus Socinus from Basel. Socinus was Dávid’s guest, but the discussion between them led to no result. At the instance of Blandrata, Dávid was tried and condemned to prison at Déva (in which he died) on the charge of innovation. Having amassed a fortune, Blandrata returned to the communion of Rome. His end is obscure. According to the Jesuit, Jacob Wujek, he was strangled by a nephew (Giorgio, son of Alphonso) in May 1588. He published a few polemical writings, some in conjunction with Dávid.

See Malacarne, *Commentario delle Opere e delle Vicende di G. Blandrata* (Padova, 1814); Wallace, *Anti-trinitarian Biography*, vol. ii. (1850).

(A. Go.*)

BLANE, SIR GILBERT (1740-1834), Scottish physician, was born at Blanefield, Ayrshire, on the 29th of August 1749. He was educated at Edinburgh university, and shortly after his removal to London became private physician to Lord Rodney, whom he accompanied to the West Indies in 1779. He did much to improve the health of the fleet by attention to the diet of the sailors and by enforcing due sanitary precautions, and it was largely through him that in 1795 the use of lime-juice was made obligatory throughout the navy as a preventive of scurvy. Enjoying a number of court and hospital appointments he built up a good practice for himself in London, and the government constantly consulted him on questions of public

hygiene. He was made a baronet in 1812 in reward for the services he rendered in connexion with the return of the Walcheren expedition. He died in London on the 26th of June 1834. Among his works were *Observations on the Diseases of Seamen* (1795) and *Elements of Medical Logic* (1819).

BLANFORD, WILLIAM THOMAS (1832-1905), English geologist and naturalist, was born in London on the 7th of October 1832. He was educated in private schools in Brighton and Paris, and with a view to the adoption of a mercantile career spent two years in a business house at Civita Vecchia. On returning to England in 1851 he was induced to enter the newly established Royal School of Mines, which his younger brother Henry F. Blanford (1834-1893), afterwards head of the Indian Meteorological Department, had already joined; he then spent a year in the mining school at Freiburg, and towards the close of 1854 both he and his brother obtained posts on the Geological Survey of India. In that service he remained for twenty-seven years, retiring in 1882. He was engaged in various parts of India, in the Raniganj coalfield, in Bombay, and in the coalfield near Talchir, where boulders considered to have been ice-borne were found in the Talchir strata—a remarkable discovery confirmed by subsequent observations of other geologists in equivalent strata elsewhere. His attention was given not only to geology but to zoology, and especially to the land-mollusca and to the vertebrates. In 1866 he was attached to the Abyssinian expedition, accompanying the army to Mágdala and back; and in 1871-1872 he was appointed a member of the Persian Boundary Commission. The best use was made of the exceptional opportunities of studying the natural history of those countries. For his many contributions to geological science Dr Blanford was in 1883 awarded the Wollaston medal by the Geological Society of London; and for his labours on the zoology and geology of British India he received in 1901 a royal medal from the Royal Society. He had been elected F.R.S. in 1874, and was chosen president of the Geological Society in 1888. He was created C.I.E. in 1904. He died in London on the 23rd of June 1905. His principal publications were: *Observations on the Geology and Zoology of Abyssinia* (1870), and *Manual of the Geology of India*, with H.B. Medlicott (1879).

Biography, with bibliography and portrait, in *Geological Magazine*, January 1905.

BLANK (from the Fr. *blanc*, white), a word used in various senses based on that of “left white,” *i.e.* requiring something to be filled in; thus a “blank cheque” is one which requires the amount to be inserted, an insurance policy in blank, where the name of the beneficiary is lacking, “blank verse” (*q.v.*) verse without rhyme, “blank cartridge” that contains only powder and no ball or shot. The word is also used, as a substantive, for a ticket in a lottery or sweepstake which does not carry a number or the name of a horse running or for an unstamped metal disc in coining.

BLANKENBERGHE, a seaside watering-place on the North Sea in the province of West Flanders, Belgium, 12 m. N.E. of Ostend, and about 9 m. N.W. of Bruges, with which it is connected by railway. It is more bracing than Ostend, and has a fine parade over a mile in length. During the season, which extends from June to September, it receives a large number of visitors, probably over 60,000 altogether, from Germany as well as from Belgium. There is a small fishing port as well as a considerable fishing-fleet. Two miles north of this place along the dunes is Zeebrugge, the point at which the new ship-canal from Bruges enters the North Sea. Fixed population (1904) 5925.

BLANKENBURG. (1) A town and health resort of Germany, in the duchy of Brunswick, at the N. foot of the Harz Mountains, 12 m. by rail S.W. from Halberstadt. Pop. (1901) 10,173. It has been in large part rebuilt since a fire in 1836, and possesses a castle, with various collections, a museum of antiquities, an old town hall and churches. There are pine-needle baths and a hospital for nervous diseases. Gardening is a speciality. In the vicinity is a cliff or ridge of rock called Teufelsmauer (Devil's wall), from which fine views are obtained across the plain and into the deep gorges of the Harz Mountains.

(2) Another BLANKENBURG, also a health-resort, is situated in Schwarzburg-Rudolstadt, Thuringia, at the confluence of the rivers Rinne and Schwarza, and at the entrance of the Schwarzatal. Its environs are charming, and to the north of it, on an eminence, rise the fine ruins of the castle of Greifenstein, built by the German king Henry I., and from 1275 to 1583 the seat of a cadet branch of the counts of Schwarzburg.

BLANKETEERS, the nickname given to some 5000 operatives who on the 10th of March 1817 met in St Peter's Field, near Manchester, to march to London, each carrying blankets or rugs. Their object was to see the prince regent and lay their grievances before him. The Habeas Corpus Act was suspended, and the leaders were seized and imprisoned. The bulk of the demonstration yielded at once. The few stragglers who persisted in the march were intercepted by troops, and treated with considerable severity. Eventually the spokesmen had an interview with the ministers, and some reforms were the result.

BLANK VERSE, the unrhymed measure of iambic decasyllable in five beats which is usually adopted in English epic and dramatic poetry. The epithet is due to the absence of the rhyme which the ear expects at the end of successive lines. The decasyllabic line occurs for the first time in a Provençal poem of the 10th century, but in the earliest instances preserved it is already constructed with such regularity as to suggest that it was no new invention. It was certainly being used almost simultaneously in the north of France. Chaucer employed it in his *Compleynte to Pitie* about 1370. In all the literatures of western Europe it became generally used, but always with rhyme. In the beginning of the 16th century, however, certain Italian poets made the experiment of writing decasyllabics without rhyme. The tragedy of *Sophonisba* (1515) of G.G. Trissino (1478-1550) was the earliest work completed in this form; it was followed in 1525 by the didactic poem *Le Api* (The Bees), of Giovanni Rucellai (1475-1525), who announced his intention of writing *"Con verso Etrusco dalle rime sciolto,"* in consequence of which expression this kind of metre was called *versi sciolti* or blank verse. In a very short time this form was largely adopted in Italian dramatic poetry, and the comedies of Ariosto, the *Aminta* of Tasso and the *Pastor Fido* of Guarini are composed in it. The iambic blank verse of Italy was, however, mainly hendecasyllabic, not decasyllabic, and under French influences the habit of rhyme soon returned.

Before the close of Trissino's life, however, his invention had been introduced into another literature, where it was destined to enjoy a longer and more glorious existence. Towards the close of the reign of Henry VIII., Henry Howard, earl of Surrey, translated two books of the *Aeneid* into English rhymeless verse, "drawing" them "into a strange metre." Surrey's blank verse is stiff and timid, permitting itself no divergence from the exact iambic movement:—

"Who can express the slaughter of that night,
Or tell the number of the corpses slain,
Or can in tears bewail them worthily?
The ancient famous city falleth down,
That many years did hold such seignory."

Surrey soon found an imitator in Nicholas Grimoald, and in 1562 blank verse was first applied to English dramatic poetry in the *Gorboduc* of Sackville and Norton. In 1576, in the *Steel Glass* of Gascoigne, it was first used for satire, and by the year 1585 it had come into

almost universal use for theatrical purposes. In Lyly's *The Woman in the Moon* and Peek's *Arraignment of Paris* (both of 1584) we find blank verse struggling with rhymed verse and successfully holding its own. The earliest play written entirely in blank verse is supposed to be *The Misfortunes of Arthur* (1587) of Thomas Hughes. Marlowe now immediately followed, with the magnificent movement of his *Tamburlaine* (1589), which was mocked by satirical critics as "the swelling bombast of bragging blank verse" (Nash) and "the spacious volubility of a drumming decasyllable" (Greene), but which introduced a great new music into English poetry, in such "mighty lines" as

"Still climbing after knowledge infinite,
And always moving as the restless spheres,"

or:—

"See where Christ's blood streams in the firmament!"

Except, however, when he is stirred by a particularly vivid emotion, the blank verse of Marlowe continues to be monotonous and uniform. It still depends too exclusively on a counting of syllables. But Shakespeare, after having returned to rhyme in his earliest dramas, particularly in *The Two Gentlemen of Verona*, adopted blank verse conclusively about the time that the career of Marlowe was closing, and he carried it to the greatest perfection in variety, suppleness and fulness. He released it from the excessive bondage that it had hitherto endured; as Robert Bridges has said, "Shakespeare, whose early verse may be described as syllabic, gradually came to write a verse dependent on stress." In comparison with that of his predecessors and successors, the blank verse of Shakespeare is essentially regular, and his prosody marks the admirable mean between the stiffness of his dramatic forerunners and the laxity of those who followed him. Most of Shakespeare's lines conform to the normal type of the decasyllable, and the rest are accounted for by familiar and rational rules of variation. The ease and fluidity of his prosody were abused by his successors, particularly by Beaumont and Fletcher, who employed the soft feminine ending to excess; in Massinger dramatic blank verse came too near to prose, and in Heywood and Shirley it was relaxed to the point of losing all nervous vigour.

The later dramatists gradually abandoned that rigorous difference which should always be preserved between the cadence of verse and prose, and the example of Ford, who endeavoured to revive the old severity of blank verse, was not followed. But just as the form was sinking into dramatic desuetude, it took new life in the direction of epic, and found its noblest proficient in the person of John Milton. The most intricate and therefore the most interesting blank verse which has been written is that of Milton in the great poems of his later life. He reduced the elisions, which had been frequent in the Elizabethan poets, to law; he admitted an extraordinary variety in the number of stresses; he deliberately inverted the rhythm in order to produce particular effects; and he multiplied at will the caesurae or breaks in a line. Such verses as

"Arraying with reflected purple and gold—
Shoots invisible virtue even to the deep—
Universal reproach, far worse to bear—
Me, me only, just object of his ire"—

are not mistaken in rhythm, nor to be scanned by forcing them to obey the conventional stress. They are instances, and *Paradise Lost* is full of such, of Milton's exquisite art in ringing changes upon the metrical type of ten syllables, five stresses and a rising rhythm, so as to make the whole texture of the verse respond to his poetical thought. Writing many years later in *Paradise Regained* and in *Samson Agonistes*, Milton retained his system of blank verse in its general characteristics, but he treated it with increased dryness and with a certain harshness of effect. It is certainly in his biblical drama that blank verse has been pushed to its most artificial and technical perfection, and it is there that Milton's theories are to be studied best; yet it must be confessed that learning excludes beauty in some of the very audacious irregularities which he here permits himself in *Samson Agonistes*. Such lines as

"Made arms ridiculous, useless the forgery—
My griefs not only pain me as a lingering disease—

Drunk with idolatry, drunk with wine—
Justly, yet despair not of his final pardon”—

are constructed with perfect comprehension of metrical law, yet they differ so much from the normal structure of blank verse that they need to be explained, and to imitate them would be perilous. A persistent weakness in the third foot has ever been the snare of English blank verse, and it is this element of monotony and dulness which Milton is ceaselessly endeavouring to obviate by his wonderful inversions, elisions and breaks.

After the Restoration, and after a brief period of experiment with rhymed plays, the dramatists returned to the use of blank verse, and in the hands of Otway, Lee and Dryden, it recovered much of its magnificence. In the 18th century, Thomson and others made use of a very regular and somewhat monotonous form of blank verse for descriptive and didactic poems, of which the *Night Thoughts* of Young is, from a metrical point of view, the most interesting. With these poets the form is little open to licence, while inversions and breaks are avoided as much as possible. Since the 18th century, blank verse has been subjected to constant revision in the hands of Wordsworth, Coleridge, Shelley, Keats, Tennyson, the Brownings and Swinburne, but no radical changes, of a nature unknown to Shakespeare and Milton, have been introduced into it.

See J.A. Symonds, *Blank Verse* (1895); Walter Thomas, *Le Décasyllabe romain et sa fortune en Europe* (1904); Robert Bridges *Milton’s Prosody* (1894); Ed. Guest, *A History of English Rhythms* (1882); J. Motheré, *Les Théories du vers héreoïque anglais* (1886); J. Schipper, *Englische Metrik* (1881-1888).

(E. G.)

BLANQUI, JERÔME ADOLPHE (1798-1854), French economist, was born at Nice on the 21st of November 1798. Beginning life as a schoolmaster in Paris, he was attracted to the study of economics by the lectures of J.B. Say, whose pupil and assistant he became. Upon the recommendation of Say he was in 1825 appointed professor of industrial economy and of history at the Conservatoire des Arts et Métiers. In 1833 he succeeded Say as professor of political economy at the same institution, and in 1838 was elected a member of the Académie des Sciences Morales et Politiques. In 1838 appeared his most important work, *Histoire de l’économie politique en Europe, depuis les anciens jusqu’à nos jours*. He was indefatigable in research, and for the purposes of his economic inquiries travelled over almost the whole of Europe and visited Algeria and the East. He contributed much to our knowledge of the conditions of the working-classes, especially in France. Other works of Blanqui were *De la situation économique et morale de l’Espagne en 1846; Résumé de l’histoire du commerce et de l’industrie* (1826); *Précis élémentaire d’économie politique* (1826); *Les Classes ouvrières en France* (1848).

BLANQUI, LOUIS AUGUSTE (1805-1881), French publicist, was born on the 8th of February 1805 at Puget-Théniers, where his father, Jean Dominique Blanqui, was at that time sub-prefect. He studied both law and medicine, but found his real vocation in politics, and at once constituted himself a champion of the most advanced opinions. He took an active part in the revolution of July 1830, and continuing to maintain the doctrine of republicanism during the reign of Louis Philippe, was condemned to repeated terms of imprisonment. Implicated in the armed outbreak of the Société des Saisons, of which he was a leading spirit, he was in the following year, 1840, condemned to death, a sentence that was afterwards commuted to imprisonment for life. He was released by the revolution of 1848, only to resume his attacks on existing institutions. The revolution, he declared, was a mere change of name. The violence of the *Société républicaine centrale*, which was founded by Blanqui to demand a modification of the government, brought him into conflict with the more moderate Republicans, and in 1849 he was condemned to ten years’ imprisonment. In 1865, while serving a further term of imprisonment under the Empire, he contrived to

escape, and henceforth continued his propaganda against the government from abroad, until the general amnesty of 1869 enabled him to return to France. Blanqui's leaning towards violent measures was illustrated in 1870 by two unsuccessful armed demonstrations: one on the 12th of January at the funeral of Victor Noir, the journalist shot by Pierre Bonaparte; the other on the 14th of August, when he led an attempt to seize some guns at a barrack. Upon the fall of the Empire, through the revolution of the 4th of September, Blanqui established the club and journal *La patrie en danger*. He was one of the band that for a moment seized the reins of power on the 31st of October, and for his share in that outbreak he was again condemned to death on the 17th of March of the following year. A few days afterwards the insurrection which established the Commune broke out, and Blanqui was elected a member of the insurgent government, but his detention in prison prevented him from taking an active part. Nevertheless he was in 1872 condemned along with the other members of the Commune to transportation; but on account of his broken health this sentence was commuted to one of imprisonment. In 1879 he was elected a deputy for Bordeaux; although the election was pronounced invalid, Blanqui was set at liberty, and at once resumed his work of agitation. At the end of 1880, after a speech at a revolutionary meeting in Paris, he was struck down by apoplexy, and expired on the 1st of January 1881. Blanqui's uncompromising communism, and his determination to enforce it by violence, necessarily brought him into conflict with every French government, and half his life was spent in prison. Besides his innumerable contributions to journalism, he published an astronomical work entitled *L'Éternité par les astres* (1872), and after his death his writings on economic and social questions were collected under the title of *Critique sociale* (1885).

A biography by G. Geffroy, *L'Enfermé* (1897), is highly coloured and decidedly partisan.

BLANTYRE, the chief town of the Nyasaland protectorate, British Central Africa. It is situated about 3000 ft. above the sea in the Shiré Highlands 300 m. by river and rail N.N.W. of the Chínde mouth of the Zambezi. Pop. about 6000 natives and 100 whites. It is the headquarters of the principal trading firms and missionary societies in the protectorate. It is also a station on the African trans-continental telegraph line. The chief building is the Church of Scotland church, a fine red brick building, a mixture of Norman and Byzantine styles, with lofty turrets and white domes. It stands in a large open space and is approached by an avenue of cypresses and eucalyptus. The church was built entirely by native labour. Blantyre was founded in 1876 by Scottish missionaries, and is named after the birthplace of David Livingstone.

BLANTYRE (Gaelic, "the warm retreat"), a parish of Lanarkshire, Scotland. Pop. (1901) 14,145. The parish lies a few miles south-east of Glasgow, and contains High Blantyre (pop. 2521), Blantyre Works (or Low Blantyre), Stonefield and several villages. The whole district is rich in coal, the mining of which is extensively carried on. Blantyre Works (pop. 1683) was the birthplace of David Livingstone (1813-1873) and his brother Charles (1821-1873), who as lads were both employed as piecers in a local cotton-mill. The scanty remains of Blantyre Priory, founded towards the close of the 13th century, stand on the left bank of the Clyde, almost opposite the beautiful ruins of Bothwell Castle. High Blantyre and Blantyre Works are connected with Glasgow by the Caledonian railway. Stonefield (pop. 7288), the most populous place in the parish, entirely occupied with mining, lies between High Blantyre and Blantyre Works, Calderwood Castle on Rotten Calder Water, near High Blantyre, is situated amid picturesque scenery.

BLARNEY, a small town of Co. Cork, Ireland, in the mid parliamentary division, 5 m. N.W.

of the city of Cork on the Cork & Muskerry light railway. Pop. (1901) 928. There is a large manufacture of tweed. The name “blarney” has passed into the language to denote a peculiar kind of persuasive eloquence, alleged to be characteristic of the natives of Ireland. The “Blarney Stone,” the kissing of which is said to confer this faculty, is pointed out within the castle. The origin of this belief is not known. The castle, built *c.* 1446 by Cormac McCarthy, was of immense strength, and parts of its walls are as much as 18 ft. thick. To its founder is traced by some the origin of the term “blarney,” since he delayed by persuasion and promises the surrender of the castle to the lord president. Richard Millikin’s song, “The Groves of Blarney” (*c.* 1798), contributed to the fame of the castle, which is also bound up with the civil history of the county and the War of the Great Rebellion.

BLASHFIELD, EDWIN HOWLAND (1848-), American artist, was born on the 15th of December 1848 in New York City. He was a pupil of Bonnat in Paris, and became (1888) a member of the National Academy of Design in New York. For some years a genre painter, he later turned to decorative work, marked by rare delicacy and beauty of colouring. He painted mural decorations for a dome in the manufacturers’ building at the Chicago Exposition of 1893; for the dome of the Congressional library, Washington; for the capitol at St Paul, Minnesota; for the Baltimore court-house; in New York City for the Appellate court house, the grand ball-room of the Waldorf-Astoria hotel, the Lawyers’ club, and the residences of W.K. Vanderbilt and Collis P. Huntington; and in Philadelphia for the residence of George W. Drexel. With his wife he wrote *Italian Cities* (1900) and edited Vasari’s *Lives of the Painters* (1896), and was well known as a lecturer and writer on art. He became president of the Society of Mural Painters, and of the Society of American Artists.

BLASIUS (or Blaise), **SAINT**, bishop of Sebaste or Sivas in Asia Minor, martyred under Diocletian on the 3rd of February 316. The Roman Catholic Church holds his festival on the 3rd of February, the Orthodox Eastern Church on the 11th. His flesh is said to have been torn with woolcombers’ irons before he was beheaded, and this seems to be the only reason why he has always been regarded as the patron saint of woolcombers. In pre-Reformation England St Blaise was a very popular saint, and the council of Oxford in 1222 forbade all work on his festival. Owing to a miracle which he is alleged to have worked on a child suffering from a throat affection, who was brought to him on his way to execution, St Blaise’s aid has always been held potent in throat and lung diseases. The woolcombers of England still celebrate St Blaise’s day with a procession and general festivities. He forms one of a group of fourteen (*i.e.* twice seven) saints, who for their help in time of need have been associated as objects of particularly devoted worship in Roman Catholic Germany since the middle of the 15th century.

See William Hone, *Every Day Book*, i. 210.

BLASPHEMY (through the Fr. from Gr. βλασφημία, profane language, slander, probably derived from root of βλάπτειν, to injure, and φήμη, speech), literally, defamation or evil speaking, but more peculiarly restricted to an indignity offered to the Deity by words or writing. By the Mosaic law death by stoning was the punishment for blasphemy (Lev. xxiv. 16). The 77th Novel of Justinian assigned death as the penalty, as did also the Capitularies. The common law of England treats blasphemy as an indictable offence. All blasphemies against God, as denying His being, or providence, all contumelious reproaches of Jesus Christ, all profane scoffing at the Holy Scriptures, or exposing any part thereof to contempt or ridicule, are punishable by the temporal courts with fine, imprisonment and also infamous corporal punishment. An act of Edward VI. (1547; repealed 1553 and revived 1558) enacts

that persons reviling the sacrament of the Lord's Supper, by contemptuous words or otherwise, shall suffer imprisonment. Persons denying the Trinity were deprived of the benefit of the Act of Toleration by an act of 1688. An act of 1697-1698, commonly called the Blasphemy Act, enacts that if any person, educated in or having made profession of the Christian religion, should by writing, preaching, teaching or advised speaking, deny any one of the Persons of the Holy Trinity to be God, or should assert or maintain that there are more gods than one, or should deny the Christian religion to be true, or the Holy Scriptures to be of divine authority, he should, upon the first offence, be rendered incapable of holding any office or place of trust, and for the second incapable of bringing any action, of being guardian or executor, or of taking a legacy or deed of gift, and should suffer three years' imprisonment without bail. It has been held that a person offending under the statute is also indictable at common law (*Rex* v. *Carlisle*, 1819, where Mr Justice Best remarks, "In the age of toleration, when that statute passed, neither churchmen nor sectarians wished to protect in their infidelity those who disbelieved the Holy Scriptures"). An act of 1812-1813 excepts from these enactments "persons denying as therein mentioned respecting the Holy Trinity," but otherwise the common and the statute law on the subject remain as stated. In the case of *Rex* v. *Woolston* (1728) the court declared that they would not suffer it to be debated whether to write against Christianity in *general* was not an offence punishable in the temporal courts at common law, but they did not intend to include disputes between learned men on *particular* controverted points.

The law against blasphemy has practically ceased to be put in active operation. In 1841 Edward Moxon was found guilty of the publication of a blasphemous libel (Shelley's *Queen Mab*), the prosecution having been instituted by Henry Hetherington, who had previously been condemned to four months' imprisonment for a similar offence, and wished to test the law under which he was punished. In the case of *Cowan* v. *Milbourn* (1867) the defendant had broken his contract to let a lecture-room to the plaintiff, on discovering that the intended lectures were to maintain that "the character of Christ is defective, and his teaching misleading, and that the Bible is no more inspired than any other book," and the court of exchequer held that the publication of such doctrine was blasphemy, and the contract therefore illegal. On that occasion the court reaffirmed the dictum of Chief Justice Hale, that Christianity is part of the laws of England. The commissioners on criminal law (sixth report) remark that "although the law forbids *all* denial of the being and providence of God or the Christian religion, it is only when irreligion assumes the form of an insult to God and man that the interference of the criminal law has taken place." In England the last prominent prosecution for blasphemy was the case of *R.* v. *Ramsey & Foote*, 1883, 48 L.T. 739, when the editor, publisher and printer of the *Freethinker* were sentenced to imprisonment; but police court proceedings were taken as late as 1908 against an obscure Hyde Park orator who had become a public nuisance.

Profane cursing and swearing is made punishable by the Profane Oaths Act 1745, which directs the offender to be brought before a justice of the peace, and fined five shillings, two shillings or one shilling, according as he is a gentleman, below the rank of gentleman, or a common labourer, soldier, &c.

By the law of Scotland, as it originally stood, the punishment of blasphemy was death, but by an act of 1825, amended in 1837, blasphemy was made punishable by fine or imprisonment or both.

In France, blasphemy (which included, also, speaking against the Holy Virgin and the saints, denying one's faith, or speaking with impiety of holy things) was from very early times punished with great severity. The punishment was death in various forms, burning alive, mutilation, torture or corporal punishment. In the United States the common law of England was largely followed, and in most of the states, also, statutes were enacted against the offence, but, as in England, the law is practically never put in force. In Germany, the punishment for blasphemy is imprisonment varying from one day to three years, according to the gravity of the offence. To constitute the offence, the blasphemy must be uttered in public, be offensive in character, and have wounded the religious susceptibilities of some other person. In Austria, whoever commits blasphemy by speech or writing is liable to imprisonment for any term from six months up to ten years, according to the seriousness of the offence.

BLASS, FRIEDRICH (1843-1907), German classical scholar, was born on the 22nd of January 1843 at Osnabrück. After studying at Göttingen and Bonn from 1860 to 1863, he lectured at several gymnasia and at the university of Königsberg. In 1876 he was appointed extraordinary professor of classical philology at Kiel, and ordinary professor in 1881. In 1892 he accepted a professorship at Halle, where he died on the 5th of March 1907. He frequently visited England, and was intimately acquainted with leading British scholars. He received an honorary degree from Dublin University in 1892, and his readiness to place the results of his labours at the disposal of others, together with the courtesy and kindliness of his disposition, won the respect of all who knew him. Blass is chiefly known for his works in connexion with the study of Greek oratory: *Die griechische Beredsamkeit von Alexander bis auf Augustus* (1865); *Die attische Beredsamkeit* (1868-1880; 2nd ed., 1887-1898), his greatest work; editions for the Teubner series of Andocides (1880), Antiphon (1881), Hypereides (1881, 1894), Demosthenes (Dindorf's ed., 1885), Isocrates (1886), Dinarchus (1888), Demosthenes (Rehdantz' ed., 1893), Aeschines (1896), Lycurgus, *Leocrates* (1902); *Die Rhythmen der attischen Kunstprosa* (1901); *Die Rhythmen der asianischen und römischen Kunstprosa* (1905). Among his other works are editions of Eudoxus of Cnidus (1887), the Ἀθηναίων πολιτεία (4th ed., 1903), a work of great importance, and Bacchylides (3rd. ed., 1904); *Grammatik des neutestamentlichen Griechisch* (1902; Eng. trans, by H. St John Thackeray, 1905); *Hermeneutik und Kritik and Paläographie, Buchwesen, und Handschriftenkunde* (vol. i. of Müller's *Handbuch der klassischen Altertumswissenschaft*, 1891); *Über die Aussprache des Griechischen* (1888; Eng. trans, by W.J. Purton, 1890); *Die Interpolationen in der Odyssee* (1904); contributions to Collitz's *Sammlung der griechischen Dialektinschriften*; editions of the texts of certain portions of the New Testament (Gospels and *Acts*). His last work was an edition of the *Choephori* (1906).

See notices in the *Academy*, March 16, 1907 (J.P. Mahaffy); *Classical Review*, May 1907 (J.E. Sandys), which contains also a review of *Die Rhythmen der asianischen und römischen Kunstprosa*.

BLASTING, the process of rending or breaking apart a solid body, such as rock, by exploding within it or in contact with it some explosive substance. The explosion is accompanied by the sudden development of gas at a high temperature and under a tension sufficiently great to overcome the resistance of the enclosing body, which is thus shattered and disintegrated. Before the introduction of explosives, rock was laboriously excavated by hammer and chisel, or by the ancient process of "fire-setting," *i.e.* building a fire against the rock, which, on cooling, splits and flakes off. To hasten disintegration, water was often applied to the heated rock, the loosened portion being afterwards removed by pick or hammer and wedge. In modern times blasting has become a necessity for the excavation of rock and other hard material, as in open surface cuts, quarrying, tunnelling, shaft-sinking and mining operations in general.

For blasting, a hole is generally drilled to receive the charge of explosive. The depth and diameter of the hole and the quantity of explosive used are all variable, depending on the character of the rock and of the explosive, the shape of the mass to be blasted, the presence or absence of cracks or fissures, and the position of the hole with respect to the free surface of the rock. The shock of a blast produces impulsive waves acting radially in all directions, the force being greatest at the centre of explosion and varying inversely as the square of the distance from the charge. This is evidenced by the observed facts. Immediately surrounding the explosive, the rock is often finely splintered and crushed. Beyond this is a zone in which it is completely broken and displaced or projected, leaving an enveloping mass of more or less ragged fractured rock only partially loosened. Lastly, the diminishing waves produce vibrations which are transmitted to considerable distances. Theoretically, if a charge of explosive be fired in a solid material of perfectly homogeneous texture and at a proper distance from the free surface, a conical mass will be blown out to the full depth of the drill hole, leaving a funnel-shaped cavity. No rock, however, is of uniform mineralogical and physical character, so that in practice there is only a rough approximation to the conical crater, even under the most favourable conditions. Generally, the shape of the mass blasted out is extremely irregular, because of the variable texture of the rock and the presence of cracks, fissures and cleavage planes. The ultimate or resultant useful effect of the explosion of a confined charge is in the direction where the least resistance is presented. In the actual

work of rock excavation it is only by trial, or by deductions based on experience, that the behaviour of a given rock can be determined and the quantity of explosive required properly proportioned.

Blasting, as usually carried on, comprises several operations: (1) drilling holes in the rock to be blasted; (2) placing in the hole the charge of explosive, with its fuze; (3) tamping the charge, *i.e.* compacting it and filling the remainder of the hole with some suitable material for preventing the charge from blowing out without breaking the ground; (4) igniting or detonating the charge; (5) clearing away the broken material. The holes for blasting are made either by hand, with hammer and drill or jumper, or by machine drill, the latter being driven by steam, compressed air, or electricity, or, in rare cases, by hydraulic power. Drill holes ordinarily vary in diameter from 1 to 3 in., and in depth from a few inches up to 15 or 20 ft. or more. The deeper holes are made only in surface excavation of rock, the shallower, to a maximum depth of say 12 ft., being suitable for tunnelling and mining operations.

Hand Drilling.—The work is either "single-hand" or "double-hand." In single-hand drilling, the miner wields the hammer with one hand, and with the other holds the drill or "bit," rotating it slightly after every blow in order to keep the hole round and prevent the drill from sticking fast; in double-hand work, one man strikes, while the other holds and rotates the drill. For large and deep holes, two hammermen are sometimes employed.

FIG. 1.

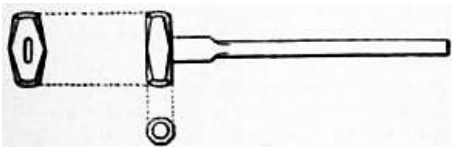


FIG. 2.—Sledge-hammer.

A miner's drill is a steel bar, occasionally round but generally of octagonal cross-section, one end of which is forged out to a cutting edge (fig. 1). The edge of the drill is made either straight, like that of a chisel, or with a convex curve, the latter shape being best for very hard rock. For hard rock the cutting edge should be rather thicker and blunter, and therefore stronger, than for soft rock. Drills are made of high-grade steel, as they must be tempered accurately and uniformly. The diameter of drill steel for hand work is usually from ¾ to 1 in., and the length of cutting edge, or gauge, of the drill is always greater than the diameter of the shank, in the proportion of from 7.4 to 4.3. Holes over 10 or 12 in. deep generally require the use of a set of drills of different lengths and depending in number on the depth required. The shortest drill, for starting the hole, has the widest cutting edge, the edges of the others being successively narrower and graduated to follow each other properly, as drill after drill is dulled in deepening the hole. Thus the hole decreases in diameter as it is made deeper. The miner's hammer (fig. 2) ranges in weight from 3½ to 4½ ℔ for single-hand drilling, up to 8 or 10 ℔ for double-hand. If the hole is directed downward, a little water is poured into it at intervals, to keep the cutting edge of the drill cool and make a thin mud of the cuttings. From time to time the hole is cleaned out by the "scraper" or "spoon," a long slender iron bar, forged in the shape of a hollow semi-cylinder, with one end flattened and turned over at right angles. If the hole is directed steeply upward and the rock is dry, the cuttings will run out continuously during the drilling; otherwise the scraper is necessary, or a small pipe with a plunger like a syringe is used for washing out the cuttings. The "jumper" is a long steel bar, with cutting edges on one or both ends, which is alternately raised and dropped in the hole by one or two men. In rock work the jumper is rarely used except for holes directed steeply downward, though for coal or soft shale or slate it may be employed for drilling holes horizontally or upward. Other tools used in connexion with rock-drilling are the pick and gad.

Holes drilled by hand usually vary in depth from say 18 to 36 in., according to the nature of the rock and purpose of the work, though deeper holes are often made. For soft rock, single-hand drilling is from 20 to 30% cheaper than double-hand, but this difference does not hold good for the harder rocks. For these double-hand drilling is preferable, and may even be essential, to secure a reasonable speed of work.

Machine Drills.—The introduction of machine drills in the latter part of the 19th century exerted an important influence on the work of rock excavation in general, and specially on the art of mining. By their use many great tunnels and other works involving rock excavation under

adverse conditions have been rapidly and successfully carried out. Before the invention of machine drills such work progressed slowly and with difficulty. Nearly all machine drills are of the reciprocating or percussive type, in which the drill bit is firmly clamped to the piston rod and delivers a rapid succession of strong blows on the bottom of the hole. The ordinary compressed air drill (which may, for surface work, be operated also by steam) may be taken as an illustration. The piston works in a cylinder, provided with a valve motion somewhat similar to that of a steam-engine, together with an automatic device for producing the necessary rotation of the piston and drill bit. While at work the machine is mounted on a heavy tripod (fig. 3); or, if underground, sometimes on an iron column or bar, firmly wedged in position between the roof and floor, or side walls, of the tunnel or mine working. As the hole is deepened, the entire drill head is gradually fed forward on its support by a screw feed, a succession of longer and longer drill bits being used as required.

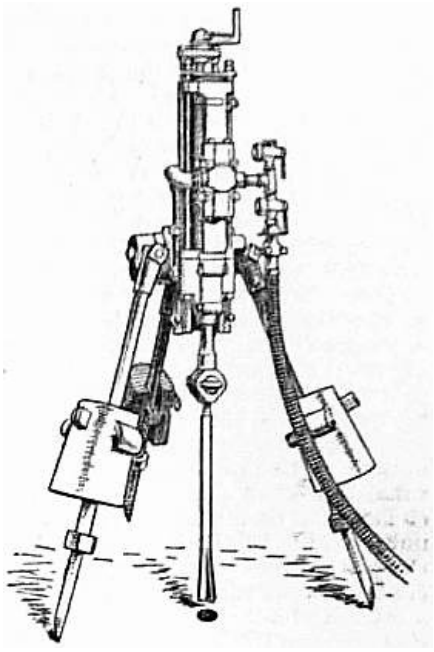
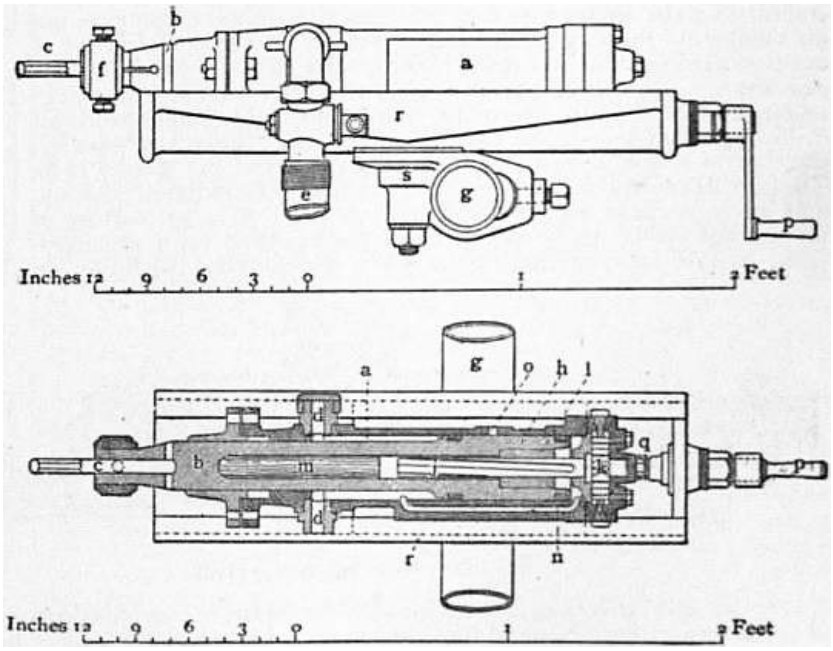


FIG. 3.—Ingersoll-Sergeant Mining Drill.

Among the numerous types and makes of percussion drill may be named the following:—Adelaide, Climax, Darlington, Dubois-François, Ferroux, Froelich, Hirnant, Ingersoll, Jeffrey, Leyner, McKiernan, Rand, Schram, Sergeant, Sullivan and Wood.



FIGS. 4 and 5.—Darlington's Rock Drill.

One of the simplest of the machine drills is the Darlington (figs. 4 and 5): *a* is the cylinder; *b*, piston rod; *c*, bit; *d*, *d*, air inlets, either being used according to the position of the drill while at work; *h*, piston; *j*, rifle-bar for rotating piston and bit; *k*, ratchet attached to *j*; *l*, brass nut, screwed into *h*, and in which *j* works; *f*, chuck for holding drill-bit; *n*, air port communicating between ends of cylinder, front and back of piston; *o*, exhaust port. This machine has no valve. From its construction, the compressed air (or steam) is always acting on the annular shoulder round the forward end of the piston. The piston is thereby forced back on the in-stroke until the port *n* is uncovered. This admits the compressed air to the rear end of the cylinder, and as the area of this end of the piston is much greater than that of the shoulder on the other end, the piston is driven forward and strikes its blow. When it has advanced far enough to cover the exhaust port *o*, the air behind the piston is exhausted, and, under the constant inward pressure noted above, the stroke is reversed. The rotation of piston and bit is caused by the rifle-bar *j*. On the outward stroke, *j*, with its ratchet *k*, is free to turn under a couple of pawls and springs, and consequently the piston delivers its blow without rotation. On the inward stroke the ratchet is held fast by the pawls, and the piston and bit are forced to rotate through a small part of a revolution. The cylinder is fed forward with respect to the shell *r*, by rotating the handle *p*, which works a long screw-bar engaging

with a nut on the under side of the cylinder. The shell *r* is bolted to the clamp *s*, which in turn is mounted on the hollow column or bar *g*, or on a tripod, according to the character of the work. By means of the adjustable clamp *s*, the machine can be set for drilling a hole in any desired direction. The drill makes from 400 to 800 strokes per minute.

The “New Ingersoll” drill, which may be taken as an example of the numerous machines in which valves are used, is shown in section in fig. 6. The steam or compressed air is distributed through the ports alternately to the ends of the cylinder, by the reciprocations of a spool-valve working in a chest mounted on the cylinder. The movements of this valve are caused by the strokes of the main piston, which, by means of the wide annular groove around the middle of the piston, alternately open and close the spool-valve exhaust ports. Fig. 3 shows the Ingersoll “Light Mining drill,” as mounted on a tripod, and in position for drilling a hole vertically downward. In the Leyner drill the drill-bit is not connected to the piston, but is struck a quick succession of blows by the latter. An important feature of this machine is the provision for directing a stream of water into the hole for clearing out the cuttings. For this purpose the shank of the drill-bit is perforated longitudinally, the water being supplied under pressure from a small tank, to which compressed air is led.

A rock drill of entirely different design, the Brandt, has been successfully used in Europe for driving railway tunnels. It is operated by hydraulic power, the pressure water being supplied by a pump. The hollow drill-bit, which has a serrated cutting edge, is forced under heavy pressure against the bottom of the hole, and is rotated slowly—at six to eight revolutions per minute—by a pair of small hydraulic cylinders, thus grinding and crushing the rock instead of chipping it. The bottom of the hole is kept clean and the drill-bit cooled by a stream of water passing down through its hollow shank. On account of its size and weight, this machine is not suitable for mine work.

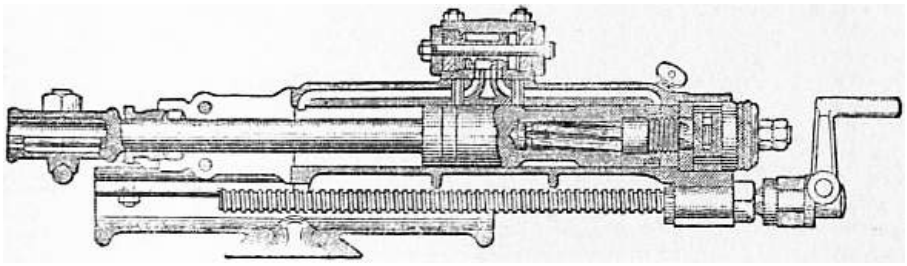


FIG. 6.—New Ingersoll Drill.

Most of the machine drills are made in a number of sizes, from 2 in. up to 5 in. diameter of cylinder, the larger sizes being capable of drilling holes 5 in. diameter and 30 ft. deep. They range in weight from say 95 to 690 lb. for the drill head (unmounted), the tripods weighing from 40 to 260 lb., exclusive of the weights placed for stability on the tripod legs (fig. 3). The sizes in most common use for mining are from 2½ in. to 3⅛ in. diameter of cylinder. In rock of average hardness the best drills make from 4 to 7.5 linear ft. of hole per hour. For use in narrow veins, or other confined workings underground, several extremely small and light compressed air drills have been introduced, as, for example, the Franke and Wonder, the first of which weighs complete only 16 lb., and the second 18 lb. These drills are held in the hands of the miner in the required position, and strike a rapid succession of light blows. A large number of mechanical drills operated by hand power have been invented. Some imitate hand-drilling in the mode of delivering the blow; in others the drill-bit is caused to reciprocate by means of combinations of crank and spring. None of these machines is entirely satisfactory, and but few are in use.

Among percussion rock-drills operated by electricity are the Bladray, Box, Durkee, Marvin and Siemens-Halske. The Marvin drill works with a solenoid; most of the others have crank and spring movements for producing the reciprocations of the piston. Power is furnished by a small electric motor, either mounted on the machine itself, as with the Box drill, or more often standing on the ground and transmitting its power through a flexible shaft. Although rather frequently used, electric percussion drills cannot yet be considered entirely successful, at least for mine service, in competition with compressed air machines. Another type of electric drill, however, has been successfully used in collieries, viz. rotary auger drills, mounted on light columns and driven through gearing by diminutive motors. These are intended for boring in coal, slate or other similar soft material. Hand augers resembling a carpenter’s brace and bit are also often used in collieries.

Whatever may be the method of drilling, after the hole has been completed to the depth required, it is finally cleaned out by a scraper or swab; or, when compressed air drills are used, by a jet of air directed into the hole by a short piece of pipe connected through a flexible hose with the compressed air supply pipe. The hole is then ready for the charge.

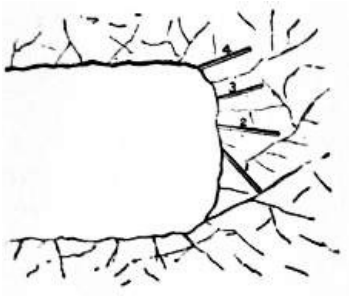


FIG. 7.

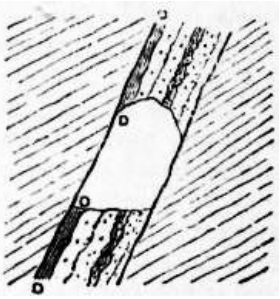


FIG. 8.

Location and Arrangement of Holes.—For hand drilling in mining the position of the holes is determined largely by the character and shape of the face of rock to be blasted. The miner observes the joints and cracks of the rock, placing the holes to take advantage of them and so obtain the best result from the blast. In driving a tunnel or drift, as in figs. 7 and 8, the rock joints can be made of material assistance by beginning with hole No. 1 and following in succession by Nos. 2, 3 and 4. Frequently the ore, or vein matter, is separated from the wall-rock by a thin, soft layer of clay (D, D, fig. 8). This would act almost as a free face, and the first holes of the round would be directed at an angle towards it, for blasting out a wedge; after which the positions of the other holes would be chosen.

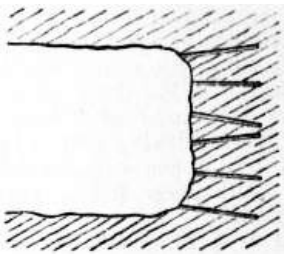


FIG. 9.

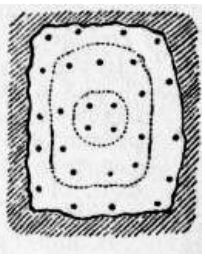


FIG. 10.

When machine drills are employed, less attention is given to natural cracks or joints, chiefly because when the drill is once set up several holes at different angles can be drilled in succession by merely swinging the cylinder of the machine into a new position with respect to its mounting. According to one method, the holes are placed with some degree of symmetry, in roughly concentric rings, as shown by figs. 9 and 10. The centre holes are blasted first, and are followed by the others in one or more volleys as indicated by the dotted lines. Another method is the “centre cut,” in which the holes are drilled in parallel rows on each side of the centre line of the tunnel, drift or shaft. Those in the two rows nearest the middle are directed towards each other, and enclose a prism of rock, which is first blasted put by heavy charges, after which the rows of side holes will break with relatively light charges.

Explosives.—A great variety of explosives are in use for blasting purposes. Up to 1864, gunpowder was the only available explosive, but in that year Alfred Nobel first applied nitroglycerin for blasting, and in 1867 invented dynamite. This name was originally applied to his mixture of nitroglycerin with kieselguhr, but now includes also other mechanical mixtures or chemical compounds which develop a high explosive force as compared with gunpowder. Besides these there are the so-called flameless or safety explosives, used in collieries where inflammable gases are given off from the coal.

Gunpowder, or black powder, is seldom used for rock-blasting, except in quarrying building-stone, where slow explosives of relatively low power are desirable to avoid shattering the stone, and in such collieries as do not require the use of safety explosives. Gunpowder is exploded by deflagration, by means of a fuze, and exerts a comparatively slow and rending force. The high explosives, on the other hand, are exploded by detonation, through the agency of a fuze and fulminating cap, exerting a quick, shattering, rather than a rending force. Dynamites and flameless explosives are made in a variety of strengths, and are packed in waterproofed cartridges of different sizes. The grades of dynamite most commonly employed contain from 35 to 60% of nitroglycerin; the stronger are used for tough rock or deep holes, or for holes unfavourably placed in narrow mine workings, as sometimes in shaft-sinking or tunnelling. When of good quality high explosives are safer to handle than gunpowder, as they cannot be ignited by sparks and are not so easily exploded. The ordinary dynamites used in mining are about four times as powerful as gunpowder.

Nitroglycerin in its liquid form is now rarely used for blasting, partly because its full

strength is not often necessary but chiefly because of the difficulty and danger of transporting, handling and charging it. If employed at all, it is charged in thin tinned plate cases or rubber-cloth cartridges.

Blasting with Black Powder.—The powder is coarse-grained, usually from ⅛ to 3/16 in. in size, and is charged in paper cartridges, 8 to 10 in. long and of a proper diameter to fit loosely in the drill hole. A piece of fuze, long enough to reach a little beyond the mouth of the hole, is inserted in the cartridge and tied fast. For wet holes paraffined paper is used, the miner waterproofing the joints with grease. When more than one cartridge is required for the blast, that which has the fuze attached is usually charged last. The cartridges are carefully rammed down by a wooden tamping bar and the remainder of the hole filled with tamping. This consists of finely broken rock, dry clay or other comminuted material, carefully compacted by the tamping bar on top of the charge. The fuze is a cord, having in the centre a core of gunpowder, enclosed in several layers of linen or hemp waterproofed covering. It is ignited by the miner's candle or lamp, or by a candle end so placed at the mouth of the hole that the flame must burn its way through the fuze covering. As the fuze burns slowly, at the rate of 2 or 3 ft. per minute, the miner uses a sufficient length to allow him to reach a place of safety.

For blasting in coal, "squibs" instead of fuzes are often used. A squib is simply a tiny paper rocket, about ⅛ in. diameter by 3 in. long, containing fine gunpowder and having a sulphur slow-match at one end. It is fired into the charge through a channel in the tamping. This channel may be formed by a piece of ¼ in. gas pipe, tamped in the hole and reaching the charge; or a "needle," a long taper iron rod, is laid longitudinally in the hole, with its point entering the charge, and after the tamping is finished, by carefully withdrawing the needle a little channel is left, through which the squib is fired. In this connexion it may be noted that for breaking ground in gassy collieries several substitutes for explosives have been used to a limited extent, *e.g.* plugs of dry wood driven tightly into a row of drill holes, and which on being wetted swell and split the coal; quicklime cartridges, which expand powerfully on the application of water; simple wedges, driven by hammer into the drill holes; multiple wedges, inserted in the holes and operated by hydraulic pressure from a small hand force-pump.

Blasting with High Explosives.—High explosives are fired either by ordinary fuze and detonating cap or by electric fuze. Detonating caps of ordinary strength contain 10 to 15 grains of fulminating mixture. The cap is crimped tight on the end of the fuze, embedded in the cartridge, and on being exploded by fire from the fuze detonates the charge. The number of cartridges charged depends on the depth of hole, the length of the line of least resistance, and the toughness and other characteristics of the rock. Each cartridge should be solidly tamped, and, to avoid waste spaces in the hole, which would reduce the effect of the blast, it is customary to split the paper covering lengthwise with a knife. This allows the dynamite to spread under the pressure of the tamping bar. The cap is often placed in the cartridge preceding the last one charged, but it is better to insert it last, in a piece of cartridge called a "primer." Though the dynamites are not exploded by sparks, they should nevertheless always be handled carefully. It is not so essential to fill the hole completely and so thoroughly to compact the tamping, as in charging black powder, because of the greater rapidity and shattering force of the explosion of dynamite; tamping, however, should never be omitted, as it increases the efficiency of the blast. In exploding dynamite, strong caps, containing say 15 grains of fulminating powder, produce the best results. Weaker caps are not economical, as they do not produce complete detonation of the dynamite. This is specially true if the weather be cold. Dynamite then becomes less sensitive, and the cartridges should be gently warmed before charging, to a temperature of not more than 80° F. Poisonous fumes are often produced by the explosion of the nitroglycerin compounds. These are probably largely due to incomplete detonation, by which part of the nitroglycerin is vaporized or merely burned. This is most likely to occur when the dynamite is chilled, or of poor quality, or when the cap is too weak. There is generally but little inconvenience from the fumes, except in confined underground workings, where ventilation is imperfect.

Like nitroglycerin, the common dynamites freeze at a temperature of from 42° to 46° F. They are then comparatively safe, and so far as possible should be transported in the frozen state. At very low temperatures dynamite again becomes somewhat sensitive to shock. When it is frozen at ordinary temperatures even the strongest detonating caps fail to develop the full force. In thawing dynamite, care must be exercised. The fact that a small quantity will often burn quietly has led to the dangerously mistaken notion that mere heating will not cause explosion. It is chiefly a question of temperature. If the quantity ignited by flame be large enough to heat the entire mass to the detonating point (say 360° F.) before all is consumed, an explosion will result. Furthermore, dynamite, when even moderately heated, becomes extremely sensitive to shocks. There are several accepted modes of thawing dynamite: (1) In a water bath, the cartridges being placed in a vessel surrounded on the sides and bottom by warm water contained in a larger enclosing vessel. The warm water

may be renewed from time to time, or the water bath placed over a candle or small lamp, *not* on a stove. (2) In two vessels, similar to the above, with the space between them occupied by air, provided the heat applied can be definitely limited, as by using a candle. (3) When large quantities of dynamite are used a supply may be kept on shelves in a wooden room or chamber, warmed by a stove, or by a coil of pipe heated by exhaust steam from an engine. Live steam should not be used, as the heat might become excessive. Thawing should always take place slowly, never before an open fire or by direct contact with a stove or steam pipes and care must be taken that the heat does not rise high enough to cause sweating or exudation of liquid nitroglycerin from the cartridges, which would be a source of danger.

For the storage of explosives at mines, &c., proper magazines must be provided, situated in a safe place, not too near other buildings, and preferably of light though fireproof construction. Masonry magazines, though safer from some points of view, may be the cause of greater damage in event of an explosion, because the brick or stones act as projectiles. Isolated and abandoned mine workings, if dry, are sometimes used as magazines.

Firing blasts by electricity has a wide application for both surface and underground work. An electrical fuze (fig. 11) consists of a pair of fine, insulated copper wires, several feet long and about ¼₀ of an inch in diameter, with their bare ends inserted in a detonating cap. For firing, the fuze wires are joined to long leading wires, connected with some source of electric current. By joining the fuze wires in series or in groups, any number of holes may be fired simultaneously, according to the current available. A round of holes fired in this way, as for driving tunnels, sinking shafts, or in large surface excavations, produces better results, both in economy of explosive and effect of the blast, than when the holes are fired singly or in succession. Also, the miners are enabled to prepare for the blast with more care and deliberation, and then to reach a place of safety before the current is transmitted. Another advantage is that there is no danger of a hole “hanging fire,” which sometimes causes accidents in using ordinary fuzes.

Fig 11. Electrical Fuze.

Hanging fire may be due to a cut, broken or damaged powder fuze, which may smoulder for some time before communicating fire to the charge. “Miss-fires,” which also are of not infrequent occurrence with both ordinary and electric fuzes, are cases where explosion from any cause fails to take place. After waiting a sufficient length of time before approaching the charged hole, the miner carefully removes the tamping down to within a few inches of the explosives and inserts and fires another cartridge, the concussion usually detonating the entire charge. Sometimes another hole is drilled near the one which has missed. No attempt to remove the old charge should ever be made.

High tension electricity, generated by a frictional machine, provided with a condenser, was formerly much used for blasting. The bare ends of the fuze wires in the detonating cap are placed say ⅛ in. apart, leaving a gap across which a spark is discharged, passing through a priming charge of some sensitive composition. The priming is not only combustible but also a conductor of electricity, such as an intimate mixture of potassium chlorate with copper sulphide and phosphide. By the combustion of the priming the fulminate mixture in the cap is detonated. As these fuzes are more apt to deteriorate when exposed to dampness than fuzes for low-tension current, and the generating machine is rather clumsy and fragile, low-tension current is more generally employed. It may be generated by a small, portable dynamo, operated by hand, or may be derived from a battery or from any convenient electric circuit. The ends of the fuze wires in the detonating cap are connected by a fine platinum filament (fig. 11), embedded in a guncotton priming on top of the fulminating mixture, and explosion results from the heat generated by the resistance opposed to the passage of the current through the filament. Blasting machines are made in several sizes, the smaller ones being capable of firing simultaneously from ten to twenty holes. The fuzes must obviously be of uniform electrical resistance, to ensure that all the connected charges will explode simultaneously. The premature explosion of any one of the fuzes would break the circuit.

In the actual operations of blasting, definite rules for the proportioning of the charges are rarely observed, and although the blasts made by a skilful miner seldom fail to do their work, it is a common fault that too much, rather than too little, explosive is used. The high explosives are specially liable to be wasted, probably through lack of appreciation of their power as compared with that of black powder. Among the indications of excessive charges are the production of much finely broken rock or of crushed and splintered rock around the bottom of the hole, and excessive displacement or projection of the rock broken by the blast. In beginning any new piece of work, such waste may be avoided or reduced by making trial shots with different charges and depths of hole, and noting the results; also by letting contracts under which the workmen pay for the explosive. In surface rock excavation the

location and determination of the depth of the holes and the quantity of explosive used, are occasionally put in charge of one or more skilled men, who direct the work and are responsible for the results obtained.

Blasting in surface excavations and quarries is sometimes done on an immense scale—called "mammoth blasting." Shafts are sunk, or tunnels driven, in the mass of rock to be blasted, and, connected with them, a number of chambers are excavated to receive the charges of explosive. The preparation for such blasts may occupy months, and many tons of gunpowder or dynamite are at times exploded simultaneously, breaking or dislodging thousands, or even hundreds of thousands, of tons of rock. This method is adopted for getting stone cheaply, as for building macadamized roads, dams and breakwaters, obtaining limestone for blast furnace flux, and occasionally in excavating large railway cuttings. It is also applied in submarine blasting for the removal of reefs obstructing navigation, and sometimes for loosening extensive banks of partly cemented gold-bearing gravel, preparatory to washing by hydraulic mining.

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(R. P.*)

BLAUBEUREN, a town of Germany, in the kingdom of Württemberg, 12 m. W. of Ulm, with which it is connected by railway. Pop. (1900) 3114. It is romantically situated in a wild and deep valley of the Swabian Alps at an altitude of 1600 ft. and is partly surrounded by ancient walls. Of the three churches (two Evangelical and one Roman Catholic) the most remarkable is the abbey church (*Klosterkirche*), a late Gothic building dating from 1465-1496, the choir of which contains beautiful 15th century carved choir-stalls and a fine high altar with a triptych (1496). The choir only is used for service (Protestant), the nave being used as a gymnasium. The town church (*Stadtkirche*) also has a fine altar with triptych. The Benedictine abbey, founded in 1095, was used after the Reformation as a school, and is now an Evangelical theological seminary. There are two hospitals in the town.

BLAVATSKY, HELENA PETROVNA (1831-1891), Russian theosophist, was born at Ekaterinoslav, on the 31st of July (O.S.) 1831, the daughter of Colonel Peter Hahn, a member of a Mecklenburg family, settled in Russia. She married in her seventeenth year a man very much her senior, Nicephore Blavatsky, a Russian official in Caucasia, from whom she was separated after a few months; in later days, when seeking to invest herself with a halo of virginity, she described the marriage as a nominal one. During the next twenty years Mme Blavatsky appears to have travelled widely in Canada, Texas, Mexico and India, with two attempts on Tibet. In one of these she seems to have crossed the frontier alone in

disguise, been lost in the desert, and, after many adventures, been conducted back by a party of horsemen. The years from 1848 to 1858 were alluded to subsequently as “the veiled period” of her life, and she spoke vaguely of a seven years’ sojourn in “Little and Great Tibet,” or preferably of a “Himalayan retreat.” In 1858 she revisited Russia, where she created a sensation as a spiritualistic medium. About 1870 she acquired prominence among the spiritualists of the United States, where she lived for six years, becoming a naturalized citizen. Her leisure was occupied with the study of occult and kabbalistic literature, to which she soon added that of the sacred writings of India, through the medium of translations. In 1875 she conceived the plan of combining the spiritualistic “control” with the Buddhistic legends about Tibetan sages. Henceforth she determined to exclude all control save that of two Tibetan adepts or “mahatmas.” The mahatmas exhibited their “astral bodies” to her, “precipitated” messages which reached her from the confines of Tibet in an instant of time, supplied her with sound doctrine, and incited her to perform tricks for the conversion of sceptics. At New York, on the 17th of November 1875, with the aid of Colonel Henry S. Olcott, she founded the “Theosophical Society” with the object of (1) forming a universal brotherhood of man, (2) studying and making known the ancient religions, philosophies and sciences, (3) investigating the laws of nature and developing the divine powers latent in man. The Brahmanic and Buddhistic literature supplied the society with its terminology, and its doctrines were a curious amalgam of Egyptian, kabbalistic, occultist, Indian and modern spiritualistic ideas and formulas. Mme Blavatsky’s principal books were *Isis Unveiled* (New York, 1877), *The Secret Doctrine, the Synthesis of Science, Religion and Philosophy* (1888), *The Key to Theosophy* (1891). The two first of these are a mosaic of unacknowledged quotations from such books as K.R.H. Mackenzie’s *Royal Masonic Encyclopaedia*, C.W. King’s *Gnostics*, Zeller’s *Plato*, the works on magic by Dunlop, E. Salverte, Joseph Ennemoser, and Des Mousseaux, and the mystical writings of Eliphas Levi (L.A. Constant). *A Glossary of Theosophical Terms* (1890-1892) was compiled for the benefit of her disciples. But the appearance of Home’s *Lights and Shadows of Spiritualism* (1877) had a prejudicial effect upon the propaganda, and Heliona P. Blavatsky (as she began to style herself) retired to India. Thence she contributed some clever papers, “From the Caves and Jungles of Hindostan” (published separately in English, London, 1892) to the *Russky Vyestnik*. Defeated in her object of obtaining employment in the Russian secret service, she resumed her efforts to gain converts to theosophy. For this purpose the exhibition of “physical phenomena” was found necessary. Her jugglery was cleverly conceived, but on three occasions was exposed in the most conclusive manner. Nevertheless, her cleverness, volubility, energy and will-power enabled her to maintain her ground, and when she died on the 8th of May 1891 (White Lotus Day), at the theosophical headquarters in the Avenue Road, London, she was the acknowledged head of a community numbering not far short of 100,000, with journalistic organs in London, Paris, New York and Madras.

Much information respecting her will be found in V.S. Solovyov’s *Modern Priestess of Isis*, translated by Walter Leaf (1895), in Arthur Lillie’s *Madame Blavatsky and Her Theosophy* (1895), and in the report made to the Society for Psychical Research by the Cambridge graduate despatched to investigate her doings in India. See also the article THEOSOPHY.

BLAYDES, FREDERICK HENRY MARVELL (1818-1908), English classical scholar, was born at Hampton Court Green, on the 29th of September 1818, being a collateral descendant of Andrew Marvell, the satirist and friend of Milton. He was educated at St Peter’s school, York, and Christ Church, Oxford. He was Hertford scholar in 1838, took a second class in literae humaniores in 1840, and was subsequently elected to a studentship at Christ Church. In 1842 he took orders, and from 1843 to 1886 was vicar of Harringworth in Northamptonshire. During a long life he devoted himself almost entirely to the study of the Greek dramatists. His editions and philological papers are remarkable for bold conjectural emendations of corrupt (and other) passages. His distinction was recognized by his being made an honorary LL.D. of Dublin, Ph.D. of the university of Buda Pest and a fellow of the royal society of letters at Athens. He died at Southsea on the 7th of September 1908.

His works include:—Aristophanes: *Comedies and Fragments*, with critical notes and commentary (1880-1893); *Clouds, Knights, Frogs, Wasps* (1873-1878); *Opera Omnia*, with critical notes (1886); Sophocles; *Oedipus Coloneus, Oedipus Tyrannus* and *Antigone* (in the Bibliotheca Classica, 1859); *Philoctetes* (1870), *Trachiniae* (1871), *Electra* (1873), *Ajax* (1875), *Antigone* (1005); Aeschylus: *Agamemnon* (1898), *Choephori* (1899), *Eumenides*

(1900), *Adversaria Critica in Comicorum Graecorum Fragmenta* (1890); *in Tragicorum Graec. Frag.* (1894), *in Aeschylum* (1895), *in Varios Poetas Graecos et Latinos* (1898), *in Aristophanem* (1899), *in Sophoclem* (1899), *in Euripidem* (1901), *in Herodotum* (1901); *Analecta Comica Graeca* (1905); *Analecta Tragica Graeca* (1906).

BLAYDON, an urban district in the Chester-le-Street parliamentary division of Durham, England, on the Tyne, 4 m. W. of Newcastle by a branch of the North-Eastern railway. Pop. (1881) 10,687; (1901) 19,617. The chief industries are coal-mining, iron-founding, pipe, fire-brick, chemical manure and bottle manufactures. In the vicinity is the beautiful old mansion of Stella, and below it Stellaheugh, to which the victorious Scottish army crossed from Newburn on the Northumberland bank in 1640, after which they occupied Newcastle.

BLAYE-ET-STE LUCE, a town of south-western France, capital of an arrondissement in the department of Gironde, on the right bank of the Gironde (here over 2 m. wide), 35 m. N. of Bordeaux by rail. Pop. (1906) of the town, 3423; of the commune, 4890. The town has a citadel built by Vauban on a rock beside the river, and embracing in its enceinte ruins of an old Gothic château. The latter contains the tomb of Caribert, king of Toulouse, and son of Clotaire II. Blaye is also defended by the Fort Pâté on an island in the river and the Fort Médoc on its left bank, both of the 17th century. The town is the seat of a sub-prefect, and has tribunals of first instance and of commerce and a communal college. It has a small river-port, and carries on trade in wine, brandy, grain, fruit and timber. The industries include the building of small vessels, distilling, flour-milling, and the manufacture of oil and candles. Fine red wine is produced in the district.

In ancient times Blaye (*Blavia*) was a port of the Santones. Tradition states that the hero Roland was buried in its basilica, which was on the site of the citadel. It was early an important stronghold which played an important part in the wars against the English and the Religious Wars. The duchess of Berry was imprisoned in its fortress in 1832-1833.

BLAZE (A.-S. *blaese*, a torch), a fire or bright flame; more nearly akin to the Ger. *blass*, pale or shining white, is the use of the word for the white mark on the face of a horse or cow, and the American use for a mark made on a tree by cutting off a piece of the bark. The word “to blaze,” in the sense of to noise abroad, comes from the A.-S. *blaesan*, to blow, cf. the Ger. *blasen*; in sense, if not in origin, it is confused with “blazon” in heraldry.

BLAZON, a heraldic shield, a coat of arms properly “described” according to the rules of heraldry, hence a proper heraldic description of such a coat. The O. Fr. *blason* seems originally to have meant simply a shield as a means of defence and not a shield-shaped surface for the display of armorial bearings, but this is difficult to reconcile with the generally accepted derivation from the Ger. *blasen*, to blow, proclaim, English “blaze,” to noise abroad, to declare. In the 16th century the heraldic term, and “blaze” and “blazon” in the sense of proclaim, had much influence on each other.

BLEACHING, the process of whitening or depriving objects of colour, an operation incessantly in activity in nature by the influence of light, air and moisture. The art of bleaching, of which we have here to treat, consists in inducing the rapid operation of whitening agencies, and as an industry it is mostly directed to cotton, linen, silk, wool and other textile fibres, but it is also applied to the whitening of paper-pulp, bees'-wax and some oils and other substances. The term bleaching is derived from the A.-S. *blaecan*, to bleach, or to fade, from which also comes the cognate German word *bleichen*, to whiten or render pale. Bleachers, down to the end of the 18th century, were known in England as "whitsters," a name obviously derived from the nature of their calling.

The operation of bleaching must from its very nature be of the same antiquity as the work of washing textures of linen, cotton or other vegetable fibres. Clothing repeatedly washed, and exposed in the open air to dry, gradually assumes a whiter and whiter hue, and our ancestors cannot have failed to notice and take advantage of this fact. Scarcely anything is known with certainty of the art of bleaching as practised by the nations of antiquity. Egypt in early ages was the great centre of textile manufactures, and her white and coloured linens were in high repute among contemporary nations. As a uniformly well-bleached basis is necessary for the production of a satisfactory dye on cloth, it may be assumed that the Egyptians were fairly proficient in bleaching, and that still more so were the Phoenicians with their brilliant and famous purple dyes. We learn, from Pliny, that different plants, and likewise the ashes of plants, which no doubt contained alkali, were employed as detergents. He mentions particularly the *Struthium* as much used for bleaching in Greece, a plant which has been identified by some with *Gypsophila Struthium*. But as it does not appear from John Sibthorp's *Flora Graeca*, edited by Sir James Smith, that this species is a native of Greece, Dr Sibthorp's conjecture that the *Struthium* of the ancients was the *Saponaria officinalis*, a plant common in Greece, is certainly more probable.

In modern times, down to the middle of the 18th century, the Dutch possessed almost a monopoly of the bleaching trade although we find mention of bleach-works at Southwark near London as early as the middle of the 17th century. It was customary to send all the brown linen, then largely manufactured in Scotland, to Holland to be bleached. It was sent away in the month of March, and not returned till the end of October, being thus out of the hands of the merchant more than half a year.

The Dutch mode of bleaching, which was mostly conducted in the neighbourhood of Haarlem, was to steep the linen first in a waste lye, and then for about a week in a potash lye poured over it boiling hot. The cloth being taken out of this lye and washed, was next put into wooden vessels containing buttermilk, in which it lay under a pressure for five or six days. After this it was spread upon the grass, and kept wet for several months, exposed to the sunshine of summer.

In 1728 James Adair from Belfast proposed to the Scottish Board of Manufactures to establish a bleachfield in Galloway; this proposal the board approved of, and in the same year resolved to devote £2000 as premiums for the establishment of bleachfields throughout the country. In 1732 a method of bleaching with kelp, introduced by R. Holden, also from Ireland, was submitted to the board; and with their assistance Holden established a bleachfield for prosecuting his process at Pitkerro, near Dundee.

The bleaching process, as at that time performed, was very tedious, occupying a complete summer. It consisted in steeping the cloth in alkaline lyes for several days, washing it clean, and spreading it upon the grass for some weeks. The steeping in alkaline lyes, called *bucking*, and the bleaching on the grass, called *crofting*, were repeated alternately for five or six times. The cloth was then steeped for some days in sour milk, washed clean and crofted. These processes were repeated, diminishing every time the strength of the alkaline lye, till the linen had acquired the requisite whiteness.

For the first improvement in this tedious process, which was faithfully copied from the Dutch bleachfields, manufacturers were indebted to Dr Francis Home of Edinburgh, to whom the Board of Trustees paid £100 for his experiments in bleaching. He proposed to substitute water acidulated with sulphuric acid for the sour milk previously employed, a suggestion made in consequence of the new mode of preparing sulphuric acid, contrived some time before by Dr John Roebuck, which reduced the price of that acid to less than one-third of what it had formerly been. When this change was first adopted by the bleachers, there was the same outcry against its corrosive effects as arose when chlorine was substituted for crofting. A great advantage was found to result from the use of sulphuric acid, which was that a souring with sulphuric acid required at the longest only twenty-four hours, and often not more than twelve; whereas, when sour milk was employed, six weeks,

or even two months, were requisite, according to the state of the weather. In consequence of this improvement, the process of bleaching was shortened from eight months to four, which enabled the merchant to dispose of his goods so much the sooner, and consequently to trade with less capital.

No further modification of consequence was introduced in the art till the year 1787, when a most important change was initiated by the use of chlorine (*q.v.*), an element which had been discovered by C.W. Scheele in Sweden about thirteen years before. The discovery that this gas possesses the property of destroying vegetable colours, led Berthollet to suspect that it might be introduced with advantage into the art of bleaching, and that it would enable practical bleachers greatly to shorten their processes. In a paper on chlorine or oxygenated muriatic acid, read before the Academy of Sciences at Paris in April 1785, and published in the *Journal de Physique* for May of the same year (vol. xxvi. p. 325), he mentions that he had tried the effect of the gas in bleaching cloth, and found that it answered perfectly. This idea is still further developed in a paper on the same substance, published in the *Journal de Physique* for 1786. In 1786 he exhibited the experiment to James Watt, who, immediately upon his return to England, commenced a practical examination of the subject, and was accordingly the person who first introduced the new method of bleaching into Great Britain. We find from Watt's own testimony that chlorine was practically employed in the bleachfield of his father-in-law, Mr Macgregor, in the neighbourhood of Glasgow, in March 1787. Shortly thereafter the method was introduced at Aberdeen by Messrs Gordon, Barron & Co., on information received from De Saussure through Professor Patrick Copland of Aberdeen. Thomas Henry of Manchester was the first to bleach with chlorine in the Lancashire district, and to his independent investigations several of the early improvements in the application of the material were due.

In these early experiments, the bleacher had to make his own chlorine and the goods were bleached either by exposing them in chambers to the action of the gas or by steeping them in its aqueous solution. If we consider the inconveniences which must have arisen in working with such a pungent substance as free chlorine, with its detrimental effect on the health of the work-people, it will be readily understood that the process did not at first meet with any great amount of success. The first important improvement was the introduction in 1792 of *eau de Javel*, which was prepared at the Javel works near Paris by absorbing chlorine in a solution of potash (1 part) in water (8 parts) until effervescence began. The greatest impetus to the bleaching industry was, however, given by the introduction in 1799 of chloride of lime, or bleaching-powder, by Charles Tennant of Glasgow, whereby the bleacher was supplied with a reagent in solid form which contained up to one-third of its weight of available chlorine. Latterly frequent attempts have been made to replace bleaching-powder by hypochlorite of soda, which is prepared by the bleacher as required, by the electrolytic decomposition of a solution of common salt in specially constructed cells, but up to the present this mode of procedure has met with only a limited success (see Alkali Manufacture).

Bleaching of Cotton.

Cotton is bleached in the raw state, as yarn and in the piece. In the raw state, and as yarn, the only impurities present are those which are naturally contained in the fibres and which include cotton wax, fatty acids, pectic substances, colouring matters, albuminoids and mineral matter, amounting in all to some 5% of the weight of the material. Both in the raw state and in the manufactured condition cotton also contains small black particles which adhere firmly to the material and are technically known as "motes." These consist of fragments of the cotton seed husk, which cannot be completely removed by mechanical means. The bleaching of cotton pieces is more complicated, since the bleacher is called upon to remove the sizing materials with which the manufacturer strengthens the warp before weaving (see below).

In principle, the bleaching of cotton is a comparatively simple process in which three main operations are involved, viz. (1) boiling with an alkali; (2) bleaching the organic colouring matters by means of a hypochlorite or some other oxidizing agent; (3) souring, *i.e.* treating with weak hydrochloric or sulphuric acid. For loose cotton and yarn these three operations are sufficient, but for piece goods a larger number of operations is usually necessary in order to obtain a satisfactory result.

Loose Cotton.—The bleaching of loose or raw cotton previous to spinning is only carried out to a very limited extent, and consists essentially in first steeping the material in a warm solution of soda for some hours, after which it is washed and treated with a solution of

bleaching powder or sodium hypochlorite. It is then again washed, soured with weak sulphuric or hydrochloric acid, and ultimately washed free from acid. Careful treatment is necessary in order to avoid any undue matting of the fibres, while any drastic treatment, such as heating with caustic soda and soap, as used for other cotton materials, cannot be employed, since the natural wax would thereby be removed, and this would detract from the spinning qualities of the fibre. In case the cotton is not intended to be spun, but is to serve for cotton wool or for the manufacture of gun cotton, more drastic treatment can be employed, and is, in fact, desirable. Thus, cotton waste is first extracted with petroleum spirit or some other suitable solvent, in order to remove any mineral oil or grease which may be present. It is then boiled with dilute caustic soda and resin soap, washed, bleached white with bleaching-powder, washed, soured and finally washed free from acid. In these operations, a certain amount of matting is unavoidable, and it is consequently necessary to open out the material after drying, in scutchers.

Cotton Yarn.—Cotton yarn is bleached in the form of cops, hanks or warps. In principle the processes employed are the same in each case, but the machinery necessarily differs. Most yarn is bleached in the hank, and it will suffice to give an account of this process only. The sequence of operations is the same as in the bleaching of cotton waste, and these can be conducted for small lots in an ordinary rectangular wooden vat as used in dyeing, in which the yarn is suspended in the liquor from poles which rest with their ends on the two longer sides of the vat. For bleaching yarn in bulk, however, this mode of procedure would involve so much manual labour that the process would become too expensive. It is, therefore, mainly with the object of economy that machinery has been introduced, by means of which large quantities can be dealt with at a time.

The first operation, viz. that of boiling in alkali, is carried out in a “kier,” a large, egg-ended, upright cylindrical vessel, constructed of boiler-plate and capable of treating from one to three tons of yarn at a time. In construction, the kiers used for yarn bleaching are similar in construction to those used for pieces (see below). The yarn to be bleached is evenly packed in the kier, and is then boiled by means of steam with the alkaline lye (3-4% of soda ash or 2% caustic soda on the weight of the cotton being usually employed) for periods varying from six to twelve hours. It is essential that a thorough circulation of the liquor should be maintained during the boiling, and this is effected either by means of a steam injector, or in other ways. As a rule low pressure kiers (working up to 10 lb pressure) are employed for yarn bleaching, though some bleachers prefer to use high pressure kiers for the purpose.

When the boiling has continued for the requisite time (6-8 hours), the steam is shut off, and the kier liquor blown off, when the yarn is washed in the kier by filling the latter with water and then running off, this operation being repeated two or three times. The hanks are now transferred to a stone cistern provided with a false bottom, from beneath which a pipe connects the cistern with a well situated below the floor line. The well contains a solution of bleaching-powder, usually of 2° Tw. strength, and this is drawn up by means of a centrifugal brass pump and showered over the top of the goods through a perforated wooden tray, passing then by gravitation through the goods back into the well. The circulation is maintained for one and a half to two hours, when the yarn will be found to be white. The bleaching-powder solution is now allowed to drain off, and water is circulated through the cistern to wash out what bleaching powder remains in the goods. The souring is next carried out either in the same or in a separate cistern by circulating hydrochloric or sulphuric acid of 2° Tw. for about half an hour. This is also allowed to drain, and the yarn is thoroughly washed to remove all acid, when it is taken out and wrung or hydroextracted. At this stage the yarn may be dyed in light or bright shades without further treatment, but if it is to be sold as white yarn, it is blued. The blueing may either be effected by dyeing or tinting with a colouring matter like Victoria blue 4R or acid violet, or by treatment in wash stocks with a suspension of ultramarine in weak soap until the colour is uniformly distributed throughout the material. The yarn is now straightened out and dried.

The bleaching of cotton yarn is a very straightforward process, and it is very seldom that either complications or faults arise, providing that reasonable care and supervision are exercised.

The *raison d’être* of the various operations is comparatively simple. The effect of boiling with alkali is to remove the pectic acid, the fatty acids, part of the cotton wax and the bulk of the colouring matter, while the albuminoids are destroyed and the motes swelled up. If soap be used along with the alkali, the whole of the wax is removed by emulsification. In the operation of bleaching proper, the calcium hypochlorite of the chloride of lime through coming into contact with the carbonic acid of the atmosphere suffers decomposition according to the equation, $Ca(OCl)_2 + CO_2 + H_2O \rightarrow CaCO_3 + 2HOCl$, and the hypochlorous acid thus liberated destroys the colouring matter still remaining from the first operation, by oxidation. At the same time the motes which were swelled up by the alkali are broken up into

small fragments and are thus removed. In the operation of souring, the lime which has been deposited on the fibres during the treatment with bleaching powder is dissolved, while at the same time any other metallic oxides (iron, copper, &c.) are removed.

Cotton Pieces.—By far the largest bulk of cotton is bleached in the piece, as it can be more conveniently and more economically dealt with in this form than in any other. Though similar in principle to yarn bleaching, the process of piece bleaching is somewhat more complex because the pieces contain in addition to the natural impurities of the cotton a considerable amount of foreign matter in the form of size which has been incorporated with the warp before weaving, with the object of strengthening it. This size consists essentially of starch (farina), with additions of tallow, zinc chloride, and occasionally other substances such as paraffin wax, magnesium chloride, soap, &c., all of which must be removed if a perfect bleach is to result. Besides, mineral oil stains from the machinery of the weaving-shed are of common occurrence in piece goods.

Cotton pieces are bleached either for whites, for prints or for dyed goods. The processes employed for these different classes vary but slightly and only in detail. The most drastic bleach is that required for goods which are subsequently to be printed. For dyed goods, the main object is not so much to obtain a perfect white as to remove any impurities which might interfere with the dyeing, while avoiding the formation of any oxycellulose. In bleaching for whites (“market bleaching”) it is essential that the white should be as perfect as possible, and such goods are consequently invariably blued after bleaching.

For small lots (1-20 pieces) the bleaching can be conducted on very simple machinery. Thus many small piece dyers conduct the whole of their bleaching on the jigger, a simple form of dyeing machine on which most cotton piece goods are dyed (see DYEING). For muslins, laces and other very light fabrics, which will not stand rough handling, the operations are conducted mainly by hand, washing being effected in the dash-wheel (fig. 1), which consists of a cylindrical box, revolving on its axis. It has four divisions, as shown by the dotted lines, and an opening into each division. A number of pieces are put into each, abundance of water is admitted behind, and the knocking of the pieces as they alternately dash from one side of the division to the other during the revolution of the wheel effects the washing. The process lasts from four to six minutes.

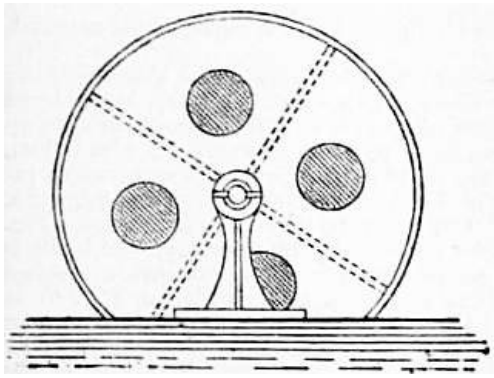

FIG. 1.—Section of a Dash-wheel.

For velveteens, corduroys, heavy drills, pocketings and other fabrics in which creasing has to be avoided as much as possible, the so-called “open bleach” is resorted to, which differs from the ordinary process chiefly in that the goods are treated throughout at full width.

The great bulk of cotton pieces is bleached in rope form, *i.e.* stitched together end to end and laterally collapsed, so that they will pass through a ring of 4 to 5 in. in diameter.

The first operation which the goods undergo on arriving in the grey-room of the bleachworks is that of stamping with tar or some other indelible material in order that they may be identified after passing through the whole process. They are then stitched together end to end by means of special sewing machines, the stitch being of such a nature (chain stitch) that the thread can be ripped out at one pull at the end of the operations.

Singeing.—In the condition in which the pieces leave the loom and come into the hands of the bleacher, the surface of the fabric is seen to be covered with a *nap* of projecting fibres which gives it a downy appearance. For some classes of goods this is not a disadvantage, but in the majority of cases, especially for prints where a clean surface is essential, the nap is removed before bleaching. This is usually effected by running the pieces at full width over a couple of arched copper plates heated to a full red heat by direct fire. An arrangement of the kind is shown in fig. 2, in which the singe-plates, *a* and *b*, are mounted over the flues of a coal fire. The plate *b* is most highly heated, *a* being at the end of the flue farthest removed from the fire. The cloth enters over a rail A, and in passing over the plate *a* is thoroughly dried and prepared for the singeing it receives when it comes to the highly-heated plate *b*. A block *d*, carrying two rails in the space between the plates, can be raised or lowered so as to increase or lessen the pressure of the cloth against the plates, or, if necessary, to lift it quite free of contact with them.

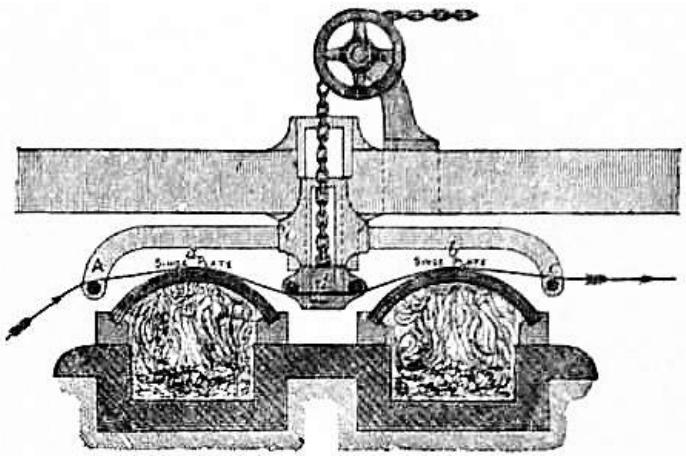

FIG. 2.—Section of Singe-stove.

The pieces on leaving the singeing machine are passed either through a water trough or through a steam box with the object of extinguishing sparks, and are then plaited down. The speed at which the pieces travel over the singe plates is necessarily considerable and varies with different classes of material.[1]

In lieu of plates, a cast-iron cylinder is sometimes employed ("roller singeing"), the heating being effected by causing the flame of the fire to be drawn through the roller, which is carried on two small rollers at each end and revolves slowly in the reverse direction to that followed by the piece, thus exposing continuously a freshly heated surface and avoiding uneven cooling.

For figured pieces which have an uneven surface, it is obvious that plate or roller singeing would only affect the portions which project most, leaving the rest untouched. For such goods, "gas singeing" is employed, which consists in running the pieces over a non-luminous gas flame, the breadth of which slightly exceeds that of the piece, or in drawing the flame right through the piece.[2] The construction of an ordinary gas singeing apparatus is seen in section in fig. 3. Coal gas mixed with air is sent under pressure through pipe *a* into the burners *b, b*, where the mixture burns with an intense heat. The cloth travels in the direction of the arrows, and in passing over the small nap rollers *c* comes into contact with the flame four times in succession before leaving the machine.

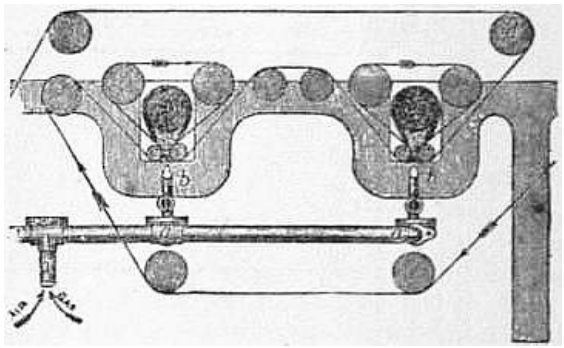

FIG. 3.—Gas Singeing Apparatus.

Gas singeing is also used for plain goods, and being cleaner and under better control has largely replaced plate singeing.

At this stage the goods which have been browned on the surface by singeing are ready for the bleaching operations. A great many innovations have been introduced in recent years in the bleaching of calico, but although it is generally admitted that in point of view of time and economy many of these processes offer considerable advantages, the old process, in which a lime boil precedes the other operations, is still the one which is most largely employed by bleachers in England. In this, the sequence of operations is the following—

Grey Washing.—This operation (which is sometimes omitted) simply consists in running the pieces through an ordinary washing machine (as shown in fig. 5) through water in order to wet them out. On leaving the machine they are piled in a heap and left over night, when fermentation sets in, which results in the starch being to a large extent hydrolysed and rendered soluble in water.

Lime Boil.—In this operation, which is also known as *bowking* (Ger. *beuchen*), the pieces are first run through milk of lime contained in an ordinary washing machine and of such a strength that they take up about 4% of their weight of lime (CaO). They are then run over winches and guided through smooth porcelain rings ("pot-eyes") into the kier, where they are evenly packed by boys who enter the vessel through the manhole at the top. It is of the greatest importance that the goods should be evenly packed, for, if channels or loosely-packed places are left, the liquor circulating through the kier, when boiling is subsequently in progress, will follow the line of least resistance, and the result is an uneven treatment. Of the numerous forms of kier in use, the injector kier is the one most generally adopted. This

consists of an egg-ended cylindrical vessel constructed of stout boiler plate and shown in sectional elevation in fig. 4. The kier is from 10 to 12 ft. in height and from 6 to 7 ft. in diameter, and stands on three iron legs riveted to the sides, but not shown in the figure. The bottom exit pipe E is covered with a shield-shaped false bottom of boiler plate, or (and this is more usual) the whole bottom of the kier is covered with large rounded stones from the river bed, the object in either case being simply to provide space for the accumulation of liquor and to prevent the pipe E being blocked. The cloth is evenly packed up to within about 3 to 4 ft. of the manholes M, when lime water is run in through the liquor pipe until the level of the liquid reaches within about 2 ft. of the top of the goods. The manholes are now closed, and steam is turned on at the injector J by opening the valve *v*. The effect of this is to suck the liquor through E, and to force it up through pipe P into the top of the kier, where it dashes against the umbrella-shaped shield U and is distributed over the pieces, through which it percolates, until on arriving at E it is again carried to the top of the kier, a continuous circulation being thus effected. As the circulation proceeds, the steam condensing in the liquor rapidly heats the latter to the boil, and as soon as, in the opinion of the foreman, all air has been expelled, the blow-through tap is closed and the boiling is continued for periods varying from six to twelve hours under 20-60 lb. pressure. Steam is now turned off, and by opening the valve V the liquor, which is of a dark-brown colour, is forced out by the pressure of the steam it contains.

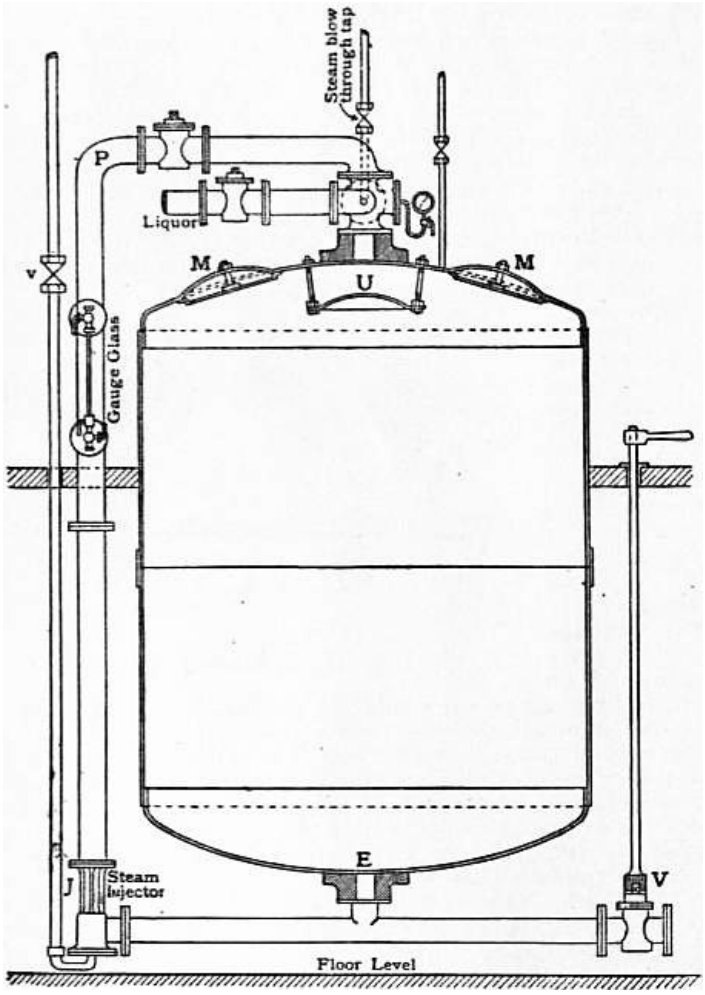

FIG 4.—High Pressure Blow-through Kier.

The pieces are now run through a continuous washing machine, which is provided with a plentiful supply of water. The machine, which is shown in fig. 5, consists essentially of a wooden vat, over which there is a pair of heavy wooden (sycamore) bowls or squeezers. The pieces enter the machine at each end, as indicated by the arrows, and pass rapidly through the bowls down to the bottom of the vat over a loose roller, thence between the first pair of guide pegs through the bowls again, and travel thus in a spiral direction until they arrive at the middle of the machine, when they leave at the side opposite to that on which they entered. The same type of machine is used for liming, chemicking, and souring.

The next operation is the “grey sour,” in which the goods are run through a washing machine containing hydrochloric acid of 2° Tw. strength, with the object of dissolving out the lime which the goods retain in considerable quantity after the lime boil. The goods are then well washed, and are now boiled again in the ash bowking kier, which is similar in construction to the lime kier, with soda ash (3%) and a solution of rosin (1½%) in caustic

soda (1¼%) for eight to ten hours. For white bleaching the rosin soap is omitted, soda ash alone being employed.

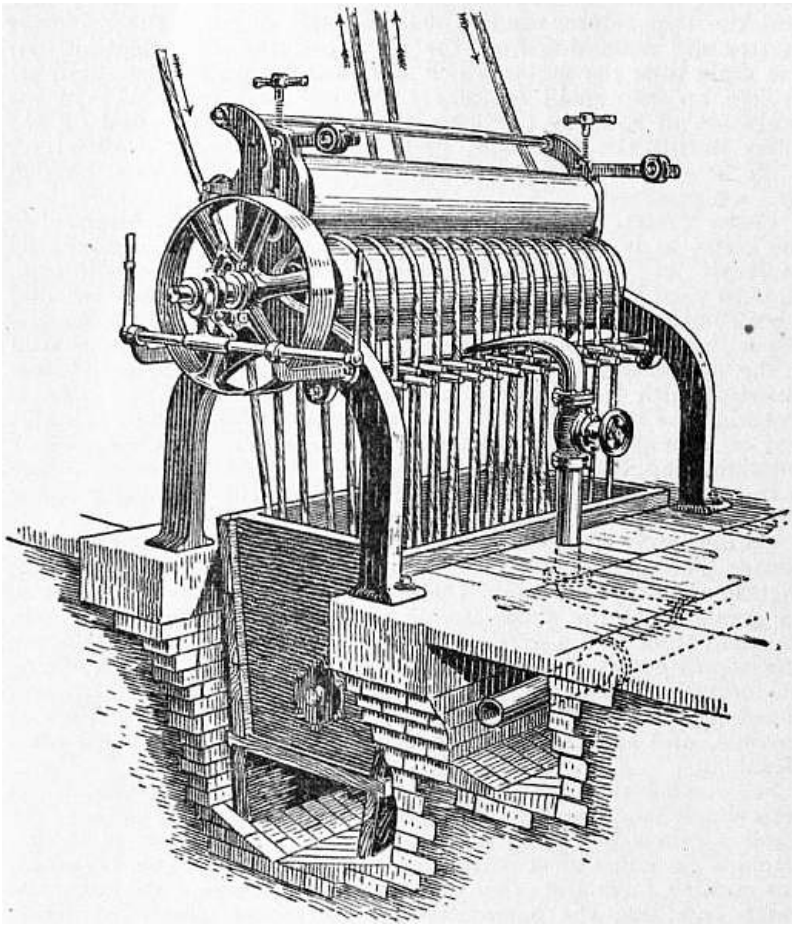

Fig 5.—Roller Washing Machine.

The pieces are now washed free from alkali and the bleaching proper or “chemicking” follows. This operation may be effected in various ways, but the most efficient is to run the goods in a washing machine through bleaching powder solution at ½°-1° Tw., and allow them to lie loosely piled over night, or in some cases for a longer period. They are now washed, run through dilute sulphuric or hydrochloric acid at 2° Tw. (“white sour”) and washed again. Should the white not appear satisfactory at this stage (and this is usually the case with very heavy or dense materials), they are boiled again in soda ash, chemicked with bleaching powder at ⅛° Tw. or even weaker, soured and washed. It is of the utmost importance that the final washing should be as thorough as possible, in order to completely remove the acid, for if only small quantities of the latter are left in the goods, they are liable to become tender in the subsequent drying, through formation of hydrocellulose.

The modern processes of bleaching cotton pieces differ from the one described above, chiefly in that the lime boil is entirely dispensed with, its place being taken by a treatment in the kier with caustic soda (or a mixture of caustic soda and soda ash) and resin soap. The best known and probably the most widely practised of these processes is one which was worked out by the late M. Horace Koechlin in conjunction with Sir William Mather, and this differs from the old process not only in the sequence of the operations but also in the construction of the kier. This consists of a horizontal egg-ended cylinder, and is shown in transverse and longitudinal sections in figs. 6 and 7. One of the ends E constitutes a door which can be raised or lowered by means of the power-driven chain C. The goods to be bleached are packed in wagons W outside the kier, and when filled these are pushed home into the kier, so that the pipes p fit with their flanges on to the fixed pipes at the bottom of the kier. The heating is effected by means of steam pipes at the lowest extremity of the kier, while the circulation of the liquor is brought about by means of the centrifugal pump P, which draws the liquor through the pipes p from beneath the false bottoms of the wagons and showers it over distributors D on to the goods. By this mode of working a considerable economy is effected in point of time, as the kier can be worked almost continuously; for as soon as one lot of goods has been boiled, the wagons are run out and two freshly-packed wagons take their place. The following is the sequence of operations:—The goods are first steeped over night in dilute sulphuric acid, after which they are washed and run through old kier liquor from a previous operation. They are then packed evenly in the wagons which are pushed into the kier, and, the door having been closed, they are boiled for about eight hours

at 7-15 lb pressure with a liquor containing soda ash, caustic soda, resin soap and a small quantity of sulphite of soda. The rest of the operations (chemicking, souring and washing) are the same as in the old process.

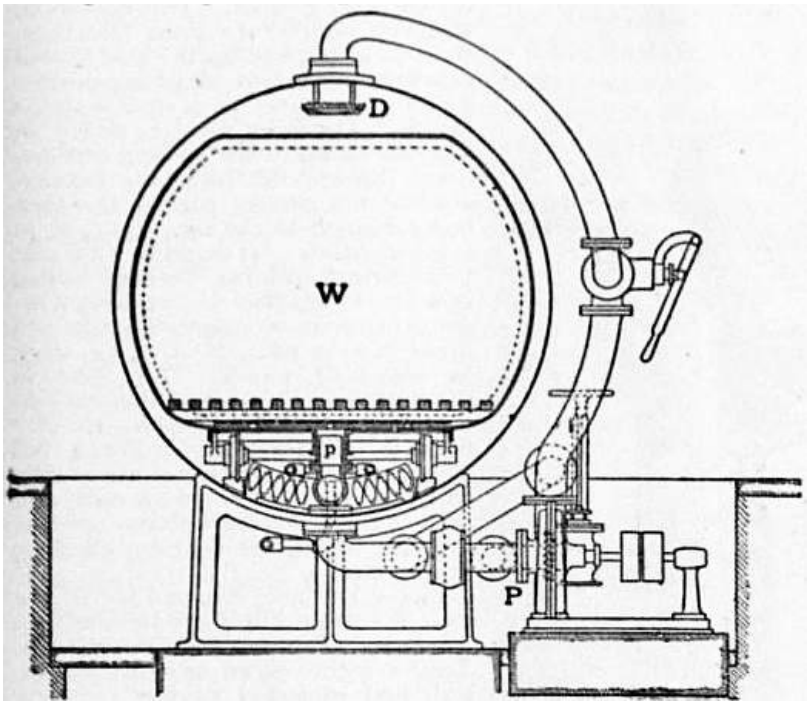

FIG. 6.—The Mather Kier, cross section.

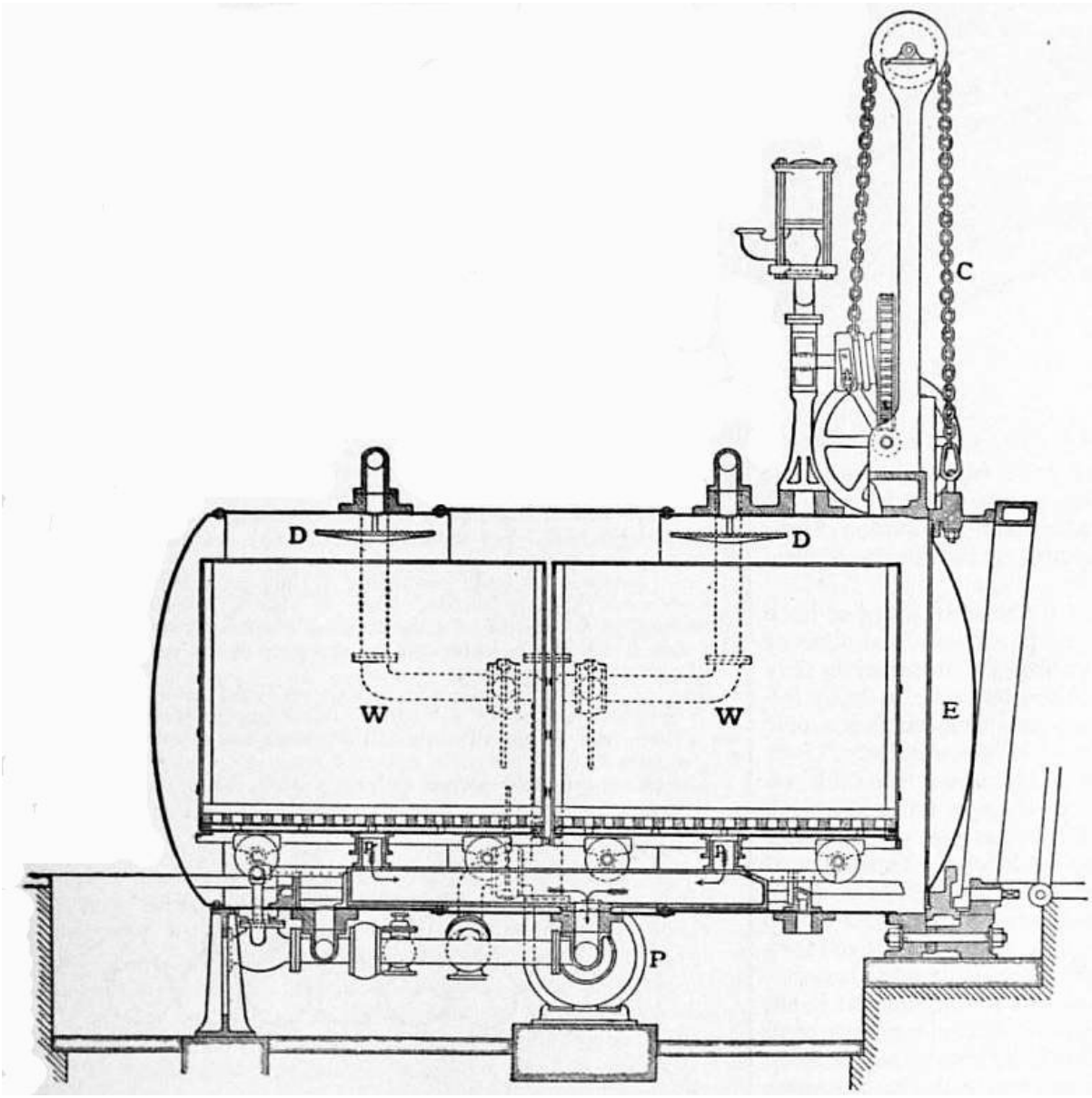

FIG. 7.—The Mather Kier, longitudinal section.

A somewhat different principle is involved in the Thies-Herzig process. In this the kier is vertical, and the circulation of the liquor is effected by means of a centrifugal or other form of pump, while the heating of the liquor is brought about outside the kier in a separate vessel between the pump and the kier by means of indirect steam. The sequence of operations is similar to that adopted in the Mather-Koechlin process, differing chiefly from the latter in the first operation, which consists in running the goods, after singeing, through very dilute boiling sulphuric or hydrochloric acid, containing in either case a small proportion of hydrofluoric acid, and then running them through a steam box, the whole operation lasting from twenty to sixty seconds.

Bleached by any of the above processes, the cloth is next passed over a mechanical contrivance known as a "scutcher," which opens it out from the rope form to its full breadth, and is then dried on a continuous drying machine. Fig. 8 shows the appearance and construction of an improved form of the horizontal drying machine, which is in more common use for piece goods than the vertical form. The machine consists essentially of a series of copper or tinned iron cylinders, which are geared together so as to run at a uniform speed. Steam at 10-15 lb pressure is admitted through the journalled bearings at one side of the machine, and the condensed water is forced out continuously through the bearings at the other side. The pieces pass in the direction of the arrow (fig. 9) over a scrimp rail or expanding roller round the first cylinder, then in a zigzag direction over all succeeding cylinders, and ultimately leave the machine dry, being mechanically plaited down at the other end.

If the bleaching process has been properly conducted, the pieces should not only show a uniform pure white colour, but their strength should remain unimpaired. Careful experiments conducted by the late Mr. Charles O'Neill showed in fact that carefully bleached cotton may actually be stronger than in the unbleached condition, and this result has since been corroborated by others. Excessive blueing, which is frequently resorted to in order to cover the defects of imperfect bleaching, can readily be detected by washing a sample of the material in water, or, better still, in water containing a little ammonia, and then comparing with the original. The formation of oxycellulose during the bleaching process may either take place in boiling under pressure with lime or caustic soda in consequence of the presence of air in the kier, or through excessive action of bleaching powder, which may either result from the latter not being properly dissolved or being used too strong. Its detection may be effected by dyeing a sample of the bleached cotton in a cold, very dilute solution of methylene blue for about ten minutes, when any portions of the fabric in which the cellulose has been converted into oxycellulose will assume a darker colour than the rest. The depth of the colour is at the same time an indication of the extent to which such conversion has taken place. Most bleached cotton contains some oxycellulose, but as long as the formation has not proceeded far enough to cause tendering, its presence is of no importance in white goods. If, on the other hand, the cotton has to be subsequently dyed with direct cotton colours (see DYEING), the presence of oxycellulose may result in uneven dyeing. Tendering of the pieces, due to insufficient washing after the final souring operation, is a common defect in bleached goods. As a rule the free acid can be detected by extracting the tendered material with distilled water and adding to the extract a drop of methyl orange solution, when the latter will turn pink if free acid be present. Other defects which may occur in bleached goods are iron stains, mineral oil stains, and defects due to the addition of paraffin wax in the size.

Bleaching of Linen.

The bleaching of linen is a much more complicated and tedious process than the bleaching of cotton. This is due in part to the fact that in linen the impurities amount to 20% or more of the weight of the fibre, whereas in cotton they do not usually exceed 5%. Furthermore these impurities, which include colouring matter, intracellular substances and a peculiar wax known as "flax wax," are more difficult to attack than those which are present in cotton, and the difficulty is still further enhanced in the case of piece goods owing to their dense or impervious character.

Till towards the end of the 18th century the bleaching of linen both in the north of Ireland and in Scotland was accomplished by bowking in cows' dung and souring with sour milk, the pieces being exposed to light on the grass between these operations for prolonged periods. Subsequently potash and later on soda was substituted for the cows' dung, while sour milk was replaced by sulphuric acid. This "natural bleach" is still in use in Holland, a higher price being paid for linen bleached in this way than for the same material bleached with the aid of bleaching powder. In the year 1744 Dr. James Ferguson of Belfast received a premium of

£300 from the Irish Linen Board for the application of lime in the bleaching of linen. Notwithstanding this reward, the use of lime in the bleaching of linen was for a long time afterwards forbidden in Ireland under statutory penalties, and so late as 1815 Mr Barklie, a respectable linen bleacher of Linen Vale, near Keady, was “prosecuted for using lime in the whitening of linens in his bleachyard.”

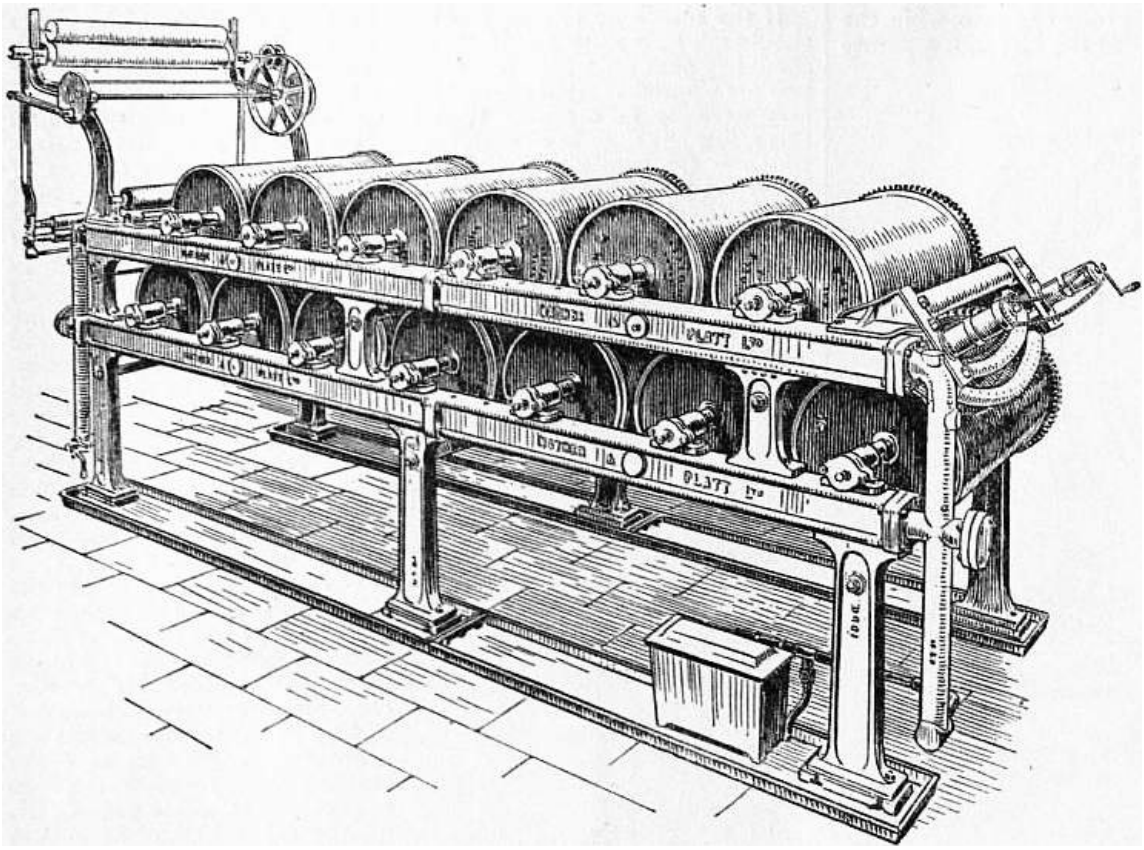

Fig. 8.—Mather & Platt’s Horizontal Drying Machine.

The methods at present employed for the bleaching of linen are, except in one or two unimportant particulars, the same as were used in the middle of the 19th century. In principle they resemble those used in cotton bleaching, but require to be frequently repeated, while an additional operation, which is a relic of the old-fashioned process, viz. that of “grassing” or “crofting,” is still essential for the production of the finest whites. Considerably more care has to be exercised in linen bleaching than is the case with cotton, and the process consequently necessitates a greater amount of manual labour. The practical result of this is that whereas cotton pieces can be bleached and finished in less than a week, linen pieces require at least six weeks. Many attempts have naturally been made to shorten and cheapen the process, but without success. The use of stronger reagents and more drastic treatment, which would at first suggest itself, incurs the risk of injury to the fibre, not so much in respect to actual tendering as to the destruction of its characteristic gloss, while if too drastic a treatment is employed at the beginning the colouring matter is liable to become set in the fibre, and it is then almost impossible to remove it. Among the many modern improvements which have been suggested, mention may be made of the use of hypochlorite of soda in place of bleaching powder, the use of oil in the first treatment in alkali (Cross & Parkes), while de Keukelaere suggests the use of sodium sulphide for this purpose. With the object of dispensing with the operation of grassing, which besides necessitating much manual labour is subject to the influences of the atmospheric conditions, Siemens & Halske of Berlin have suggested exposure of the goods in a chamber to the action of electrolytically prepared ozone. Jardin seeks to achieve the same object by steeping the linen in dilute nitric acid.

Since the qualities of linen which are submitted to the bleacher vary considerably, and the mode of treatment has to be varied accordingly, it is not possible to give more than a bare outline of linen bleaching.

Linen is bleached in the yarn and in the piece. Whenever one of the operations is repeated, the strength of the reagent is successively diminished. In yarn-bleaching the sequence of the operations is about as follows:—(1) Boil in kier with soda ash. (2) Reel in bleaching powder. This operation, which is peculiar to linen bleaching, consists in suspending the hanks from a square roller into bleaching powder solution contained in a shallow stone trough. The roller

revolves slowly, so that the hanks, while passing continuously through the bleaching powder, are for the greater part of the time being exposed to the air. (3) Sour in sulphuric acid. (4) Scald in soda ash. (The term “scalding” means boiling in a kier.) (5) Reel in bleaching powder. (6) Sour in sulphuric acid. (7) Scald in soda ash. (8) Dip, *i.e.* steep in bleaching powder. (9) Sour in sulphuric acid. (10) Scald in soda ash. (11) Dip in bleaching powder. (12) Sour in sulphuric acid. For a full white, two more operations are usually required, viz. (13) scald in soda ash, and (14) dip in bleaching powder. Washing intervenes between all these operations.

Pieces are not stamped as in the case of cotton, but thread-marked by hand with cotton dyed Turkey red. They are then sewn together end to end, and subjected to the following operations:—

Boil with lime in kier.

The pieces are now separated and made up into bundles (except in the case of very light linens, which may pass through the whole of the operations in rope form) and soured with sulphuric acid.

First lye boil with soda ash and caustic soda.

Second lye boil. For some classes of goods no less than six lye boils may be required.

Grass between lye boils (according to their number).

Rub with rubbing boards. This is also a speciality in linen bleaching, and consists of a mechanical treatment with soft soap, the object of which is to remove black stains in the yarn.

Bleach with hypochlorite of soda.

Scald. The two latter treatments are repeated three to five times, each series constituting a “turn.” Grassing intervenes between each turn, and in some instances the pieces are rubbed before the last soda boil.

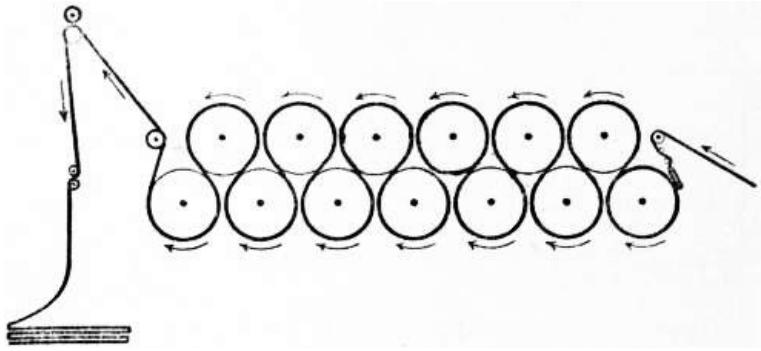

FIG. 9.—Diagram showing the Horizontal Drying Machine threaded with Cloth.

The pieces are next steeped in large vessels (kiers) in weak hypochlorite of soda, and then in weak sulphuric acid, these treatments being repeated several times.

Ultimately the goods are mill-washed, blued with smalt and dried.

Bleaching of other Vegetable Textile Fabrics.

Hemp may be bleached by a process similar to that used for linen, but this is seldom done owing to the expense entailed. *China grass* is bleached like cotton. *Jute* contains in its raw state a considerable amount of colouring matter and intracellular substance. Since the individual fibres are very short, the complete removal of the latter would be attended by a disintegration of the material. Although it is possible to bleach jute white, this is seldom if ever carried out on a large scale owing to the great expense involved. A half-bleach on jute is obtained by steeping the goods alternately in bleaching powder (or hypochlorite of soda) and sulphuric acid, washing intervening. For a cream these treatments are repeated.

Bleaching of Straw.

In the Luton district, straw is bleached principally in the form of plait, in which form it is imported. The bleaching is effected by steeping the straw for periods varying from twelve hours to several days in fairly strong alkaline peroxide of hydrogen. The number of baths

depends upon the quality of straw and the degree of whiteness required. Good whites are thus obtained, and no further process would be necessary if the hats had not subsequently to be “blocked” or pressed at a high temperature which brings about a deterioration of the colour. After bleaching with peroxide and drying, the straw consequently undergoes a further process of sulphuring, *i.e.* exposure to gaseous sulphurous acid. Panama hats are bleached after making up, but in this case only peroxide of hydrogen is used and a very lengthy treatment entailing sometimes fourteen days’ steeping is required.

Bleaching of Wool.

In the condition in which it is delivered to the manufacturers wool is generally a very impure article, even if it has been washed on the sheep’s back before shearing. The impurities which it contains consist in the main of the natural grease (in reality a kind of wax) exuded from the skin of the sheep and technically known as the “yolk,” the dried-up perspiration from the body of the sheep; technically called “suint,” and dust, dirt, burrs, &c., which mechanically adhere to the sticky surfaces of the fibres. In this condition wool is quite unfit for any manufacturing purposes and must be cleansed before any mechanical operations can be commenced. Formerly the washing was effected in stale urine, which owed its detergent properties mainly to the presence of ammonium carbonate. The stale urine or *lant* was diluted with four to five times its bulk of water, and in this liquor, heated to 40°-50° C., the washing was effected.

At the present day this method has been entirely abandoned, the washing or “scouring” being effected with soap, assisted by ammonia, potash, soda or silicate of soda. The finest qualities of wool are washed with soft soap and potash, while for inferior qualities, cheaper detergents are employed. The operation is in principle perfectly simple, the wool being submerged in the warm soap solution, where it is moved about with forks and then taken out and allowed to drain. A second treatment in weaker soap serves to complete the process. In dealing with large quantities, wool-washing machines are employed, which consist essentially of long cast-iron troughs which contain the soap solution. The wool to be washed is fed in at one end of the machine and is slowly propelled to the other end by means of a system of mechanically-driven forks or rakes. As it passes from the machine, it is squeezed through a pair of rollers. Three such machines are usually required for efficient washing, the first containing the strongest and the third the weakest soap.

The washing of wool is in the main a mechanical process, in which the water dissolves out the suint while the soap emulsifies the yolk and thus removes it from the fibre. The attendant earthy impurities pass mechanically into the surrounding liquid and are swilled away.

In some works the wool is washed first with water alone, the aqueous extract thus obtained being evaporated to dryness and the residue calcined. A very good quality of potash is thus obtained as a by-product. In many works in Yorkshire and elsewhere, the dirty soap liquors obtained in wool-washing are not allowed to run to waste, but are run into tanks and there treated with sulphuric acid. The effect of this treatment is to decompose the soap, and the fatty acids along with the wool-grease rise as a magma to the surface. The purified product is known in the trade as “Yorkshire grease.”

Attempts have been made from time to time to extract the natural grease from wool by means of organic solvents, such as carbon bisulphide, carbon tetrachloride, petroleum spirit, &c., but have not met with much success.

Worsted yarn spun on the English system, as well as woollen yarn and fabrics made from them, contain oil which has been incorporated with the wool to facilitate the spinning. This oil must be got rid of previous to bleaching, and this is effected by scouring in warm soap with or without the assistance of alkalis.

> The actual bleaching of wool may be effected in two ways, viz. by treating the material either with sulphurous acid or with hydrogen peroxide. Sulphurous acid may either be applied in the gaseous form or in solution as bisulphite of soda. In working by the first method, which is technically known as “stoving,” the scoured yarn is wetted in very weak soap containing a small amount of blue colouring matter, wrung or hydro-extracted and then suspended in a chamber or stove. Sulphur contained in a vessel on the floor of the chamber is now lighted, and the door having been closed, is allowed to burn itself out. The goods are left thus exposed to the sulphur dioxide overnight, when they are taken out and washed in water. For piece goods a somewhat different arrangement is employed, the pieces passing through a slit into a chamber supplied with sulphur dioxide, then slowly up and down over a

large number of rollers and ultimately emerging again at the same slit. Wool may also be bleached by steeping in a fairly strong solution of bisulphite of soda and then washing well in water. Wool bleached with sulphurous acid or bisulphite is readily affected by alkalis, the natural yellow colour returning on washing with soap or soda. A more permanent bleach is obtained by steeping the wool in hydrogen peroxide (of 12 volumes strength), let down with about three times its bulk of water and rendered slightly alkaline with ammonia or silicate of soda. Black or brown wools cannot be bleached white, but when treated with peroxide they assume a golden colour, a change which is frequently desired in human hair.

Bleaching of Silk.

In raw silk, the fibre proper is uniformly coated with a proteid substance known as *silk-gum, silk-glue* or *sericine* which amounts to 19-25% of the weight of the material, and it is only after the removal of this coating that the characteristic properties of the fibre become apparent. This is effected by the process of “discharging” or “boiling-off,” which consists in suspending the hanks of raw silk over poles or sticks in a vat containing a strong hot soap solution (30% of soap on the weight of the silk). The liquor is kept just below boiling point for two or three hours, the hanks being turned from time to time. During the process, the sericine at first swells up considerably, the fibres becoming slippery, but as the operation proceeds it passes into solution. It is important that only soft water should be used for boiling-off since calcareous impurities are liable to mar the lustre of the silk.

The silk is now rinsed in weak soda solution and wrung. In this condition it is suitable for being dyed, but if it is to be bleached, the hanks are tied up loosely with smooth tape, put into coarse linen bags to prevent the silk becoming entangled, and boiled again in soap solution which is half as strong as that used in the first operation. The hanks are now taken out, rinsed in a weak soda solution, washed in water and wrung.

The actual bleaching of silk is usually effected by stoving as in the case of wool, with this difference, that the operation is repeated several times and blueing or tinting with other colours is effected after bleaching. Silk may also be bleached with peroxide of hydrogen, but this method is only used for certain qualities of spun silk and for tussore.

Ornamental feathers are best bleached by steeping in peroxide of hydrogen, rendered slightly alkaline by the addition of ammonia. The same treatment is applied to the bleaching of *ivory*. If peroxide of hydrogen could be prepared at a moderate cost, it would doubtless find a much more extensive application in bleaching, since it combines efficiency with safety, and gives good results with both vegetable and animal substances.

(E. K.)

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1 Besides being used for cotton goods, plate singeing is also employed for certain classes of worsted goods (alpacas, bunting, &c.), and for most union goods (cotton warp and worsted weft).

2 A machine working on this principle has been constructed by F. Binder, and the makers of the machine (Messrs Mather & Platt, Ltd.) claim that it does better service than the machines constructed on the older principle.

BLEAK, or Blick (*Alburnus lucidus*), a small fish of the Cyprinid family, allied to the bream and the minnow, but with a more elongate body, resembling a sardine. It is found in European streams, and is caught by anglers, being also a favourite in aquariums. The well-known and important industry of “Essence Orientale” and artificial pearls, carried on in France and Germany with the crystalline silvery colouring matter of the bleak, was introduced from China about the middle of the 17th century.

BLEEK, FRIEDRICH (1793-1859), German Biblical scholar, was born on the 4th of July 1793, at Ahrensbök, in Holstein, a village near Lübeck. His father sent him in his sixteenth year to the gymnasium at Lübeck, where he became so much interested in ancient

languages that he abandoned his idea of a legal career and resolved to devote himself to the study of theology. After spending some time at the university of Kiel, he went to Berlin, where, from 1814 to 1817, he studied under De Wette, Neander and Schleiermacher. So highly were his merits appreciated by his professors—Schleiermacher was accustomed to say that he possessed a special *charisma* for the science of "Introduction"—that in 1818 after he had passed the examinations for entering the ministry he was recalled to Berlin as *Repetent* or tutorial fellow in theology, a temporary post which the theological faculty had obtained for him. Besides discharging his duties in the theological seminary, he published two dissertations in Schleiermacher's and G.C.F. Lücke's *Journal*(1819-1820,1822), one on the origin and composition of the Sibylline Oracles "Über die Entstehung und Zusammensetzung der Sibyllinischen Orakel," and another on the authorship and design of the Book of Daniel, "Über Verfasser und Zweck des Buches Daniel." These articles attracted much attention, and were distinguished by those qualities of solid learning, thorough investigation and candour of judgment which characterized all his writings. Bleek's merits as a rising scholar were recognized by the minister of public instruction, who continued his stipend as *Repetent* for a third year, and promised further advancement in due time. But the attitude of the political authority underwent a change. De Wette was dismissed from his professorship in 1819, and Bleek, a favourite pupil, incurred the suspicion of the government as an extreme democrat. Not only was his stipend as *Repetent* discontinued, but his nomination to the office of professor extraordinarius, which had already been signed by the minister Karl Altenstein, was withheld. At length it was found that Bleek had been confounded with a certain Baueleven Blech, and in 1823 he received the appointment.

During the six years that Bleek remained at Berlin, he twice declined a call to the office of professor ordinarius of theology, once to Greifswald and once to Königsberg. In 1829, however, he was induced to accept Lücke's chair in the recently-founded university of Bonn, and entered upon his duties there in the summer of the same year. For thirty years he laboured with ever-increasing success, due not to any attractions of manner or to the enunciation of novel or bizarre opinions, but to the soundness of his investigations, the impartiality of his judgments, and the clearness of his method. In 1843 he was raised to the office of consistorial councillor, and was selected by the university to hold the office of rector, a distinction which has not since been conferred upon any theologian of the Reformed Church. He died suddenly of apoplexy on the 27th of February 1859.

Bleek's works belong entirely to the departments of Biblical criticism and exegesis. His views on questions of Old Testament criticism were "advanced" in his own day; for on all the disputed points concerning the unity and authorship of the books of the Old Covenant he was opposed to received opinion. But with respect to the New Testament his position was conservative. An opponent of the Tübingen school, his defence of the genuineness and authenticity of the gospel of St. John is among the ablest that have been written; and although on some minor points his views did not altogether coincide with those of the traditional school, his critical labours on the New Testament must nevertheless be regarded as among the most important contributions to the maintenance of orthodox opinions. His greatest work, his commentary on the epistle to the Hebrews (*Brief an die Hebräer erläutert durch Einleitung, Übersetzung, und fortlaufenden Commentar*, in three parts, 1828, 1836 and 1840) won the highest praise from men like De Wette and Fr. Delitzsch. This work was abridged by Bleek for his college lectures, and was published in that condensed form in 1868. In 1846 he published his contributions to the criticism of the gospels (*Beiträge zur Evangelien Kritik*, pt. i.), which contained his defence of St John's gospel, and arose out of a review of J.H.A. Ebrard's *Wissenschaftliche Kritik der Evangelischen Geschichte* (1842).

After his death were published:—(1) His *Introduction to the Old Testament* (*Einleitung in das Alte Testament*), (3rd ed., 1869); Eng. trans. by G.H. Venables (from 2nd ed., 1869); in 1878 a new edition (the 4th) appeared under the editorship of J. Wellhausen, who made extensive alterations and additions; (2) his *Introduction to the New Testament* (3rd ed., W. Mangold, 1875), Eng. trans. (from 2nd German ed.) by William Urwick (1869, 1870); (3) his *Exposition of the First Three Gospels* (*Synoptische Erklarung der drei ersten Evangelien*), by H. Holtzmann (1862); (4) his *Lectures on the Apocalypse* (*Vorlesungen über die Apokalypse*), (Eng. trans. 1875). Besides these there has also appeared a small volume containing *Lectures on Colossians, Philemon and Ephesians* (Berlin, 1865). Bleek also contributed many articles to the *Studien und Kritiken*. For further information as to Bleek's life and writings, see Kamphausen's article in Herzog-Hauck, *Realencyklopadie*; Frédéric Lichtenberger's *Histoire des idées religieuses en Allemagne*, vol. iii.; Diestel's *Geschichte des Allen Testamentes* (1869); and T.K. Cheyne's *Founders of Old Testament Criticism* (1893).

BLEEK, WILHELM HEINRICH IMMANUEL (1827-1875), German philologist, son of Friedrich Bleek, was born in 1827 at Berlin. He studied first at Bonn and afterwards at Berlin, where his attention was directed towards the philological peculiarities of the South African languages. In his doctor's dissertation (Bonn, 1851), *De nominum generibus linguarum Africae Australis*, he endeavoured to show that the Hottentot language was of North African descent. In 1854 his health prevented him accompanying Dr W.B. Baikie in the expedition to the Niger; but in the following year he accompanied Bishop Colenso to Natal, and was enabled to prosecute his researches into the language and customs of the Kaffirs. Towards the close of 1856 he settled at Cape Town, and in 1857 was appointed interpreter by Sir George Grey. In 1859 he was compelled by ill health to visit Europe, and on his return in the following year he was made librarian of the valuable collection of books presented to the colony by Sir George Grey. In 1869 he visited England, where the value of his services was recognized by a pension from the civil list. He died at Cape Town on the 17th of August 1875. His works, which are of considerable importance for African and Australian philology, consist of the *Vocabulary of the Mozambique Language* (London, 1856); *Handbook of African, Australian and Polynesian Philology* (Cape Town and London, 3 vols., 1858-1863); *Comparative Grammar of, the South African Languages* (vol. i., London, 1869); *Reynard the Fox in South Africa, or Hottentot Fables and Tales* (London, 1864); *Origin of Language* (London, 1869).

BLENDE, or SPHALERITE, a naturally occurring zinc sulphide, ZnS, and an important ore of zinc. The name blende was used by G. Agricola in 1546, and is from the German *blenden*, to blind, or deceive, because the mineral resembles lead ore in appearance but contains no lead, and was consequently often rejected as worthless. Sphalerite, introduced by E.F. Glocker in 1847, has the same meaning (σφαλερός, deceptive), and so have the miners' terms "mock ore," "false lead," and "blackjack." The term "blende" was at one time used in a generic sense, and as such enters into the construction of several old names of German origin; the species under consideration is therefore sometimes distinguished as zinc-blende.

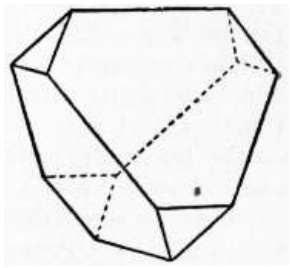


FIG. 1.

Crystals of blende belong to that subclass of the cubic system in which there are six planes of symmetry parallel to the faces of the rhombic dodecahedron and none parallel to the cubic faces; in other words, the crystals are cubic with inclined hemihedrism, and have no centre of symmetry. The fundamental form is the tetrahedron. Fig. 1 shows a combination of two tetrahedra, in which the four faces of one tetrahedron are larger than the four faces of the other: further, the two sets of faces differ in surface characters, those of one set being dull and striated, whilst those of the other set are bright and smooth. A common form, shown in fig. 2, is a combination of the rhombic dodecahedron with a three-faced tetrahedron *y* (311); the six faces meeting in each triad axis are often rounded together into low conical forms. The crystals are frequently twinned, the twin-axis coinciding with a triad axis; a rhombic dodecahedron so twinned (fig. 3) has no re-entrant angles. An important character of blende is the perfect dodecahedral cleavage, there being six directions of cleavage parallel to the faces of the rhombic dodecahedron, and angles between which are 60°.

When chemically pure, which is rarely the case, blende is colourless and transparent; usually, however, the mineral is yellow, brown or black, and often opaque, the depth of colour and degree of transparency depending on the amount of iron present. The streak, or colour of the powder, is brownish or light yellow, rarely white. The lustre is resinous to adamantine, and the index of refraction high (2.369 for sodium light). The substance is usually optically isotropic, though sometimes it exhibits anomalous double refraction; fibrous zinc sulphide which is doubly refracting is to be referred to the hexagonal species wurtzite. The specific gravity is 4.0, and the hardness 4. Crystals exhibit pyroelectrical characters, since they possess four uniterminal triad axes of symmetry.

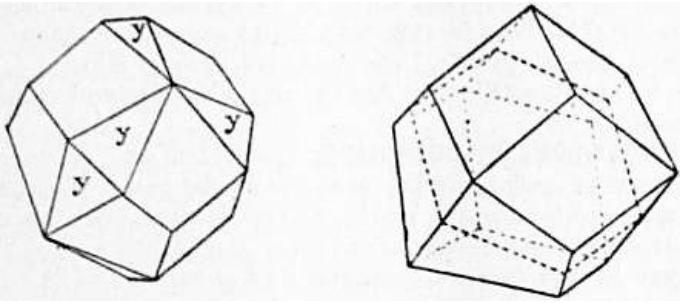


FIG. 2. FIG. 3.

Crystals of blende are of very common occurrence, but owing to twinning and distortion and curvature of the faces, they are often rather complex and difficult to decipher. For this reason the mineral is not always readily recognized by inspection, though the perfect dodecahedral cleavage, the adamantine lustre, and the brown streak are characters which may be relied upon. The mineral is also frequently found massive, with a coarse or fine granular structure and a crystalline fracture; sometimes it occurs as a soft, white, amorphous deposit resembling artificially precipitated zinc sulphide. A compact variety of a pale liver-brown colour and forming concentric layers with a reniform surface is known in Germany as *Schalenblende* or *Leberblende*.

A few varieties of blende are distinguished by special names, these varieties depending on differences in colour and chemical composition. A pure white blende from Franklin in New Jersey is known as cleiophane; snow-white crystals are also found at Nordmark in Vermland, Sweden. Black blende containing ferrous sulphide, in amounts up to 15 or 20% isomorphously replacing zinc sulphide, is known as marmatite (from Marmato near Guayabal in Colombia, South America) and christophite (from St Christophe mine at Breitenbrunn near Eibenstock in Saxony). Transparent blende of a red or reddish-brown colour, such as that found near Holywell in Flintshire, is known as “ruby-blende” or “ruby-zinc.” Přibramite is the name given to a cadmiferous blende from Přibram in Bohemia. Other varieties contain small amounts of mercury, tin, manganese or thallium. The elements gallium and indium were discovered in blende.

Blende occurs in metalliferous veins, often in association with galena, also with chalcopyrite, barytes, fluorspar, &c. In ore-deposits containing both lead and zinc, such as those filling cavities in the limestones of the north of England and of Missouri, the galena is usually found in the upper part of the deposit, the blende not being reached until the deeper parts are worked. Blende is also found sporadically in sedimentary rocks; for example, in nodules of clay-ironstone in the Coal Measures, in the cement-doggers of the Lias, and in the casts of fossil shells. It has occasionally been found on the old timbers of mines. In these cases the zinc sulphide has probably arisen from the reduction of sulphate by organic matter.

Localities for fine crystallized specimens are numerous. Mention may be made of the brilliant black crystals from Alston Moor in Cumberland, St Agnes in Cornwall and Derbyshire. Yellow crystals are found at Kapnik-Bánya, near Nagy-Bánya in Hungary. Transparent yellow cleavage masses of large size occur in limestone in the zinc mines at Picos de Europa in the province of Santander, Spain. Beautiful isolated tetrahedra of transparent yellow blende are found in the snow-white crystalline dolomite of the Binnenthal in the Valais, Switzerland.

(L. J. S.)

BLENHEIM (Ger. *Blindheim*), a village of Bavaria, Germany, in the district of Swabia, on the left bank of the Danube, 30 m. N.E. from Ulm by rail, a few miles below Höchstädt. Pop. 700. It was the scene of the defeat of the French and Bavarians under Marshals Tallard and Marsin, on the 13th of August 1704, by the English and the Austrians under the duke of Marlborough and Prince Eugene. In consideration of his military services and especially his decisive victory, a princely mansion was erected by parliament for the duke of Marlborough near Woodstock in Oxfordshire, England, and was named Blenheim Palace after this place.

The battle of Blenheim is also called Höchstädt, but the title accepted in England has the

advantage that it distinguishes this battle from that won on the same ground a year previously, by the elector of Bavaria over the imperial general Styrum (9-20 September 1703), and from the fighting between the Austrians under Krag and the French under Moreau in June 1800 (see French Revolutionary Wars). The ground between the hills and the marshy valley of the Danube forms a defile through which the main road from Donauwörth led to Ulm; parallel streams divide the narrow plain into strips. On one of these streams, the Nebel, the French and Bavarians (somewhat superior in numbers) took up their position facing eastward, their right flank resting on the Danube, their left in the under-features of the hilly ground, and their front covered by the Nebel, on which were the villages of Oberglau, Unterglau and Blenheim. The imperialist army of Eugene and the allies under Marlborough (52,000 strong) encamped 5 m. to the eastward along another stream, their flanks similarly protected. On the 2nd-13th of August 1704 Eugene and Marlborough set their forces in motion towards the hostile camps; several streams had to be crossed on the march, and it was seven o'clock (five hours after moving off) when the British of Marlborough's left wing, next the Danube, deployed opposite Blenheim, which Tallard thereupon garrisoned with a large force of his best infantry, aided by a battery of 24-pounder guns. The French and Bavarians were taken somewhat by surprise, and were arrayed in two separate armies, each with its cavalry on the wings and its foot in the centre. Thus the centre of the combined forces consisted of the cavalry of Marsin's right and of Tallard's left.

Here was the only good ground for mounted troops, and Marlborough followed Tallard's example when forming up to attack, but it resulted from the dispositions of the French marshal that this weak point of junction of his two armies was exactly that at which decisive action was to be expected. Tallard therefore had a few horse on his right between the Danube and Blenheim, a mass of infantry in his centre at Blenheim itself, and a long line of cavalry supported by a few battalions forming his left wing in the plain, and connecting with the right of Marsin's army. This army was similarly drawn up. The cavalry right wing was in the open, the French infantry near Oberglau, which was strongly held, the Bavarian infantry next on the left, and finally the Bavarian cavalry with a force of foot on the extreme left in the hills. The elector of Bavaria commanded his own troops in person. Marlborough and Eugene on their part were to attack respectively Tallard and Marsin. The right wing under Eugene had to make a difficult march over broken ground before it could form up for battle, and Marlborough waited, with his army in order of battle between Unterglau and Blenheim, until his colleague should be ready. At 12.30 the battle opened. Lord Cutts, with a detachment of Marlborough's left wing, attacked Blenheim with the utmost fury. A third of the leading brigade (British) was killed and wounded in the vain attempt to break through the strong defences of the village, and some French squadrons charged upon it as it retired; a colour was captured in the *mêlée*, but a Hessian brigade in second line drove back the cavalry and retook the colour. After the repulse of these squadrons, in which some British cavalry from the centre took part, Cutts again moved forward. The second attack, though pressed even more fiercely, fared no better than the first, and the losses were heavier than before. The duke then ordered Cutts to observe the enemy in Blenheim, and concentrated all his attention on the centre. Here, between Unterglau and Blenheim, preparations were being made, under cover of artillery, for the crossing of the Nebel, and farther up-stream a corps was sent to attack Oberglau. This attack failed completely, and it was not until Marlborough himself, with fresh battalions, drove the French back into Oberglau that the allies were free to cross the Nebel.

In the meanwhile the first line of Marlborough's infantry had crossed lower down, and the first line of cavalry, following them across, had been somewhat severely handled by Tallard's cavalry. The squadrons under the Prussian general Bothmar, however, made a dashing charge, and achieved considerable temporary success. Eugene was now closely engaged with the elector of Bavaria, and both sides were losing heavily. But Eugene carried out his holding attack successfully. Marsin dared not reinforce Tallard to any extent, and the duke was preparing for the grand attack. His whole force, except the detachment of Cutts, was now across the Nebel, and he had formed it in several lines with the cavalry in front. Marlborough himself led the cavalry; the French squadrons received the attack at the halt, and were soon broken. Marsin's right swung back towards its own army. Those squadrons of Tallard's left which retained their order fell back towards the Danube, and a great gap was opened in the centre of the defence, through which the victorious squadrons poured. Wheeling to their left the pursuers drove hundreds of fugitives into the Danube, and Eugene was now pressing the army of Marsin towards Marlborough, who re-formed and faced northward to cut off its retreat. Tallard was already a prisoner, but in the dusk and confusion Marsin slipped through between the duke and Eugene. General Churchill,

Marlborough's brother, had meanwhile surrounded the French garrison of Blenheim; and after one or two attempts to break out, twenty-four battalions of infantry and four regiments of dragoons, many of them the finest of the French army, surrendered.

The losses of the allies are stated at 4500 killed and 7500 wounded (British 670 killed and 1500 wounded). Of the French and Bavarians 11,000 men, 100 guns and 200 colours and standards were taken; besides the killed and wounded, the numbers of which vere large but uncertain—many were drowned in the Danube. Marsin's army, though it lost heavily, was drawn off in good order; Tallard's was almost annihilated.

BLENNERHASSETT, HARMAN (1765-1831), Irish-American lawyer, son of an Irish country gentleman of English stock settled in Co. Kerry, was born on the 8th of October 1765. He was educated at Trinity College, Dublin, and in 1790 was called to the Irish bar. After living for several years on the continent, he married in 1796 his niece, Margaret Agnew, daughter of Robert Agnew, the lieutenant-governor of the Isle of Man. Ostracised by their families for this step the couple decided to settle in America, where Blennerhassett in 1798 bought an island in the Ohio river about 2 m. below Parkersburg, West Virginia. Here in 1805 he received a visit from Aaron Burr (*q.v.*), in whose conspiracy he became interested, furnishing liberal funds for its support, and offering the use of his island as a rendezvous for the gathering of arms and supplies and the training of volunteers. When the conspiracy collapsed, the mansion and island were occupied and plundered by the Virginia militia. Blennerhassett fled, was twice arrested and remained a prisoner until after Burr's release. The island was then abandoned, and Blennerhassett was in turn a cotton planter in Mississippi, and a lawyer (1819-1822) in Montreal, Canada. After returning to Ireland, he died in the island of Guernsey on the 2nd of February 1831. His wife, who had considerable literary talent and who published *The Deserted Isle* (1822) and *The Widow of the Rock and Other Poems* (1824), returned to the United States in 1840, and died soon afterward in New York City while attempting to obtain through Congress payment for property destroyed on the island.

See William H. Safford, *Life of Harman Blennerhassett* (Cincinnati, 1853); W.H. Safford (editor), *The Blennerhassett Papers* (Cincinnati, 1864); and "The True Story of Harman Blennerhassett," by Therese Blennerhassett-Adams, in the *Century Magazine* for July 1901, vol. lxii.

BLERA (mod. *Bieda*), an ancient Etruscan town on the Via Clodia, about 32 m. N.N.W. of Rome. It was of little importance, and is only mentioned by geographers and in inscriptions. It is situated on a long, narrow tongue of rock at the junction of two deep glens. Some remains of the town walls still exist, and also two ancient bridges, both belonging to the Via Clodia, and many tombs hewn in the rock—small chambers imitating the architectural forms of houses, with beams and rafters represented in relief. See G. Dennis, *Cities and Cemeteries of Etruria*, i. 207. There was another Blera in Apulia, on the road from Venusia to Tarentum.

BLESSINGTON, MARGUERITE, COUNTESS OF (1789-1849), Irish novelist and miscellaneous writer, daughter of Edmund Power, a small landowner, was born near Clonmel, Co. Tipperary, Ireland, on the 1st of September 1789. Her childhood was made unhappy by her father's character and poverty,—and her early womanhood wretched by her compulsory marriage at the age of fifteen to a Captain Maurice St Leger Farmer, whose drunken habits brought him at last as a debtor to the king's bench prison, where, in October

1817, he died. His wife had left him some time before, and in February 1818 she married Charles John Gardiner, earl of Blessington. Of rare beauty, charm and wit, she was no less distinguished for her generosity and for the extravagant tastes which she shared with her husband, which resulted in encumbering his estates with a load of debt. In the autumn of 1822 they went abroad, spent four months of the next year at Genoa in close intimacy with Byron, and remained on the continent till Lord Blessington's death in May 1829. Some time before this they had been joined by Count D'Orsay, who in 1827 married Lady Harriet Gardiner, Lord Blessington's only daughter by a former wife. D'Orsay, who had soon separated from his wife, now accompanied Lady Blessington to England and lived with her till her death. Their home, first at Seamore Place, and afterwards Gore House, Kensington, became a centre of attraction for whatever was distinguished in literature, learning, art, science and fashion. After her husband's death she supplemented her diminished income by contributing to various periodicals as well as by writing novels. She was for some years editor of *The Book of Beauty* and *The Keepsake*, popular annuals of the day. In 1834 she published her *Conversations with Lord Byron*. Her *Idler in Italy* (1839-1840), and *Idler in France* (1841) were popular for their personal gossip and anecdote, descriptions of nature and sentiment. Early in 1849, Count D'Orsay left Gore House to escape his creditors; the furniture and decorations were sold, and Lady Blessington joined the count in Paris, where she died on the 4th of June 1849.

Her *Literary Life and Correspondence* (3 vols.), edited by R.R. Madden, appeared in 1855. Her portrait was painted in 1808 by Sir Thomas Lawrence.

BLIDA, a town of Algeria, in the department of Algiers, 32 m. by railway S.W. from Algiers, on the line to Oran. Pop. (1906) 16,866. It lies surrounded with orchards and gardens, 630 ft. above the sea, at the base of the Little Atlas, on the southern edge of the fertile plain of the Metija, and the right bank of the Wad-el-Kebir affluent of the Chiffa. The abundant water of this stream provides power for large corn mills and several factories, and also supplies the town, with its numerous fountains and irrigated gardens. Blida is surrounded by a wall of considerable extent, pierced by six gates, and is further defended by Fort Mimieh, crowning a steep hill on the left bank of the river. The present town, French in character, has well-built modern streets with many arcades, and numbers among its buildings several mosques and churches, extensive barracks and a large military hospital. The principal square, the place d'Armes, is surrounded by arcaded houses and shaded by trees. The centre of a fertile district, and a post on one of the main routes in the country, Blida has a flourishing trade, chiefly in oranges and flour. The orange groves contain over 50,000 trees, and in April the air for miles round is laden with the scent of the orange blossoms. In the public gardens is a group of magnificent olive trees. The products of the neighbouring cork trees and cedar groves are a source of revenue to the town. In the vicinity are the villages of Joinville and Montpensier, which owe their origin to military camps established by Marshal Valée in 1838; and on the road to Medea are the tombs of the marabout Mahommed-el-Kebir, who died in 1580, and his two sons.

Blida, *i.e. boleida*, diminutive of the Arab word *belad*, city, occupies the site of a military station in the time of the Romans, but the present town appears to date from the 16th century. A mosque was built by order of Khair-ed-din Barbarossa, and under the Turks the town was of some importance. In 1825 it was nearly destroyed by an earthquake, but was speedily rebuilt on a site about a mile distant from the ruins. It was not till 1838 that it was finally held by the French, though they had been in possession for a short time eight years before. In April 1906 it was chosen as the place of detention of Behanzin, the ex-king of Dahomey, who died in December of that year.

Blida is the chief town of a commune of the same name, having (1906) a population of 33,332.

BLIGH, WILLIAM (1754-1817), English admiral, was born of a good Cornish family in

1754. He accompanied Captain Cook in his second expedition (1772-1774) as sailing-master of the “Resolution.” During the voyage, the bread-fruit, already known to Dampier, was found by them at Otaheite; and after seeing service under Lord Howe and elsewhere, “Bread-fruit Bligh,” as he was nicknamed, was despatched at the end of 1787 to the Pacific in command of H.M.S. “Bounty,” for the purpose of introducing it into the West Indies from the South Sea Islands. Bligh sailed from Otaheite, after remaining there about six months; but, when near the Friendly Islands, a mutiny (April 28, 1789) broke out on board the “Bounty,” headed by Fletcher Christian, the master’s mate, and Bligh, with eighteen others, was set adrift in the launch. The mutineers themselves settled on Pitcairn Island (*q.v.*), but some of them were afterwards captured, brought to England and in three cases executed. This mutiny, which forms the subject of Byron’s Island, did not arise so much from tyranny on the part of Bligh as from attachments contracted between the seamen and the women of Otaheite. After suffering severely from hunger, thirst and storms, Bligh and his companions landed at Timor in the East Indies, having performed a voyage of about 4000 m. in an open boat. Bligh returned to England in 1790, and he was soon afterwards appointed to the “Providence,” in which he effected the purpose of his former appointment by introducing the bread-fruit tree into the West India Islands. He showed great courage at the mutiny of the Nore in 1797, and in the same year took part in the battle of Camperdown, where Admiral Duncan defeated the Dutch under De Winter. In 1801 he commanded the “Glatton” (54) at the battle of Copenhagen, and received the personal commendations of Nelson. In 1805 he was appointed “captain general and governor of New South Wales.” As he made himself intensely unpopular by the harsh exercise of authority, he was deposed in January 1808 by a mutiny headed by Major George Johnston of the 102nd foot, and was imprisoned by the mutineers till 1810. He returned to England in 1811, was promoted to rear-admiral in that year, and to vice-admiral in 1814. Major Johnston was tried by court martial at Chelsea in 1811, and was dismissed the service. Bligh, who was an active, persevering and courageous officer, died in London in 1817.

BLIND, MATHILDE (1841-1896), English author, was born at Mannheim on the 21st of March 1841. Her father was a banker named Cohen, but she took the name of Blind after her step-father, the political writer, Karl Blind (1826-1907), one of the exiled leaders of the Baden insurrection in 1848-1849, and an ardent supporter of the various 19th-century movements for the freedom and autonomy of struggling nationalities. The family was compelled to take refuge in England, where Mathilde devoted herself to literature and to the higher education of women. She produced also three long poems, “The Prophecy of St Oran” (1881), “The Heather on Fire” (1886), an indignant protest against the evictions in the Highlands, and “The Ascent of Man” (1888), which was to be the epic of the theory of evolution. She wrote biographies of George Eliot (1883) and Madame Roland (1886), and translated D.F. Strauss’s *The Old Faith and the New* (1873-1874) and the *Memoirs of Marie Bashkirtseff* (1890). She died on the 26th of November 1896, bequeathing her property to Newnham College, Cambridge.

A complete edition of her poems was edited by Mr Arthur Symons in 1900, with a biographical introduction by Dr Richard Garnett.

BLIND HOOKEY, a game of chance, played with a full pack of cards. The deal, which is an advantage, is decided as at whist, the cards being shuffled and cut as at whist. The dealer gives a parcel of cards to each player including himself. Each player puts the amount of his stake on his cards, which he must not look at. The dealer has to take all bets. He then turns up his parcel, exposing the bottom card. Each player in turn does the same, winning or losing according as his cards are higher or lower than the dealer’s. Ties pay the dealer. The cards rank as at whist. The suits are of no importance, the cards taking precedence according to their face-value.

BLINDING, a form of punishment anciently common in many lands, being inflicted on thieves, adulterers, perjurers and other criminals. The inhabitants of Apollonia (Illyria) are said to have inflicted this penalty on their “watch” when found asleep at their posts. It was resorted to by the Roman emperors in their persecutions of the Christians. The method of destroying the sight varied. Sometimes a mixture of lime and vinegar, or barely scalding vinegar alone, was poured into the eyes. Sometimes a rope was twisted round the victim’s head till the eyes started out of their sockets. In the middle ages the punishment seems to have been changed from total blindness to a permanent injury to the eyes, amounting, however, almost to blindness, produced by holding a red-hot iron dish or basin before the face. Under the forest laws of the Norman kings of England blinding was a common penalty. Shakespeare makes King John order his nephew Arthur’s eyes to be burnt out.

BLINDMAN’S-BUFF (from an O. Fr. word, *buffe*, a blow, especially a blow on the cheek), a game in which one player is blindfolded and made to catch and identify one of the others, who in sport push him about and “buffet” him.

BLINDNESS, the condition of being blind (a common Teutonic word), *i.e.* devoid of sight (see also Vision; and Eye: *Diseases*). The data furnished in various countries by the census of 1901 showed generally a decrease in blindness, due to the progress in medical science, use of antiseptics, better sanitation, control of infectious diseases, and better protection in shops and factories. Blindness is much more common in hot countries than in temperate and cold regions, but Finland and Iceland are exceptions to the general rule.[1] In hot countries the eyes are affected by the glaring sunlight, the dust and the dryness of the air. From statistics in Italy, France and Belgium, localities on the coast seem to have more blind persons than those at a distance from the sea.

The following table gives the number of blind persons as reported in the census of each country. Unless otherwise stated, it refers to the statistics of 1900.

Country.	Total Number.	Number per Million of Population.
Austria	14,582	540
Belgium	3448	487
Canada	3279	610
Denmark	1047	427
England	25,317	778
France	27,174	698
Finland[2]	3229	1191
Germany	34,334	609
Hungary	19,377	1006
Ireland	4263	954
Italy	38,160	1175
Holland (1890)	2114	414
Norway	1879	838
Portugal	5650	1040
Sweden	3413	664
Switzerland (1895)	2107	722
Scotland	3253	727
Spain (1877)	24,608	1006
Russia	. .	about 2000
United States (corrected census)	85,662	1125

There are many cases of complete or partial blindness which might have been prevented, and a knowledge of the best methods of prevention and cure should be spread as widely as possible. Magnus, Bremer, Steffen and Rössler are of opinion that 40% of the cases of blindness might have been prevented. Hayes gives 33.35% as positively avoidable, 38.75% possibly avoidable, and 46.27% as a conservative estimate. Cohn regards blindness as certainly preventable in 33%, as probably preventable in 43%, and as quite unpreventable in only 24%. If we take the lowest of these figures, and assume that 400 out of every 1000 blind persons might have been saved from such a calamity, we realize the importance of preventative measures. For the physiology and pathology of the eye generally, see Vision and Eye.

Ophthalmia.

The great majority of these cases are due to infantile purulent ophthalmia. This arises from inoculation of the eyes with hurtful material at time of birth. If the contagious discharges are allowed to remain, violent inflammation is set up which usually ends in the loss of sight. It depends on the presence of a microbe, and the effective application of a weak solution of nitrate of silver is curative, if made in a proper manner at an early period of the case. In Germany, midwives are expressly prohibited by law from treating any affection of the eyes or eyelids of infants, however slight. On the appearance of the first symptoms, they are required to represent to the parents, or others in charge, that medical assistance is urgently needed, or, if necessary, they are themselves to report to the local authorities and the district doctor. Neglect of these regulations entails liability to punishment. Eleven of the United States of America have enacted laws requiring that, if one or both eyes of an infant should become inflamed, swollen or reddened at any time within two weeks of its birth, it shall be the duty of the midwife or nurse having charge of such infant to report in writing within six hours, to the health officer or some legally qualified physician, the fact that such inflammation, swelling or redness exists. The penalty for failure to comply is fine or imprisonment.

The following weighty words, from a paper prepared by Dr Park Lewis, of Buffalo, N.Y., for the American Medical Association, show that laws are not sufficient to prevent evil, unless supported by strong public sentiment:—

> “When an enlightened, civilized and progressive nation quietly and passively, year after year, permits a multitude of its people unnecessarily to become blind, and more especially when one-quarter of these are infants, the reason for such a startling condition of affairs demands explanation. That such is the fact, practically all reliable ophthalmologists agree.
>
> “From a summary of carefully tabulated statistics it has been demonstrated that at least four-tenths of all existing blindness might have been avoided had proper preventative or curative measures been employed, while one-quarter of this, or one-tenth of the whole, is due to *ophthalmia neonatorum*, an infectious, preventable and almost absolutely curable disease. Perhaps this statement will take on a new meaning when it is added that there are in the state of New York alone more than 6000, and in the United States more than 50,000 blind people; of these 600 in the one state, and 5000 in the country, would have been saved from lives of darkness and unhappiness, in having lost all the joys that come through sight, and of more or less complete dependence—for no individual can be as self-sufficient without as with eyes—if a simple, safe and easily applied precautionary measure had been taken at the right time and in the right way to prevent this affliction. The following three vital facts are not questioned, but are universally accepted by those qualified to know:—
>
> “1. The ophthalmia of infancy is an infectious germ disease.
>
> “2. By the instillation of a silver salt in the eyes of a new-born infant the disease is prevented from developing in all but an exceedingly small number of the cases in which it would otherwise have appeared.
>
> “3. In practically all those few exceptional cases the disease is absolutely curable, if like treatment is employed at a sufficiently early period.
>
> “Since these facts are no longer subjects of discussion, but are universally accepted by all educated medical men, the natural inquiry follows: Why, as a common-sense proposition, are not these simple, harmless, preventive measures invariably employed, and why, in consequence of this neglect, does a nation sit quietly and indifferently by, making no attempt to prevent this enormous and needless waste of human eyes?
>
> “The reasons are three-fold, and lie—first, with the medical profession; second, with the lay public; third, with the state.

"For the education of its blind children annually New York alone pays *per capita* at least $350, and a yearly gross sum amounting to much more than $100,000. If, as sometimes happens, the blind citizen is a dependent throughout a long life, the cost of maintenance is not less than $10,000, and the mere cost in money will be multiplied many times in that a productive factor, by reason of blindness, has been removed from the community.

"If, therefore, as an economic proposition, it were realized how vitally it concerns the state that not one child shall needlessly become blind, thereby increasing the public financial burden, there is no doubt that early and effective measures would be instituted to protect the state from this unnecessary and extravagant expenditure of public funds.

"Eleven states have passed legislative enactments requiring that the midwife shall report each case to the proper health authority, and affixing a penalty for the failure to do so. As has been intimated, however, it is not by any means always under the ministration of midwives that these cases occur, and, like all laws behind which is not a strong and well-informed public sentiment, this law is rarely enforced. A more effective method must be devised. Every physician having to do with the parturient woman, every obstetrician, every midwife, must be frequently and constantly advised of the dangers and possibilities of this disease, the necessity of prevention, and the value of early and correct treatment. They must then have placed in their hands, ready for instant use, a safe and efficient preparation, issued by the health authorities as a guarantee as to its quality and efficiency.

"An important step was taken in this direction when a resolution was passed by the House of Delegates at the annual meeting of the New York State Medical Society, requesting the various health officers of the state to include *ophthalmia neonatorum* among contagious diseases which must be reported to the local boards of health.

"The second essential, in order that the cause of infantile ophthalmia be abolished, is that a solution of the necessary silver salt be prepared under the authority of somebody capable of inspiring universal confidence, and that it be distributed by the health department of every state gratuitously to every obstetrician, physician or midwife qualified to care for the parturient woman. The nature of the solution, together with the character of the descriptive card which should accompany it, should be determined by a committee, chosen by the president of the American Medical Association, which should have among its members at least one representative ophthalmologist, one obstetrician and one sanitarian. The conclusions of this committee should be reported back to the House of Delegates, so that the preparation and its text should carry with it, on the great authority of this association, the assurance that the solution is entirely safe and necessary, and that its use should invariably be part of the toilet of every new-born child. The solution, probably silver nitrate, could be put up either by the state itself or by some trustworthy pharmacist, at an insignificant cost; its purity and sterility should be vouched for by the board of health of the state. It should be enclosed in specially prepared receptacles, each containing a special quantity, and so arranged that it may be used drop by drop. These, properly enclosed, accompanied by a brief lucid explanation of the danger of the disease, the necessity of this germicide, the method of its employment, and the right subsequent care of the eyes, should be sent to the obstetrician on the receipt of each birth certificate.

"I have said that responsibility for the indifference that is annually resulting in such frightful disaster lies primarily with the state, the public and the medical profession.

"The state is already aroused to the necessity of taking effective measures to wipe out this controllable plague. Bills have been introduced in the legislature of Massachusetts and of New York, providing for the appointment of commissions for the blind, one of whose duties will be to study the causes of unnecessary blindness and to suggest preventative measures."

Trachoma.

One of the most common diseases of the eye is trachoma, often called "granular lids," because the inner surface of the lid seems to be covered with little granulations. The disease sometimes lasts for years without causing blindness, though it gives rise to great irritation. It is generally attended by a discharge, which is highly contagious, producing the same disease if it gets into other eyes. Want of cleanliness is one of the most important factors in the propagation of trachoma, hence its great prevalence in Oriental countries. Trachoma is very prevalent in Egypt, where those suffering from total or partial blindness are said to amount to 10% of the population. During Napoleon's Egyptian campaign, nearly every soldier, out of an army of 32,000 men, was affected. During the following twenty years the disease spread through almost all European armies. In the Belgian army, there was one trachomatous soldier out of every five, and up to 1834 no less than 4000 soldiers had lost both eyes and 10,000 one eye. It is a disease which is very common in workhouse schools, orphan asylums and similar establishments. Unlike ophthalmia of new-born children, it is difficult to cure, and a total separation of the diseased from the healthy children should be effected.

About one-half of those who are blinded by injuries lose the second eye by sympathetic ophthalmia. It is a constant source of danger to those who retain an eye blinded by injury. Blindness from this cause can be prevented by the removal of the injured eye, but unfortunately the proposal often meets with opposition from the patient.

Sympathetic inflammation.

Glaucoma is a disease which almost invariably leads to total blindness; but in most cases it can be arrested by a simple operation if the case is seen sufficiently early.

Glaucoma.

Myopia, or "short-sight," makes itself apparent in children between the ages of seven and nine. Neglect of a year or two may do serious mischief. Short-sight, when not inherited, is produced by looking intently and continuously at near objects. Children should be encouraged to describe objects at a distance, with which they are unacquainted, and parents should choose out-door occupations and amusements for children who show a tendency to shortsightedness.

Short-sight.

A report was issued in 1906, by the school board of Glasgow, as to an investigation by Dr H. Wright Thomas, ophthalmic surgeon, regarding the eyesight of school children, which includes the following passage. Dr Wright Thomas states that the teachers tested the visual acuteness of 52,493 children, and found 18,565, or 35%, to be below what is regarded as the normal standard. He examined the 18,565 defectives by retinoscopy, and found that 11,209, or 21% of the whole, had ocular defects. The proportion of these cases was highest in the poor and closely-built districts and in old schools, and was lowest in the better-class schools and those near the outskirts of the city. Defective vision, apart from ocular defect, seems to be due partly to want of training of the eyes for distant objects and partly to exhaustion of the eyes, which is easily induced when work is carried on in bad light, or the nutrition of the children is defective from bad feeding and unhealthy surroundings. Regarding training of the eyes for distant objects, much might be done in the infant department by the total abolition of sewing, which is definitely hurtful to such young eyes, and the substitution of competitive games involving the recognition of small objects at a distance of 20 ft. or more. An annual testing by the teachers, followed by medical inspection of the children found defective, would soon cause all existing defects to be corrected, and would lead to the detection of those which develop during school life.

History of Institutions

Although there is a record of a hospital established by St Basil at Caesarea, Cappadocia, in the 4th century, a refuge by the hermit St Lymnee (d. *c.* 455) at Syr, Syria, in the 5th century, and an institution by St Bertrand, bishop of Le Mans, in the 7th century, the first public effort to benefit the blind was the founding of a hospital at Paris, in 1260, by Louis IX., for 300 blind persons. The common legend is that he founded it as an asylum for 300 of his soldiers who had become blinded in the crusade in Egypt, but the statutes of the founder are preserved, and no mention is made of crusaders. This Hospice des Quinze-Vingts, increased by subsequent additions to its funds, still assists the adult blind of France. The pensioners are divided into two classes—those who are inmates of the hospital (300), and those who receive pensions in the form of out-door relief. All appointments to inmates or pensions are vested in the minister of the Interior, and applicants must be of French nationality, totally blind and not less than forty years of age.

From the time of St Louis to the 18th century, there are records of isolated cases of blind persons who were educated, and of efforts to devise tangible apparatus to assist them.

Girolamo Cardan, the 16th-century Italian physician, conceived the idea that the blind could be taught to read and write by means of touch. About 1517 Francesco Lucas in Spain, and Rampazetto in Italy, made use of large letters cut in wood for instructing the blind. In 1646 a book, on the condition of the blind, was written by an Italian, and published in Italian and French, under the title of *L'Aveugle affligé et consolé*. In 1670 a book was written on the instruction of the blind by Lana Terzi, the Jesuit. In 1676 Jacques Bernoulli, the Swiss savant, taught a blind girl to read, but the means of her instruction were not made known. In 1749 D. Diderot wrote his *Lettre sur les aveugles à l'usage de ceux qui voient*, to show how far the intellectual and moral nature of man is modified by blindness. Dr S.G. Howe, who many years after translated and printed the "Letter" in embossed type, characterizes it as abounding with errors of fact and inference, but also with beauties and suggestions. The heterodox speculations contained in his "Letter on the Blind" caused Diderot to be imprisoned three months in the Bastille. He was released because his services were

required for the forthcoming *Encyclopaedia*. Rousseau visited Diderot in prison, and is reported to have suggested a system of embossed printing. J. Locke, G.W. Leibnitz, Molineau and others discussed the effect of blindness on the human mind. In Germany, Weissembourg had used signs in relief and taught Mlle Paradis.

Prior to the 18th century, blind beggars existed in such numbers that they struggled for standing room in positions favourable for asking alms. Their very affliction led to their being used as spectacles for the amusement of the populace. The degraded state of the masses of the blind in France attracted the attention of Valentin Haüy. In 1771, at the annual fair of St Ovid, in Paris, an innkeeper had a group of blind men attired in a ridiculous manner, decorated with peacock tails, asses' ears, and pasteboard spectacles without glasses, in which condition they gave a burlesque concert, for the profit of their employer. This sad scene was repeated day after day, and greeted with loud laughter by the gaping crowds. Among those who gazed at this outrage to humanity was the philanthropist Valentin Haüy, who left the disgraceful scene full of sorrow. "Yes," he said to himself, "I will substitute truth for this mocking parody. I will make the blind to read, and they shall be enabled to execute harmonious music." Haüy collected all the information he could gain respecting the blind, and began teaching a blind boy who had gained his living by begging at a church door. Encouraged by the success of his pupil, Haüy collected other blind persons, and in 1785 founded in Paris the first school for the blind (the Institution Nationale des Jeunes Aveugles), and commenced the first printing in raised characters. In 1786, before Louis XVI. and his court at Versailles, he exhibited the attainments of his pupils in reading, writing, arithmetic, geography and music, and in the same year published an account of his methods, entitled *Essai sur l'education des aveugles*. As the novelty wore off, contributions almost came to an end, and the Blind School must have ceased to exist, had it not been taken, in 1791, under the protection of the state.

The emperor of Russia, and later the dowager empress, having learned of Haüy's work, invited him to visit St Petersburg for the purpose of establishing a similar institution in the Russian capital. On his journey Haüy was invited by the king of Prussia to Charlottenburg. He took part in the deliberations of the Academy of Sciences in Berlin, and as a result a school was founded there.

Edward Rushton, a blind man, was the projector of the first institution for the blind in England—the School for the Indigent Blind, Liverpool. In 1790 Rushton suggested to the literary and philosophical society of which he was a member, the establishment of a benefit club for the indigent blind. The idea was communicated to his friend, J. Christie, a blind musician, and the latter thought the scheme should also include the instruction of young blind persons. They circulated letters amongst individuals who would be likely to give their assistance, and the Rev. Henry Dannett warmly advocated the undertaking. It was mainly due to his co-operation and zeal that Messrs Rushton and Christie's plan was carried out, and the Liverpool asylum was opened in 1791. Thomas Blacklock of Edinburgh, a blind poet and scholar, translated Haüy's work on the *Education of the Blind*. He interested Mr David Millar, a blind gentleman, the Rev. David Johnston and others in the subject, and after Blacklock's death the Edinburgh Asylum for the Relief of the Indigent and Industrious Blind was established (1793). Institutions were established in the United Kingdom in the following order:—

School for the Indigent Blind, Liverpool	1791
Royal Blind Asylum, Edinburgh	1793
Bristol Asylum	1793
School for the Indigent Blind Southwark (now removed to Leatherhead)	1799
Norwich Asylum and School	1805
Richmond Asylum, Dublin	1810
Aberdeen Asylum	1812
Molyneux Asylum, Dublin	1815
Glasgow Asylum and School	1827
Belfast School	1831
Wilberforce School, York	1833
Limerick Asylum	1834
London Society for Teaching the Blind to Read, St John's Wood, N.	1838
Royal Victoria School for the Blind, Newcastle-on-Tyne	1838
West of England Institute for the Blind, Exeter	1838
Henshaw's Blind Asylum, Manchester	1839
County and City of Cork Asylum	1840
Catholic Asylum, Liverpool	1841
Brighton Asylum	1842
Midland Institute for the Blind, Nottingham	1843

General Institute for the Blind, Birmingham	1848
Macan Asylum, Armagh	1854
St Joseph's Asylum, Dublin	1858
St Mary's Asylum, Dublin	1858
Institute for the Blind, Devonport	1860
South Devon and Cornwall Institute for the Blind, Plymouth	1860
School for the Blind, Southsea	1864
Institute for the Blind, Dundee	1865
South Wales Institute for the Blind, Swansea	1865
School for the Blind, Leeds	1866
College for the Sons of Gentlemen, Worcester	1866
Northern Counties Institute for the Blind, Inverness	1866
Royal Normal College and Academy of Music for the Blind, Upper Norwood	1872
School for the Blind, Sheffield	1879
Barclay Home and School for Blind Girls, Brighton	1893
Homes for Blind Children, Preston	1895
North Stafford School, Stoke-on-Trent	1897

Many of the early institutions were asylums, and to the present day schools for the blind are regarded by the public as asylums rather than as educational establishments. With nearly all these schools workshops were connected. In 1856 Miss Gilbert, the blind daughter of the bishop of Chichester, established a workshop in Berners Street, London, and since that date workshops have been started in many of the provincial towns.

After the beginning of the 19th century, institutions for the blind were established in various parts of Europe. The institution at Vienna was founded in 1804 by Dr W. Klein, a blind man, and he remained at its head for fifty years. That of Berlin was established in 1806, Amsterdam, Prague and Dresden in 1808, Copenhagen in 1811. There are more than 150 on the European continent, most of them receiving aid from the government, and being under government supervision.

The first school for the blind in the United States was founded in Boston, Mass., chiefly through the efforts of Dr John D. Fisher, a young physician who visited the French school. It was incorporated in 1829, and in honour of T.H. Perkins (1764-1854) who gave his mansion to the institution was named the Perkins Institution and Massachusetts Asylum (now School) for the Blind. Aid was granted by the state from the beginning. In 1831 Dr Samuel G. Howe (*q.v.*) was appointed director, and held that position for nearly forty-four years; being succeeded by his son-in-law Michael Anagnos (d. 1906), who established a kindergarten for the blind at Jamaica Plain, in connexion with the Perkins Institution. Dr Howe was interested in many charitable and sociological movements, but his life-work was on behalf of the blind. One of his most notable achievements was the education of Laura Bridgman (*q.v.*) who was deaf, dumb and blind, and this has since led to the education of Helen Keller and other blind deaf-mutes. The New York Institution was incorporated in 1831, and the Pennsylvania Institution was founded at Philadelphia by the Society of Friends in 1833. The Ohio was founded at Columbus in 1837, Virginia at Staunton in 1839, Kentucky at Louisville in 1842, Tennessee at Nashville in 1844, and now every state in the Union makes provision for the education of the blind.

Statistics

England and Wales.

In England and Wales the total number of persons returned in 1901 as afflicted with blindness was 25,317, being in the proportion of 778 per million living, or 1 blind person in every 1285 of the population. The following table shows that the proportion of blind persons to population has diminished at each successive enumeration since 1851, in which year particulars of those afflicted in this manner were ascertained for the first time. It will, however, be noted that, although the decrease in the proportion of blind in the latest intercensal period was still considerable, yet the rate of decrease which had obtained between 1871 and 1891 was not maintained.—

Year.	Number of Blind.	Blind per Million of the Population.	Persons Living to one Blind Person.
1851	18,306	1021	979
1861	19,352	964	1037
1871	21,590	951	1052
1881	22,832	879	1138
1891	23,467	809	1236

1901	25,317	778	1285

The following table, which gives the proportions of blind per million living at the earlier age-groups, shows that in the decennium 1891-1901, as also in recent previous intercensal periods, there was a decrease in the proportion of blind children in England and Wales generally; it thus lends support to the contention, in the *General Report* for 1891, that the decrease was due either to the lesser prevalence, or to the more efficient treatment, of purulent ophthalmia and other infantile maladies which may result in blindness.

Age-Period.	1851	1861	1871	1881	1891	1901
Under 5 years	198	196	185	166	155	129
5-10	297	256	259	288	188	192
10-15	365	366	359	”	290	323
15-20	416	415	404	388	370	239
20-25	481	443	451	422	385	359
Total under 25	339	322	317	298	269	261

In 1886 a royal commission on the blind, deaf and dumb was appointed by the government, and, after taking much valuable evidence, issued an exhaustive and instructive report. Following on the practical recommendations submitted by this commission, the Elementary Education (Blind and Deaf Children) Act 1893, was passed, under which the education of the blind became for the first time compulsory. In terms of this statute, the school authorities were made responsible for the provision of suitable elementary education for blind children up to sixteen years of age, and grants of £3, 3s. for elementary subjects, and of £2, 2s. for industrial training, were contributed by the state towards the cost of educating children in schools certified as efficient within the meaning of the Elementary Education Act 1876. The principal aim of the Education Act of 1893 was to supply education in some useful profession or trade which will enable the blind to earn their livelihood and to become useful citizens; but the weak spot was that no provision was made therein for the completion of their education and industrial training after the age of sixteen.

In England and Wales, in 1907, there were twenty-four resident schools and forty-three workshops for the blind. In many of the large towns, day classes for the education of blind children have been established by local education authorities. There are forty-six home teaching societies, who send teachers to visit the blind in their homes, to teach adults who wish to learn to read, to act as colporteurs, to lend and exchange useful books, and to act as Scripture readers to those who are aged and infirm. All the home teaching societies for the blind and many public libraries lend embossed books. The public library at Oxford has nearly 400 volumes of classical works for the use of university students.

A society was instituted in 1847 by Dr W. Moon for stereotyping and embossing the Scriptures and other books in “Moon” type. The type has been adapted to over 400 languages and dialects. After Dr Moon’s death in 1884 the work was carried on by his daughter, Miss Adelaide Moon, and the books are much used by the adult blind.

In 1868 Dr T.R. Armitage, being aware of the great improvements which had been made in the education of the blind in other countries, founded the British and Foreign Blind Association. This association was formed for the purpose of promoting the education and employment of the blind, by ascertaining what had been done in these respects in various countries, by endeavouring to supply deficiencies where these were found to exist, and by attempting to bring about greater harmony of action between the different existing schools and institutions. It gave a new impetus to the education and training of the blind in the United Kingdom. At that time their education was in a state of chaos. The Bible, or a great part of it, had been printed in five different systems. The founders took as an axiom that the relative merits of the various methods of education through the sense of touch should be decided by those and those only who have to rely on this sense. The council, who were all totally or partially blind, spent two years in comparing the different systems of embossed print. In 1869 and 1870 Dr Armitage corresponded with Dr J.R. Russ in regard to the New York Point. No trouble was spared to arrive at a right conclusion. The Braille system was finally adopted, and the association at once became a centre for supplying frames for writing Braille, printed books, maps, music and other educational apparatus for the blind. All books printed by the association are printed from stereotyped plates embossed by blind copyists. About 3000 separate works, varying in length from 1 to 12 volumes, have been copied by hand to meet the requirements of public libraries and individuals. About 700 ladies, who give their services, make the first Braille copy of these books, and they are recopied by blind

scribes, chiefly women and girls, who are paid for their work.

The National Lending library, London, was founded in 1882. It has over 5500 volumes in Braille and other types. Books are forwarded to all parts of the United Kingdom.

There are fourteen magazines published in embossed type in the United Kingdom.

There are thirty-six pension societies—the principal are Hetherington's, Day's, the Clothworkers', the Cordwainers', the National Blind Relief Society, Royal Blind Pension Society and Indigent Blind Visiting Society.

The Gardner Trust administers the income of £300,000 left by Henry Gardner in 1879. The income is used for instructing the blind in the profession of music, in suitable trades, handicrafts and professions other than music, for pensions, and free grants to institutions and individuals for special purposes.

Scotland.

According to the census of 1901, Scotland had 3253 (or 727 per million) blind persons, as against 2797 in 1891, but in a paper read at the conference in Edinburgh, 1906, the superintendent of the Glasgow Mission to the Out-door Blind stated that there were 758 employed or being educated in institutions, and 3238 known as "out-door blind," making a total of 3996. There are in Scotland ten missions, so distributed as to cover the whole country, and regular visits are made as far north as the Orkney and Shetland Islands. In carrying on the work, there are twenty-four paid missionaries or teachers and a large number of voluntary helpers. These societies originated in a desire to teach the blind to read in their own homes, and to provide them with the Scriptures and other religious books, but the social, intellectual and temporal needs of the blind also receive a large share of attention. These teachers afford the best means of circulating embossed literature, therefore the library committee of the Glasgow corporation has agreed to purchase books and place them in the mission library instead of in the public library. As the institutions provide for only a small number of the blind, strenuous efforts are made by the committee and teachers of missions to find some employment for the many adults who come under their care.

In Glasgow, a ladies' auxiliary furnishes work for 150 knitters, and takes the responsibility of disposing of their work. In Scotland there are five schools for the young blind, and in connexion with each is a workshop for adults. In Edinburgh the school is at West Craigmillar, and the workshop in the city, but both are under the same board of directors.

Ireland.

According to the census of 1901, there were 4253 totally blind persons in Ireland, a proportion of 954 per million, as against 1135 in 1891. Of these, 2430 were over 60 years of age and 11 over 100. These figures do not include the partially blind, who numbered 1217. The fact that so many aged blind persons are to be found in Ireland is doubtless due to an ophthalmic epidemic which occurred during the Irish famine. There are twelve institutions, a home mission and home teaching society; nine of these institutions are asylums, that system having been largely adopted in Ireland. The scarcity of manufacturing industries, except in a few northern counties, entails a lack of work suited to the blind. The Elementary Education Act (Blind and Deaf) does not extend to Ireland.

The following table gives the number of blind in age-groups in 1901:—

Age-Period.	Number.	Age-Period.	Number.
Under 5 years	10	50-55	392
5-10	38	55-60	314
10-15	64	60-65	617
15-20	73	65-70	382
20-25	95	70-75	540
25-30	116	75-80	306
30-35	146	80-85	372
35-40	146	85-90	118
40-45	205	95 and upwards	95
45-50	224		

British Colonies.

In the Dominion of Canada, South Africa, the states of the Australian Commonwealth and New Zealand, provision is made by the government for the education of the young blind, and in some cases for training the adults in handicrafts. Embossed literature is carried free of expense, and on the Victorian railways no charge is made for the guide who accompanies a blind person.

The following were the census returns for 1901:—

Victoria	1082	Tasmania	173
New South Wales	884	New Zealand	274 (1891)
South Australia	315	Natal	68
Queensland	209	Cape Colony	2802 (1904)
West Australia	121	Canada	3279

In Australia there are institutions for the blind at Melbourne, Sydney, Adelaide, Brighton, Brisbane and Maylands near Perth. In New Zealand the institution is at Auckland.

In Cape Colony between 1875 and 1891, there was an extraordinary increase in blindness, but between 1891 and 1904 the rate per 10,000 has decreased 23.78%. There is an institution at Worcester for deaf-mutes and blind, founded in 1881. It is supported by a government grant, fees and subscription.

Schools for the blind were established by the Dominion government at Brantford, Ontario (1871), and Halifax, Nova Scotia (1867).

In Montreal there are two private institutions, the M'Kay Institute for Protestant Deaf-Mutes and Blind, and a school for Roman Catholic children under the charge of the Sisters of Charity.

United States.

In the United States the education of the blind is not regarded as a charity, but forms part of the educational system of the country, and is carried on at the public expense. According to the *Annual Report* of the Commissioner of Education for 1908, there were 40 state schools, with 4340 pupils. The value of apparatus, grounds and buildings was $9,201,161. For salaries and other expenditure, the aggregate was $1,460,732. The United States government appropriates $10,000 annually for printing embossed books, which are distributed among the different state schools for the blind. Beside these state schools, there are workshops for the blind subsidized by the state government or the municipality. Commissions composed of able men have recently been appointed in several of the states to take charge of the affairs of the blind from infancy to old age. The exhaustive summary of the 12th census enables these commissions to communicate with every blind person in their respective states.

At the 12th census a change was made in the plan for securing the returns, and the work of the enumerators was restricted to a brief preliminary return, showing only the name, sex, age, post office address, and nature of the existing defects in all persons alleged to be blind or deaf. Dr Alexander Graham Bell, of Washington, D.C., was appointed expert special agent of the census office for the preparation of a report on the deaf and blind. He was empowered to conduct in his own name a correspondence relating to this branch of the census inquiry. A circular containing eighteen questions was addressed to every blind person given in the census, and from the data contained in the replies the following tables (I., II., III., IV.) have been compiled.

TABLE I.—*The Blind, by Degree of Blindness and Sex.*

Sex.	The Blind.	The Totally Blind.	The Partially Blind.
Number—			
Total	64,763	35,645	29,118
Male	37,054	20,144	16,190
Female	27,709	15,501	12,208
Per cent distribution—			
Total	100.0	100.0	100.0
Male	57.2	56.5	58.1
Female	42.8	43.5	41.9
Number per 1,000,000 population of same sex—			
Both sexes	852	469	383
Male	955	519	436
Female	745	417	328

The enumerators reported a total of 101,123 persons alleged to be blind as defined in the instructions contained in the schedules, but this number was greatly reduced as a result of the correspondence directly with the individuals, 8842 reporting that the alleged defect did not exist, and 6544 that they were blind only in one eye but were able to see with the other,

and hence did not come within the scope of the inquiry. No replies were received in 19,884 cases in which personal schedules were sent, although repeated inquiries were made; consequently these cases were dropped. In 380 cases the personal schedules returned were too incomplete for use, and in 75 cases duplication was discovered. The number of cases remaining for statistical treatment, after making the eliminations and corrections, was 64,763, representing 35,645 totally blind, and 29,118 partially blind. This number, however, can be considered only as the minimum, as an unknown proportion of the blind were not located by the enumerators, and doubtless a considerable proportion of the 19,884 persons who failed to return the personal schedules should be included in the total.

"Blindness, either total or partial, is so largely a defect of the aged, and occurs with so much greater frequency as the age advances and the population diminishes, that in any comparison of the proportion of the blind in the general population of different classes, such as native and foreign-born whites, or white and coloured, the age distribution of the population of each class should be constantly borne in mind. The differences in this respect account for many of the differences in the gross ratios, and it is only when ratios are compared for classes of population of identical ages that their relative liability to blindness can be properly inferred."

TABLE II.—*The Blind, by Degree of Blindness, Age-Periods, Colour and Nativity.*

Degree of Blindness and Age-Period.	All Classes.	White.			Coloured.
		Total.	Native.	Foreign-born.	
Number—					
The blind	64,763	56,535	45,479	10,694	8228
Under 20 years	8,308	7,252	6,937	231	1056
20 years and over	56,165	49,067	38,388	10,420	7098
Age unknown	290	216	154	43	74
The totally blind	35,645	30,359	23,636	6,511	5286
Under 20 years	4,123	3,543	3,377	129	580
20 years and over	31,363	26,704	20,179	6,636	4639
Age unknown	159	112	80	19	27
The partially blind	29,118	26,176	21,843	4,183	2942
Under 20 years	4,185	3,709	3,560	102	476
20 years and over	24,802	22,363	18,209	4,057	2439
Age unknown	131	104	74	24	27
Number per 1,000,000 population of same age—					
The blind	852	846	804	1,047	896
Under 20 years	247	250	248	215	229
20 years and over	1,334	1,305	1,348	1,143	1574
The totally blind	469	454	418	637	576
Under 20 years	123	122	121	120	126
20 years and over	745	710	708	698	1033
The partially blind	383	392	386	410	320
Under 20 years	124	128	127	95	103
20 years and over	589	595	639	445	541

Table II. shows the classification, by degree of blindness, of the blind under twenty years of age, twenty years of age and over, and of unknown age, with respect to colour and nativity, with the number at the specified ages per million of population in the same age-group.

The relationship or consanguinity of parents of the 64,763 blind was reported in 56,507 cases, in 2527 (or 4.5%) of which the parents were related as cousins.

In 57,726 cases the inquiry as to the existence of blind relatives was answered; 10,967 (or 19%) of this number reported that they had blind relatives.

Of the 2527 blind persons whose parents were cousins, 993 (or 39.3%) had blind relatives, —844 having blind brothers, sisters or ancestors, and 149 having blind collateral relatives or descendants.

Of the 53,980 blind whose parents were not related, 9490 (or 17.6%) had blind relatives, 7395 having blind brothers, sisters or ancestors, and 2095 having blind collateral relatives or descendants.

It was found that, of the 2527 blind whose parents were cousins, 632 (or 25%) were congenitally blind, of whom 350 (or 55.4%) had also blind relatives of the classes specified; while, among the 53,980 whose parents were not so related, the number of congenitally blind was 3666 (or but 6.8%), of whom only 1023 (or 27.9%) had blind relatives.

France.

In 1883 the number of blind in France was estimated at 32,056, the total population of the country being 38,000,000; 2548 of the blind were under, and 29,508 above, 21 years of age; of the former 857 were receiving instruction in 21 schools supported by the state, by the city of Paris, by some of the departments, and by some religious bodies. The four Parisian institutions are the Institution Nationale des Jeunes Aveugles, the École Braille (founded in 1883), the Établissement des Soeurs Aveugles de St Paul (founded in 1852), and that of the Frères de Saint Jean de Dieu (founded in 1875).

TABLE III.—*The Blind, by Degree of Blindness and Age-Periods.*

Age-Period.	The Blind.	The Totally Blind.	The Partially Blind.
Number—			
All Ages	64,763	35,645	29,118
Under 10 years	2,307	1,262	1,045
10-19 years	6,001	2,861	3,140
20-29 ”	4,861	2,851	2,010
30-39 ”	5,024	3,077	1,947
40-49 ”	6,504	3,778	2,726
50-59 ”	8,530	4,791	3,739
60-69 ”	10,507	5,835	4,672
70-79 ”	11,421	6,132	5,289
80-89 ”	7,490	3,885	3,605
90-99 ”	1,596	851	745
100 years and over	232	163	69
Age unknown	290	159	131
Number per 1,000,000 population of same age—			
All ages	852	469	383
Under 10 years	128	70	58
10-19 years	384	183	201
20-29 ”	351	206	145
30-39 ”	478	293	185
40-49 ”	845	491	354
50-59 ”	1,655	930	725
60-69 ”	3,396	1,886	1,510
70-79 ”	8,136	4,368	3,768
80-89 ”	22,022	11,423	10,599
90-99 ”	52,746	28,125	24,621
100 years and over	66,210	46,518	19,692
Age unknown	1,446	793	653

Germany.

The number of the blind in Germany was about 39,000, or 870 per million in 1885. The number of institutions was 28, nearly all being educational, with a total of 2139 pupils. All these institutions, except two which are supported entirely by private munificence, are largely assisted by the state, the communes or the provinces. Seventeen of them derive their entire requirements from the state, so that they are quite independent of private charity, while the remainder are only supplemented from public funds so far as the private contributions fall short of the expenses.

Saxony system.

The following extracts were made from an official communication from Hofrath Büttner, director of the institution for the blind in Dresden, to the royal commission, concerning the care and supervision (*Fürsorge*) of the blind after their discharge from the institution:—

“When twenty years of age, the blind are usually discharged from the institution. Long experience has taught us that the care and supervision of the blind after their discharge from the institution are quite as important as their education and training in the institution. It would, in our opinion, be unjust to remove them from their sad surroundings, educate and accustom them to higher wants, and then allow them to sink

backward into their former miserable way of life. After much deliberation it was decided to remain in connexion with the discharged blind, to visit them in their places of abode, to learn their wants, to study the difficulties which they experienced in supporting themselves independently, and, as far as possible, to remove their grievances. Director Georgi began this work in 1843. Director Reinhard continued it from 1867 to 1879, and the present director has followed the same path. With the knowledge of these difficulties the *Fürsorge* (care) for discharged blind steadily advanced, and has won the confidence of the Saxon people. It was decided that, on the discharge of the blind person, the director should select a trustworthy person, residing in his future place of abode, to give him advice and practical help, to protect him from imposition, and to keep up communication with the director. If this guardian is unable to advise or help, he then writes to the director, who, if necessary, comes to the place, and this is all the easier as he travels free on all railways in Saxony. The result of these visits, as well as all communications from the guardian, the letters from the blind person, and every document relating to him, are entered in a register kept at the institution. These guardians are respectable, benevolent, practical men, capable of procuring custom for their wards. But there was no doubt that, in spite of these arrangements, the discharged blind were unable to support themselves without the assistance of capital, whether in money or outfit. The blind man can do as good work as the man who can see; but as a rule he does not work so quickly, and if the man who is not blind has to use every exertion to support himself and his family, the blind man to do the same requires some special help, without which he will either not be able to compete, or will have to lead a life of great privation.

"The first difficulty when a blind pupil is starting in life is to provide himself with the necessary tools and material. These the institution supplies to him, and continues through life to afford him moral and material help; and by this means the greater part of the blind are enabled to save money for sickness and old age. Those who cannot return to their relations cannot at once meet all their expenses, and the weak and old need special help. A part of the money for their board and lodging is paid for those who have to be settled in other places on account of the death or untrustworthiness of their relatives.

"The fund for the discharged blind is administered by the director of the institution. The number of those assisted amounts at present to about 400, who live respectably in all parts of Saxony, are almost self-supporting, and feel themselves free men. For, just as a son does not feel galled by a gift from his father, so they are not ashamed to receive assistance from their second paternal home, the institution."

Holland.

The number of the blind in Holland, according to the census of the 1st of December 1869, was 1593, or one in every 2247 of the general population. The Protestants and Roman Catholics were about equally balanced. No cognizance was taken of the blind in the census of 1879. There is only one blind institution, that of Amsterdam, with 60 pupils, with a preparatory school at Benuchem (with 20 pupils) and an asylum for adults with 52 inmates (unmarried). Besides these, there are workshops at Amsterdam, Rotterdam, the Hague, Utrecht and Middelburg.

Denmark.

According to the census of 1870, there were in Denmark 1249 blind (577 males and 672 females), or one blind for every 1428 persons. One institution has been established by government, *i.e.* the Royal Institution for the Blind, at Copenhagen; 100 children, aged 10 and upwards, are here educated. There is a preparatory school for blind children under 10 years of age, and an asylum for blind females, most of whom are former pupils of the royal school. An association for promoting the self-dependence of the blind assists not only former pupils of the school but every blind man or woman willing and able to work.

TABLE IV.—*The Blind, by Consanguinity of Parents, Degree of Blindness, and Blind Relatives of Other Classes.*

Consanguinity of Parents.	Total.	Blind Brothers, Sisters or Ancestors.	Collateral Relatives or De-scendants alone, Blind.	No Blind Relatives or Rela-tives by Marriage alone, Blind.	Not Stated.
All Classes—					
The blind	64,763	8629	2338	46,759	7037
Totally blind	35,645	4378	1215	25,349	3703
Partially blind	29,118	4251	1123	20,410	3334
Parents cousins—					

The blind	2,527	844	149	1,456	78
Totally blind	1,291	435	78	739	39
Partially blind	1,236	409	71	717	39
Parents not cousins—					
The blind	53,980	7395	2095	43,368	1122
Totally blind	29,892	3720	1090	24,541	541
Partially blind	24,088	3675	1005	18,827	581
Consanguinity of parents not stated—					
The blind	8,256	390	94	1,935	5837
Totally blind	4,462	223	47	1,069	3123
Partially blind	3,794	167	47	866	2714

Sweden.

The number of blind persons in Sweden, according to the census of December 1880, was 3723, being at the rate of one blind person for every 1226 of the general population. At the beginning of the year 1879, the instruction of the blind in Sweden was completely separated from that of the deaf and dumb, on the grounds that it hindered the intellectual development of the blind—a conclusion which experience shows to be tolerably correct. Since July 1888 the Royal Institution of the Blind has obtained a new building at Tomteboda, near Stockholm.

Norway.

The law of the 8th of July 1881, concerning the instruction of abnormal children, has imposed on the state the duty of establishing a sufficient number of schools for the blind in Norway as well as for the other abnormal children. All the blind of the country, from 9 years of age until the age of 21, are compelled to be educated, with a maximum of 8 years of instruction for each pupil.

Finland.

The census of 1873 showed that in Finland there were 7959 blind in a total population of about 2,000,000 inhabitants, the proportion reaching the very high figure of one for every 251 of the total population. Nevertheless there were only 160 of school age. For these there are two institutions, one at Helsingfors where the instruction is given in the Swedish language, and where there are about 12 pupils, and another at Kuopio, where the instruction is given in the Finnish language, and where the pupils number about 30.

Austria.

According to information received from the I.R. Central Commission for Statistics, the number of blind in the provinces represented in the Austrian Reichsrath amounted to 15,582 in the year 1884. Of these, 2345 were children up to 15 years of age, namely 433 below 5, 779 from 5 to 10, and 1113 from 10 to 15 years. The total number of institutions for blind children in Austria amounts to 8. The blind children of school age who are not placed in special institutions are compulsorily taught in the public general free schools, as far as practicable. The number of blind in the whole dominion of the crown of St Stephen was 208,391.

Italy.

The number of blind persons in Italy was 21,718, according to the census of 1881, and those of school age were estimated to form 25% of the whole, or about 5429 in number. But no special cognizance of the blind is taken in the government census. There are 20 institutions, schools and workshops for the blind.

Russia.

Statistics with regard to the number and condition of the blind in the Russian empire are of a very limited character, and it is only of late years that any attempt has been made to draw up any accurate returns with regard to them. The total number of the blind throughout the empire is generally reckoned at from 160,000 to 200,000, thus making 1600 to 2000 per million inhabitants. In Russia there are 21 institutions for the support of the blind.

Egypt

“In Egypt the blind are very numerous in comparison with other countries, and although no exact statistics are at present obtainable on this point, it is computed that the proportion is at least one totally blind person to every 50 of the population. This is principally the result of acute ophthalmia occurring in infancy, and it is fostered by the superstitious observance which prevents the mothers from washing their children from the time of birth until they are two years old, at which late date only they are weaned. There is also a great deal of infection carelessly and ignorantly conveyed direct from eye to eye, by means of unwashed fingers, and this is accountable for the occurrence of much more eye-disease than any that may be caused by the proverbial flies. The only employment followed by the blind, both Mahommedan and Coptic (or native Christian), and that only to a limited extent, is recitation aloud—the former repeating portions of the Koran at funerals, and the latter chanting the church-ritual in their services; the blind girls and women are without occupation. Practically no education is given to the blind as a class, and anything which they learn has to be acquired orally by frequent

repetition. The blind were not always so completely neglected, as the native ecclesiastical authorities (Wakf) gave an annual grant of £2000 for the continued maintenance of a school for the blind and the deaf and dumb in Cairo, which taught about 80 day-pupils; the latter years of the school were passed under the ministry of education, and it was ultimately discontinued. Such a condition of affairs appealed to Dr T.R. Armitage, and explains his motive in trying to establish some proper means for affording the blind in Egypt the necessary scholastic instruction and other training. In Egypt, as in other countries, it is occasionally very difficult, and takes some time, to start any enterprise such as this on a satisfactory and practical footing, and it was left for Mrs T.R. Armitage to be the means of successfully carrying out her husband's wishes in this particular. In 1900 Mrs Armitage asked Dr Kenneth Scott to prepare a scheme for the education and welfare of the blind in Egypt, on lines suggested to her. This, through the British and Foreign Blind Association, was submitted to Queen Victoria, who graciously commanded it to be sent, through the foreign office, to the khedive, who in mark of approbation and encouragement generously gave a handsome donation towards its realization. The Institution for the Blind was established at Zeitoun, Cairo, early in the year 1901, through funds provided by Mrs T.R. Armitage. The object of the institution, which is wholly unsectarian in character, is to educate and train the blind mentally and physically and in industrial occupations, and at the same time to improve their moral standard, so that eventually they may become in great measure, or even completely, self-supporting." (Dr Kenneth Scott.)

India.

India has a large proportion of blind inhabitants, ranging from one in 600 in some provinces, to one in 400 in others, with a total of more than half a million. Until recently, little had been done in the way of organized effort to educate them, though many of the missionaries had helped individual cases. At Amritsar a large and well-organized work for the blind has been carried on for many years. This school has now been moved to Rajpur, and helps 70 blind women and children. In 1903 a government school and hospital were established at Bombay as a memorial to Queen Victoria. Reading, writing, arithmetic, tailoring, typewriting, carpentering, lathe-work and carpet-weaving are taught. There are small schools at Parantij, Calcutta, Palancottah, Calicut, Coorg, Chota-Nagpur, and at Moulmein in Burma. The memorial to Queen Victoria in Ceylon took the form of work for the blind. J. Knowles, with the help of L. Garthwaite of the Indian Civil Service, devised a scheme of oriental Braille, which has been adopted by the British and Foreign Bible Society for the production of the Scriptures in Eastern languages.

China.

Blindness is very prevalent in China, and to eye-diseases, neglect and dirt, must be added leprosy and smallpox as causes. Blind beggars may be seen on every highway, clamouring for alms. As in India their pitiful condition attracted the attention of the missionaries. W.H. Murray, a Scottish missionary in Peking, made a simple and ingenious adaptation of the Braille symbols to the complicated system of Chinese printing, in which over 4000 characters are required. It was necessary to represent at least 408 sounds, and each one was given a corresponding Braille number. When a pupil reads the number he knows instantly the sound for which it stands. A school for the blind was established at Peking, and the version of the Scriptures printed at Peking can be read in all the provinces where the Northern Mandarin dialect is spoken (see Miss Gordon Cumming, *The Inventor of the Numeral Type for China*). A Braille code has recently been arranged for Mandarin, based on a system of initials and finals, by Miss Garland of the China Inland Mission. At Foochow there is a large school for boys and girls in connexion with the Church Missionary Society. At Ningpo, Amoy, Canton and Fukien work for the blind is carried on by the missionaries.

Japan.

The blind in Japan have long been trained in massage, acupuncture and music, and until recently, with few exceptions, none but the blind engaged in these occupations. From three to five years are required to become proficient in massage, but a blind person is then able to support himself. In Yokohama, with a population of half a million, there are 1000 men and women engaged in massage, and all but about 100 of these are blind. In 1878 a school for the blind and deaf-mutes was established in Kyoto, and soon after one in Tokyo. Japan has four schools for the blind, and seven combined schools for the blind and deaf-mutes.

Palestine.

As in other Eastern countries, blindness is very prevalent in Palestine. Ophthalmic hospitals and medical attendance are now available in the larger towns, and the missionary schools have done much to inculcate habits of cleanliness, therefore there is a slight decrease in the number of the blind. The home and school for blind girls in Jerusalem is the outcome of a day school opened in 1896 by an American missionary. There is also a small school at Urfa under the auspices of the American mission in that town.

As more sensations are received through the eye than through any other organ, the mind of a blind child is vacant, and the training should begin early or the mind will degenerate.

Early training.

Indirectly the loss of sight results in inaction. If no one encourages a blind child to move, he will sit quietly in a corner, and when he leaves his seat will move timidly about. This want of activity produces bad physical effects, and further delays mental growth. The blind are often injured, some of them ruined for life, through the ignorance and mistaken kindness of their friends during early childhood. They should be taught to walk, to go up and down stairs, to wash, dress and feed themselves.

They should be carefully taught correct postures and attitudes, and to avoid making grimaces. They should be told the requirements of social conventions which a seeing child learns through watching his elders. They have no consciousness that their habits are disagreeable, and the earlier unsightly mannerisms are corrected the better. It is a fallacy to suppose that the other senses of the blind are naturally sharper than those of the seeing. It is only when the senses of hearing and touch have been cultivated that they partially replace sight, and such cultivation can begin with very young children.

Blind children have a stronger claim upon the public for education than other children, because they start at a disadvantage in life, they carry a burden in their infirmity, they come mostly of poor parents, and without special instruction and training they are almost certain to become a public charge during life.

Public authorities should adopt the most efficient plan for preparing blind children to become active, independent men and women, rather than consider the cheapest and easiest method of educating them. We cannot afford to give the blind an education that is not the best of its kind in the trade or profession they will have to follow. There are many seeing persons with little education who are useful citizens and successful in various industries, but an uneducated blind person is helpless, and must become dependent.

The surroundings of the blind do not favour the development of activity, self-reliance and independence. Parents and friends find it easier to attend to the wants and requirements of their blind children than to teach them to be self-helpful in the common acts of everyday life. A mistaken kindness leads the friends to guard every movement and prevent physical exertion. As a rule, the vitality of the blind is much below the average vitality of seeing persons, and any system of education which does not recognize and overcome this defect will be a failure. It is the lack of energy and determination, not the want of sight, that causes so many failures among the blind.

A practical system of education, which has for its object to make the blind independent and self-sustaining, must be based upon a comprehensive course of physical development. A

Physical training.

blind man who has received mechanical training, general education, or musical instruction, without physical development, is like an engine provided with everything necessary except motive power.

Schools for the blind should be provided with well-equipped gymnasia, and the physical training should include various kinds of mass and apparatus work. Large and suitable playgrounds are also essential. Besides a free space where they can run and play, it should have a supply of swings, tilts, jumping-boards, stilts, chars-à-bancs, skittle-alleys, &c. Any game that allows of sides being taken adds greatly to the enjoyment, and is a powerful incentive to play. The pupils should be encouraged to enter into various competitions, as walking, running, jumping, leap-frog, sack-racing, shot-pitching, tug-of-war, &c. Cycling, rowing, swimming and roller-skating are not only beneficial but most enjoyable.

The subjects in the school curriculum should be varied according to the age and capacity of the pupils, but those which cultivate the powers of observation and the perceptive

Mental training.

faculties should have a first place. Object lessons or nature study should have a large share of attention. Few people realize that a blind child knows nothing of the size, shape and appearance of common objects that lie beyond the reach of his arm. When he has once been shown how to learn their characteristics, he will go on acquiring a knowledge of his surroundings unaided by a teacher. Again, a careful drill in mental arithmetic, combining accuracy with rapidity, is essential. A good command of English should be cultivated by frequent exercises in composition, and by committing to memory passages of standard prose and poetry. In his secondary course, the choice of subjects must depend upon his future career. Above all, stimulate a love of good reading.

From the earliest years manual dexterity should be cultivated by kindergarten work, modelling, sewing, knitting and sloyd. Blind children who have not had the advantage of this early handwork find much more difficulty when they begin a regular course in technical training. Early manual training cultivates the perceptive faculties, gives activity to the body, and prepares the hands and finger for pianoforte-playing, pianoforte-tuning and handicrafts.

Early manual training.

Besides a good general education, the blind must have careful and detailed training in some handicraft, or thorough preparation for some profession. The trades and professions open to them are few, and if they fail in one of these they cannot turn quickly to some other line of work. Those who have charge of their education should avail themselves of the knowledge that has been gained in all countries, in order to decide wisely in regard to the trade or occupation for which each pupil should be prepared. It may be some kind of handicraft, pianoforte-tuning, school-teaching, or the profession of music; the talent and ability of each child should be carefully considered before finally deciding his future occupation. The failure to give the blind a practical education often means dependence through life.

Choice of occupation

Pianoforte-tuning as an employment for the blind originated in Paris. About 1830 Claud Montal and a blind fellow-pupil attempted to tune a piano. The seeing tuner in charge of the school pianos complained to the director, and they were forbidden to touch the works, but the two friends procured an old piano and continued their efforts. Finally, the director, convinced of their skill, gave them charge of all the school pianos, and classes were soon started for the other pupils. When Montal left the institution he encountered great prejudice, but his skill in tuning became known to the professors of the Conservatoire, and his work rapidly increased and success was assured. Montal afterwards established a manufactory, and remained at its head for many years. Tuning is an excellent employment for the blind, and one in which they have certain advantages. The seeing who excel in the business go through a long apprenticeship, and one must give the blind even more careful preparation. They must work a number of hours daily, under suitable tuition, for several years. After a careful examination by an expert pianoforte-tuning authority, every duly qualified tuner should be furnished with an official certificate of proficiency, and tuners who cannot take the required examinations ought not to be allowed to impose upon the public.

Pianoforte-tuning.

Music in its various branches, when properly taught, is the best and most lucrative employment for the blind. To become successful in the profession, it is necessary for the blind to have opportunities of instruction, practice, study, and hearing music equal to those afforded the seeing, with whom they will have to compete in the open market. If the blind musician is to rise above mediocrity, systematic musical instruction in childhood is indispensable, and good instruction will avail little unless the practice is under constant and judicious supervision. The musical instruction, in its several branches of harmony, pianoforte, organ and vocal culture, must be addressed to the mind, not merely to the ear. This is the only possible method by which musical training can be made of practical use to the blind. The blind music teacher or organist must have a well-disciplined mind, capable of analysing and dealing with music from an intellectual point of view. If the mental faculties have not been developed and thoroughly disciplined, the blind musician, however well he may play or sing, will be a failure as a teacher. The musical instruction must be more thorough, more analytical, more comprehensive, than corresponding instruction given to seeing persons. In 1871 Dr Armitage published a book on the education and employment of the blind, in which he stated that of the blind musicians trained in the United Kingdom not more than one-half per cent were able to support themselves, whereas of those trained in the Paris school 30% supported themselves fully, and 30% partially, by the profession of music.

Musical training.

To provide a better education and improve the musical training of the blind, the Royal Normal College was established in 1872.[3] Its object was to afford the young blind a thorough general and musical education, to qualify them to earn a living by various intellectual pursuits, especially as organists, pianists, teachers and pianoforte-tuners. From the first, the founders of the college maintained that the blind could only be made self-sustaining by increasing their intelligence, bodily activity and dexterity, by inculcating business habits, by arousing their self-respect, and by creating in their minds a belief in the possibility of future self-maintenance. A kindergarten department was opened in 1881. In July 1896 Queen’s Scholarship examinations were held at the Royal Normal College, for the first time, for blind students, and the institution recognized by the Education Department as a training college

Royal Normal College.

for blind school-teachers.

From the first day a pupil enters school until he finishes his course of training, care must be taken to implant business habits. Blind children are allowed to be idle and helpless at home; they do not learn to appreciate the value of time, and in after years this is one of the most difficult lessons to inculcate. Having drifted through childhood, they are content to drift through life. The important habits of punctuality, regularity and precision should be cultivated in all the arrangements and requirements. A great effort should be made to lift the blind from pauperism. As soon as pupils enter a school, all semblance of pauper origin should be removed. They must be inspired with a desire for independence and a belief in its possibility. In the public mind blindness has been so long and closely associated with dependence and pauperism that schools for the blind, even the most progressive, have been regarded hitherto as asylums rather than educational establishments. A sad mistake in the training of the blind is the lack of an earnest effort to improve their social condition. The fact that their education has been left to charity has helped to keep them in the ranks of dependents.

Educational needs.

The question of day-classes versus boarding-schools has been much discussed. It is claimed by some that a blind child gains more independence if kept at home and educated in a school with the seeing. This theory is not verified by practical experience. At home its blindness makes the child an exception, and often it takes little or no part in the active duties of everyday life. Again, in a class of seeing children the blind member is treated as an exception. The memory is cultivated at the expense of the other faculties, and the facility with which it recites in certain subjects causes it to make a false estimate of its attainments. The fundamental principles in different branches are imperfectly understood, from the failure to follow the illustrations of the teacher. In the playgrounds, a few irrepressibles join in active games, but most of the blind children prefer a quiet corner.

For the sake of economy, schools for deaf-mutes and the blind are sometimes united. As the requirements of the two classes are entirely separate and distinct, the union is undesirable, whether for general education or industrial training. The plan was tried in America, but has been given up in most of the states. To meet the difficulty of proper classification with small numbers, blind boys and girls are taught in the same classes. The acquaintances then made lead to intimacy in later years and foster intermarriage among the blind. Intermarriage among the blind is a calamity, both for them and for their children; some who might have been successful business men are to-day begging in the streets in consequence of intermarriage.

In every school or class there will be a certain number of young blind children who, from neglect, want of food, or other causes, are feeble in body and defective in intellect; such children are a great burden in any class or school, and require special treatment and instruction. Educational authorities should unite and have one or two schools in a healthful locality for mentally defective blind children.

More and more, in educational work for the seeing, there is a tendency to specialize, and thus enable each student to have the best possible instruction in the subjects that bear most directly on his future calling. To prepare the blind for self-maintenance, there should be an equally careful study of the ability of each child.

A scheme of education which has for its object to make the blind a self-sustaining class should include: kindergarten schools for children from 5 to 8 years of age; preparatory schools from 8 to 11; intermediate schools from 11 to 14. At 14 an intelligent opinion can be formed in regard to the future career of the pupils. They will fall naturally into the following categories:—(*a*) A certain number will succeed better in handicraft than in any other calling, and should be drafted into a suitable mechanical school. (*b*) A few will have special gifts for general business, and should be educated accordingly. (*c*) A few will have the ability and ambition to prepare for the university, and the special college should afford them the most thorough preparation for the university examinations. (*d*) Some will have the necessary talent, combined with the requisite character and industry, to succeed in the musical profession; in addition to a liberal education, these should have musical instruction, equal to that given to the seeing, in the best schools of music. (*e*) Some may achieve excellent success as pianoforte-tuners, and in a pianoforte-tuning school strict business habits should be cultivated, and the same attention to work required as is demanded of seeing workmen in well-regulated pianoforte factories.

The United Kingdom stands almost alone in allowing the education of the blind to depend upon charity. In the United States, each state government not only makes liberal provision for the education and training of the blind, but most of them provide grounds, buildings and

a complete equipment in all departments. Although it costs much more *per capita*, from £40 to £60 per annum, the blind are as amply provided with the means of education as the seeing. The government of the United States appropriates $10,000 per annum for printing embossed books for the blind. Most of the European countries and the English colonies provide by taxation for the education of the blind.

Types

The earliest authentic records of tangible letters for the blind describe a plan of engraving the letters upon blocks of wood, the invention of Francesco Lucas, a Spaniard, who dedicated it to Philip II. of Spain in the 16th century. In 1640 Pierre Moreau, a writing-master in Paris, cast a movable leaden type for the use of the blind, but being without means to carry out his plan, abandoned it. Pins inserted in cushions were next tried, and large wooden letters. After these came a contrivance of Du Puiseaux, a blind man, who had metal letters cast and set them in a small frame with a handle. Whilst these experiments were going on in France, attempts had also been made in Germany. R. Weissembourg (a resident of Mannheim), who lost his sight when about seven years of age, made use of letters cut in cardboard, and afterwards pricked maps in the same material. By this method he taught Mlle Paradis, the talented blind musician and the friend of Valentin Haüy.

To Haüy belongs the honour of being the first to emboss paper as a means of reading for the blind; his books were embossed in large and small italics, from movable type set by his pupils. The following is an account of the origin of his discovery. Haüy’s first pupil was François Lesueur, a blind boy whom he found begging at the porch door of St Germain des Prés. While Lesueur was sorting the papers on his teacher’s desk, he came across a card strongly indented by the types in the press. The blind lad showed his master he could decipher several letters on the card. Immediately Haüy traced with the handle of his pen some signs on paper. The boy read them, and the result was printing in relief, the greatest of Haüy’s discoveries. In 1821 Lady Elizabeth Lowther brought embossed books and types from Paris, and with the types her son, Sir Charles Lowther, Bart., printed for his own use the Gospel of St Matthew. The work of Haüy was taken up by Mr Gall of Edinburgh, Mr Alston of Glasgow, Dr Howe of Boston, Mr Friedlander of Philadelphia, and others. In 1827 James Gall of Edinburgh embossed some elementary works, and published the Gospel of St John in 1834. His plan was to use the common English letter and replace curves by angles.

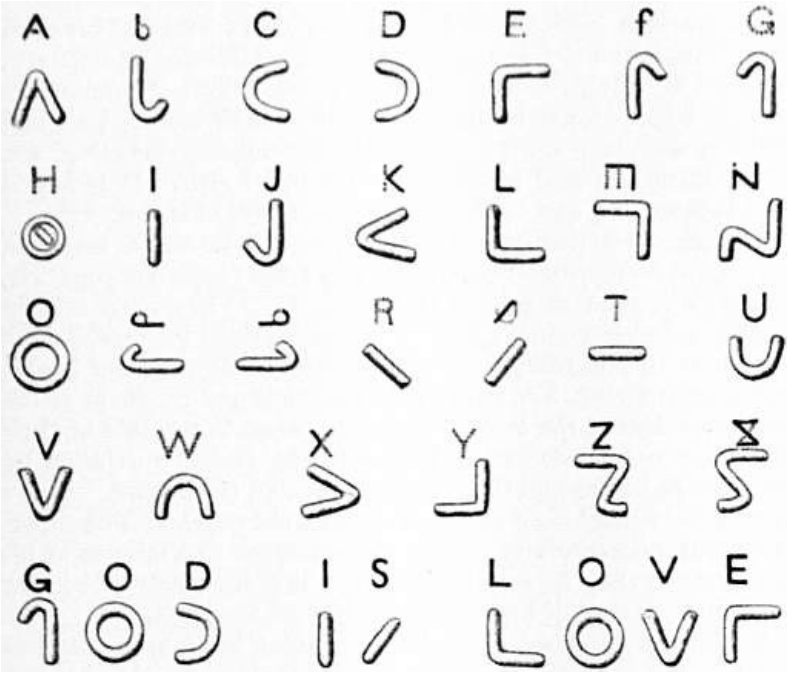
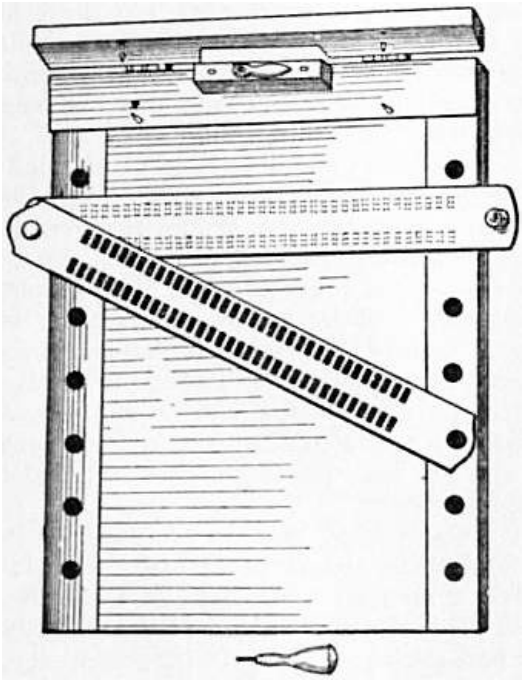


Fig. 1.—Moon Alphabet.

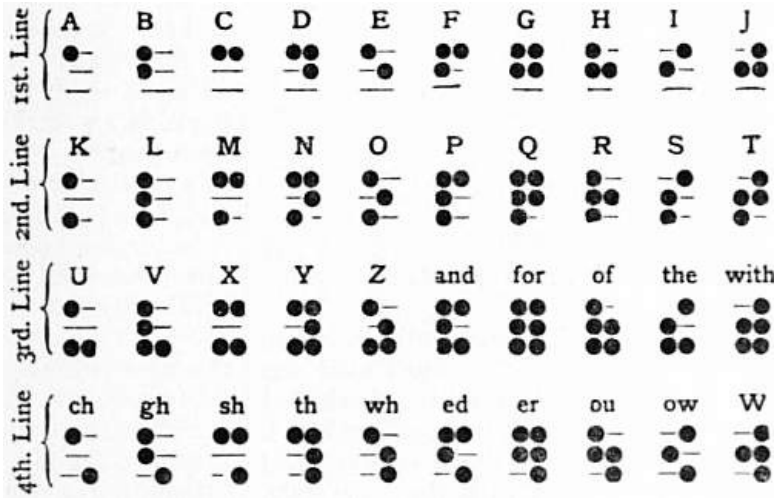
In 1832 the Edinburgh Society of Arts offered a gold medal for the best method of printing for the blind, and it was awarded to Dr Edmond Fry of London, whose alphabet consisted of ordinary capital letters without their small strokes. In 1836 the Rev. W. Taylor of York and John Alston in Glasgow began to print with Fry’s type. Mr Alston’s appeal for a printing fund met with a hearty response, and a grant of £400 was made by the treasury; in 1838 he completed the New Testament, and at the end of 1840 the whole Bible was published in embossed print. In 1833 printing for the blind was commenced in the United States at

Boston and Philadelphia. Dr S.G. Howe in Boston used small English letters without capitals, angles being employed instead of curves, while J.R. Friedlander in Philadelphia used only Roman capitals. About 1838 T.M. Lucas of Bristol, a shorthand writer, and J.H. Frere of Blackheath, each introduced an alphabet of simpler forms, and based their systems on stenography. In 1847 Dr Moon of Brighton brought out a system which partially retains the outline of the Roman letters. This type is easily read by the adult blind, and is still much used by the home teaching societies. The preceding methods are all known as line types, but the one which is now in general use is a point type.

In the early part of the 19th century Captain Charles Barbier, a French officer, substituted embossed dots for embossed lines. The slate for writing was also invented by him.



Apparatus for writing Braille.



Braille Alphabet. The black dots represent the raised points of the sign in their position in relation to the group of six.

FIG. 2.

Barbier arranged a table of speech sounds, consisting of six lines with six sounds in each line. His rectangular cell contained two vertical rows of six points each. The number of points in the left-hand row indicates in which horizontal line, and that in the right-hand row in which vertical line, of the printed table the speech sound is to be found.

Louis Braille, a pupil and afterwards a professor of the Institution Nationale des Jeunes Aveugles, Paris, studied all the various methods in which arbitrary characters were used. Barbier's letter, although it gave a large number of combinations, was too long to be covered by the finger in reading, and Louis Braille reduced the number of dots. In 1834 Braille perfected his system. Dr Armitage considered it was the greatest advance that had ever been made in the education of the blind.

The Braille alphabet consists of varying combinations of six dots in an oblong, of which the vertical side contains three, and the horizontal two dots  . There are 63 possible combinations of these six dots, and after the letters of the alphabet have been supplied, the remaining signs are used for punctuation, contractions, &c.

> "For writing, a ruler is used, consisting of a metal bed either grooved or marked by groups of little pits, each group consisting of six; over this bed is fitted a brass guide, punched with oblong holes whose vertical diameter is three-tenths of an inch, while the horizontal diameter is two-tenths. The pits are arranged in two parallel lines, and the guide is hinged on the bed in such a way that when the two are locked together the openings in the guide correspond exactly to the pits in the bed. The brass guide has a double row of openings, which enables the writer to write two lines; when these are written, he shifts his guide downwards until two little pins, which project from the under surface at its ends, drop into corresponding holes of a wooden board; then two more lines are written, and this operation is repeated until the bottom of the page is reached. The paper is introduced between the frame and the metal bed. The instrument for writing is a blunt awl, which carries a little cap of paper before it into the grooves or pits of the bed, thereby producing a series of little pits in the paper on the side next the writer. When taken out and turned over, little prominences are felt, corresponding to the pits on the other side. The reading is performed from left to right, consequently the writing is from right to left; but this reversal presents no practical difficulty as soon as the pupil had caught the idea that in reading and writing alike he has to go *forwards*.
>
> "The first ten letters, from 'a' to 'j,' are formed in the upper and middle grooves; the next ten, from 'k' to 't,' are formed by adding one lower back dot to each letter of the first series; the third row is formed from the first by adding two lower dots to each letter; the fourth row, similarly, by adding one lower front dot.
>
> "The first ten letters, when preceded by the prefix for numbers, stand for the nine numbers and the cipher. The same signs, written in the lower and middle grooves, instead of the upper and middle, serve for punctuation. The seven last letters of each series stand for the seven musical notes—the first series representing quavers, the second minims, the third semibreves, the fourth crotchets. Rests, accidentals, and every other sign used in music can be readily and clearly expressed without having recourse to the staff of five lines which forms the basis of ordinary musical notation, and which, though it has been reproduced tor the blind, can only be considered as serving to give them an idea of the method employed by the seeing, and cannot, of course, be written. By means of this dotted system, a blind man is able to keep memoranda or accounts, write his own music, emboss his own books from dictation, and carry on correspondence."

The Braille system for literature and music was brought into general use in England by Dr T.R. Armitage. Through his wise, untiring zeal and noble generosity, every blind man, woman and child throughout the English-speaking world can now obtain not only the best literature, but the best music.

In America there are two modifications of the point type, known as New York point and American braille. In each of these the most frequently recurring letters are represented by the least number of dots.

The original Braille is used by the institutions for the blind in the British empire, European countries, Mexico, Brazil and Egypt.

Appliances for Educational Work

The apparatus for writing point alphabets has already been described. Frank H. Hall, former superintendent of the School for the Blind, Jacksonville, Ill., U.S.A., has invented a Braille typewriter and stereotype maker; the latter embosses metal plates from which any number of copies can be printed. An automatic Braille-writer has been brought out in Germany, and William B. Wait (principal of the Institution for the Blind in New York City) has invented a machine for writing New York point. These machines are expensive, but A. Wayne of Birmingham has brought out a cheap and effective Braille-writer. H. Stainsby, secretary of the Birmingham institution, and Wayne have invented a machine for writing Braille shorthand.

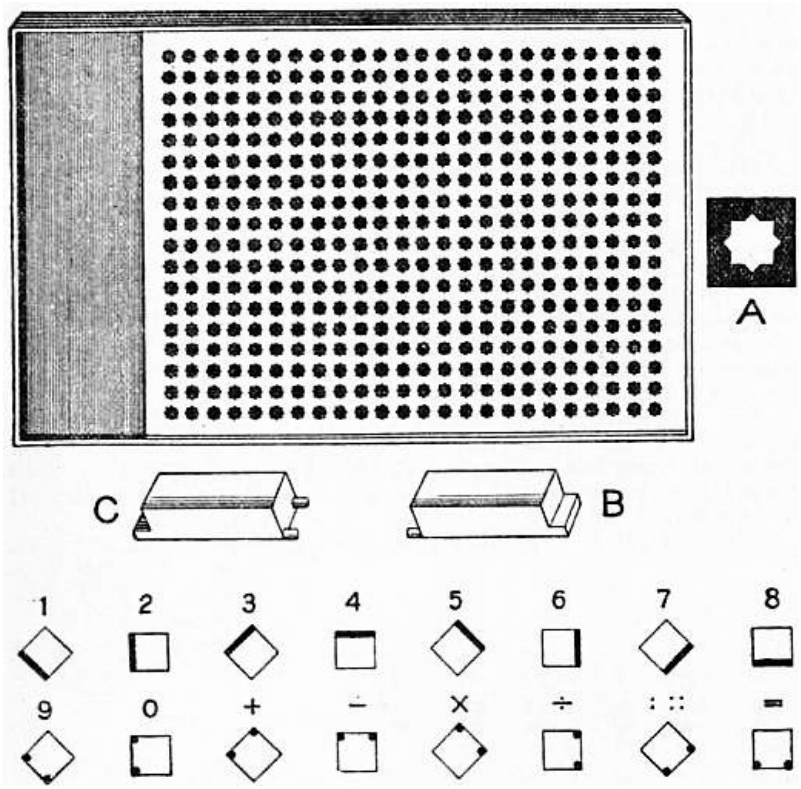


FIG. 3.—Arithmetic Board, Pin and Characters. A, Shape of opening in the board for pin; B and C, pin.

Many boards have been constructed to enable the blind to work arithmetical problems. The one which is most used was invented by the Rev. W. Taylor. The board has star-shaped openings in which a square pin fits in eight different positions. The pin has on one end a plain ridge and on the other a notched ridge; sixteen characters can be formed with the two ends. The board is also used for algebra, another set of type furnishing the algebraic symbols.

Books are prepared with raised geometrical diagrams; figures can be formed with bent wires on cushions, or on paper with a toothed wheel attached to one end of a pair of compasses.

Geography is studied by means of relief maps, manufactured in wood or paper. The physical maps and globes prepared for seeing children are used also for the blind.

Chiefly owing to the unremitting energy and liberality of Dr T.R. Armitage, in connexion with the British and Foreign Blind Association, all school appliances for the blind have been greatly improved and cheapened.

EMPLOYMENT

Reference has been made to the fact that music in its various branches furnishes the best and most lucrative employment for the blind. But those who have not the ability, or are too old to be trained for music or some other profession, must depend upon handicrafts for their support. The principal ones taught in the various institutions are the making of baskets, brushes, mats, sacks, ships' fenders, brooms and mattresses, upholstery, wire-work, chair-caning, wood-chopping, &c. Females are taught to make fancy baskets and brushes, chair-caning, knitting, netting, weaving, sewing—hand and machine—crocheting, &c. It is difficult to find employment for blind girls. It is hoped that typewriting and massage will prove remunerative.

The blind, whether educated for the church, trained as teachers, musicians, pianoforte-tuners, or for any other trade or occupation, generally require assistance at the outset. They need help in finding suitable employment, recommendations for establishing a connexion, pecuniary assistance in providing outfits of books, tools, instruments, &c., help in the selection and purchase of the best materials at the lowest wholesale rates, in the sale of their manufactured goods in the best markets, and if overtaken by reverses, judicious and timely help towards a fresh start. Every institution should keep in touch with its old pupils. The superintendent who carefully studies the successes and failures of his pupils when they go into the world, will more wisely direct the work and energies of his present and future students.

Within recent years great improvements have been made in some of the progressive workshops for the blind. At the conference in London in 1902 Mr T. Stoddart gave the following information in regard to the work in Glasgow:—"We are building very extensive additions to our workshops, which will enable us to accommodate 600 blind people. We mean to employ the most up-to-date methods, and are introducing electric power to drive the machinery and light the workshops. We have to do with the average blind adult recently deprived of sight after he has attained an age of from 25 to 40 or even 50 years. In Glasgow we have developed an industry eminently suitable for the employment of the blind, namely, the manufacture of new and the remaking of old bedding. There are industries which are purely local, where certain articles of manufacture largely used in one district are useless, or nearly so, in another; but the field in which this industry may be promoted is practically without limit. It is perhaps the employment *par excellence* for the blind, and among other advantages it has the following to recommend it: employment is provided for the blind of both sexes and of all ages; there is no accumulation nor deterioration of stock; it yields an excellent profit, and its use is universal. We have been pushing this industry for years, our annual turnover in this particular department having exceeded £7000, and as we find it so suited to the capabilities of all grades of blind people, it is our intention to provide facilities for doing a turnover of three times that amount. Instead of the thirty sewing-machines which we have at present running by power, we hope to employ 100 blind women. At cork-fender-making, also an industry of the most suitable kind, we are at present employing about thirty workers. It is also our intention to greatly develop and extend our mat-making department."

In the United States many blind persons are engaged in agricultural pursuits, and some are very successful in commercial pursuits. When a man loses his sight in adult life, if he can possibly follow the business in which he has previously been engaged, it is the best course for him. In the present day, work in manufactories is subdivided to such an extent that often some one portion can be done by a blind person; but it needs the interest of some enthusiastic believer in the capabilities of the blind to persuade the seeing manager that blind people can be safely employed in factories.

In England, at the time of the royal commission of 1889, upwards of 8000 blind persons, above the age of 21, were in receipt of relief from the guardians, of whom no less than 3278 were resident in workhouses or workhouse infirmaries. The census returns for 1901 indicate that the number at that time was equally large. It would certainly be more economical to establish workshops where the able-bodied adult blind can be trained in some handicraft and employed.

The papers read at the various conferences show that, even under the most favourable circumstances, some are not able to earn enough for their support; nevertheless, employment improves their condition; there is no greater calamity than to live a life of compulsory idleness in total darkness. The cry of the blind is not alms but work. One of the workshops in western America has adopted the motto, "Independence through Industry," and it should be the aim of every civilized country to hasten the time when blindness and pauperism shall no longer be synonymous terms.

Biography

It may be interesting, in conclusion, to mention some of the names of prominent blind people in history:—

Timoleon (c. 410-336 B.C.), a Greek general.

Aufidius, a Roman senator.

Bela II. (d. 1141), king of Hungary.

John, king of Bohemia (1296-1346), killed in the battle of Crécy.

John Zizca (c. 1376-1424), Bohemian general.

Basil III. (d. 1462), prince of Moscow.

Shah Alam (d. 1806), the last of the Great Moguls.

Diodorus, the instructor of Cicero.

Didymus of Alexandria (c. 308-395), mathematician, theologian and linguist.

Nicase of Malines (d. 1492), professor of law in the university of Cologne. The degree of doctor of divinity was conferred on him by the university of Louvain, and the pope

granted a dispensation suspending the law of the Church, that he might be ordained as a priest.

Ludovico Scapinelli (b. 1585), professor at the universities of Bologna, Modena and Pisa.

James Schegkius (d. 1587), professor of philosophy and medicine at Tübingen.

Franciscus Salinas, professor of music at the university of Salamanca, in the 16th century.

Nicholas Bacon (16th century), doctor of laws in the university of Brussels.

Count de Pagan of Avignon (b. 1604), mathematician of note.

John Milton (1608-1674), the poet.

Rev. Richard Lucas (1648-1715), prebendary of Westminster.

Nicholas Saunderson (*q.v.*; 1682-1739).

John Stanley (1713-1786), Mus. Bac. Oxon., was born in London in 1713. At seven he began to study music, and made such rapid progress that he was appointed organist of All-Hallows, Bread Street, at the age of eleven. He graduated as Mus. Bac. at Oxford when sixteen, and was organist of the Temple church at the age of twenty-one. He composed a number of cantatas, and after the death of Handel he superintended the performance of Handel's oratorios at Covent Garden. He received the degree of doctor of music, and was master of the king's band.

Leonard Euler (1707-1783), the celebrated mathematician and astronomer.

John Metcalf (b. 1717), road-builder and contractor.

Sir John Fielding (d. 1780), eminent lawyer and magistrate.

Thomas Blacklock (*q.v.*; 1721-1791), Scottish scholar and poet.

François Huber (1750-1831), Swiss naturalist, noted for his observations on bees.

Edward Rushton (b. 1756). At six years of age he entered the Liverpool free grammar school, and at eleven shipped for his first voyage in a West India merchantman. On a later voyage he was shipwrecked, and owed his life to the self-sacrifice of a negro. Rushton and the black man swam for their lives to a floating cask; the negro reached it first, saw Rushton about to sink, pushed the cask to the failing lad, and struck out for the shore, but never reached it. This incident made Rushton an enthusiastic champion through life of the cause of the negro. During a voyage to Dominica malignant ophthalmia broke out among the slave cargo, and Rushton caught the disease by attending them in the hold when all others refused help. This attack deprived him of sight, and cut short a promising nautical career at the age of nineteen. He struggled bravely against difficulties, and besides entering successfully into various literary engagements, maintained himself and family as a bookseller. A volume of his poems containing a memoir was published in 1824.

Marie Thérèse von Paradis (b. 1759), the daughter of an imperial councillor in Vienna. She was a godchild of the empress Marie Thérèse, and as her parents possessed rank and wealth, no expense was spared in her education. Weissembourg, a blind man, was her tutor, and she learned to spell with letters cut out of pasteboard, and read words pricked upon cards with pins. She studied the piano with Richter (of Holland) and Kozeluch. She was a highly esteemed pianist, and Mozart wrote a concerto for her; she also attained considerable skill on the organ, in singing and in composition. She made a concert tour of Europe, visiting the principal courts and everywhere achieving great success. She remained four months in England, under the patronage of the queen. On her return to Vienna, through Paris, she met Valentin Haüy. Towards the close of her life she devoted herself to teaching singing and the pianoforte with great success.

James Holman (*q.v.*; 1786-1857), traveller.

William H. Prescott (*q.v.*; 1796-1859), the American historian.

Several early 19th-century musicians held situations as organists in London; among them Grenville, Scott, Lockhart, Mather, Stiles and Warne.

Louis Braille (1809-1852). In 1819 he went to the school for the blind in Paris. He became proficient on the organ, and held a post in one of the Paris churches. While a professor at the Institution Nationale des Jeunes Aveugles, he perfected his system of point writing.

Alexander Rodenbach, Belgian statesman. When a member of the chamber of deputies, in 1836, he introduced and succeeded in establishing by law the right of blind and deaf-

mute children to an education.

Dr William Moon (1818-1894), the inventor of the type for the blind which bears his name.

Rev. W.H. Milburn, D.D. (1823-1903), the American chaplain, known in the United States as "The Blind Man Eloquent." He often travelled from thirty to fifty thousand miles a year, speaking and preaching every day. He was three times chaplain of the House of Representatives, and in 1893 was chosen to the chaplaincy of the senate.

Dr T.R. Armitage (b. 1824). After spending his youth on the continent, he became a medical student, first at King's College, and afterwards at Paris and Vienna. His career promised to be a brilliant one, but at the age of thirty-six failing sight caused him to abandon his profession. For the rest of his life he devoted his time and fortune to the interests of the blind. He reorganized the Indigent Blind Visiting Society, endowed its Samaritan fund, founded the British and Foreign Blind Association, and, in conjunction with the late duke of Westminster and others, founded the Royal Normal College.

Elizabeth Gilbert (b. 1826), daughter of the bishop of Chichester. She lost her sight at the age of three. She was educated at home, and took her full share of household duties and cares and pleasures. When she was twenty-seven, she began to consider the condition of the poor blind of London. She saw some one must befriend those who had been taught trades, some one who could supply material, give employment or dispose of the articles manufactured. In 1854 her scheme was started, and work was given to six men in their own homes, but the number soon increased. In 1856 a committee was formed, a house converted into a factory, and the Association for Promoting the General Welfare of the Blind was founded.

Rev. George Matheson, D.D. (b. 1842), preacher and writer of the Church of Scotland. The degree of D.D. was conferred on him by the university of Edinburgh in 1879, and he was appointed Baird Lecturer in 1881, and St Giles' Lecturer in 1882.

Henry Fawcett (1833-1884), professor of political economy at Cambridge, and postmaster-general.

W.H. Churchman of Pennsylvania, who was instrumental in establishing the schools for the blind in Tennessee, Indiana and Wisconsin.

H.L. Hall, founder of the workshops and home for the blind in Philadelphia; by his energetic management he raised the standard of work for the adult blind throughout America.

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(F. J. C.)

1 There are no late returns for Iceland, but the last available statistics gave 3400 per million. A paper written in 1903 on blindness in Egypt stated that 1 in every 50 of the population was blind.

2 Previous returns from Finland have shown a much larger number of blind persons, but these statistics were supplied by the British consul in St Petersburg from the last census.

3 Its principal (responsible, with Dr Armitage, the duke of Westminster and others, for its foundation) was Sir F.J. Campbell, LL.D., F.R.G.S., F.S.A., himself a blind man, who, born in Tennessee, U.S.A., in 1832, and educated at the Nashville school, and afterwards in music at Leipzig and Berlin, had from 1858 to 1869 been associated with Dr Howe at the Perkins Institution, Boston. He was knighted in 1909.

BLISS, CORNELIUS NEWTON (1833-), American merchant and politician, was born at Fall River, Massachusetts, on the 26th of January 1833. He was educated in his native city and in New Orleans, where he early entered his step-father's counting-house. Returning to Massachusetts in 1849, he became a clerk and subsequently a junior partner in a prominent Boston commercial house. Later he removed to New York City to establish a branch of the firm. In 1881 he organized and became president of Bliss, Fabyan & Company, one of the largest wholesale dry-goods houses in the country. A consistent advocate of the protective tariff, he was one of the organizers, and for many years president, of the American Protective Tariff League. In politics an active Republican, he was chairman of the Republican state committee in 1887 and 1888, and contributed much to the success of the Harrison ticket in New York in the latter year. He was treasurer of the Republican national committee from 1892 to 1904, and was secretary of the interior in President McKinley's cabinet from 1897 to 1899.

BLISTER (a word found in many forms in Teutonic languages, cf. Ger. *Blase*; it is ultimately connected with the same root as in "blow," cf. "bladder"), a small vesicle filled with serous fluid raised on the skin by a burn, by rubbing on a hard surface, as on the hand in rowing, or by other injury; the term is also used of a similar condition of the skin caused artificially, as a counter-irritant in cases of inflammation, by the application of mustard, of various kinds of fly (see CANTHARIDES) and of other vesicatories. Similar small swellings, filled with fluid or air, on plants and on the surface of steel or paint, &c., are also called "blisters."

BLIZZARD (origin probably onomatopoeic, cf. "blast," "bluster"), a furious wind driving fine particles of choking, blinding snow whirling in icy clouds. The conditions to which the name was originally given occur with the northerly winds in rear of the cyclones crossing the eastern states of America during winter.

BLOCK, MARK ELIEZER (c. 1723-1799), German naturalist, was born at Ansbach, of poor Jewish parents, about 1723. After taking his degree as doctor at Frankfort-on-Oder he established himself as a physician at Berlin. His first scientific work of importance was an essay on intestinal worms, which gained a prize from the Academy of Copenhagen, but he is best known by his important work on fishes (see ICHTHYOLOGY). Bloch was fifty-six when he began to write on ichthyological subjects. To begin at his time of life a work in which he intended not only to give full descriptions of the species known to him from specimens or drawings, but also to illustrate each species in a style truly magnificent for his time, was an undertaking the execution of which most men would have despaired of. Yet he accomplished not only this task, but even more than he at first contemplated. He died at Carlsbad on the 6th of August 1799.

BLOCK, MAURICE (1816-1901), French statistician, was born in Berlin of Jewish parents on the 18th of February 1816. He studied at Bonn and Giessen, but settled in Paris, becoming naturalized there. In 1844 he entered the French ministry of agriculture, becoming in 1852 one of the heads of the statistical department. He retired in 1862, and thenceforth devoted himself entirely to statistical studies, which have gained for him a wide

reputation. He was elected a member of the Académie des Sciences Morales et Politiques in 1880. He died in Paris on the 9th of January 1901. His principal works are: *Dictionnaire de l'administration française* (1856); *Statistique de la France* (1860); *Dictionnaire général de la politique* (1862); *L'Europe polilique et sociale* (1869); *Traité théorique et pratique de statistique* (1878); *Les Progrés de l'économie politique depuis Adam Smith* (1890); he also edited from 1856 *L'Annuaire de l'économie politique et de la statistique*, and wrote in German *Die Bevolkerung des französischen Kaiserreichs* (1861); *Die Bevolkerung Spaniens und Portugals* (1861); and *Die Machtstellung der europäischen Staaten* (1862).

BLOCK (from the Fr. *bloc*, and possibly connected with an Old Ger. *Block*, obstruction, cf. "baulk"), a piece of wood. The word is used in various senses, *e.g.* the block upon which people were beheaded, the block or mould upon which a hat is shaped, a pulley-block, a printing-block, &c. From the sense of a solid mass comes the expression, a "block" of houses, *i.e.* a rectangular space covered with houses and bounded by four streets. From the sense of "obstruction" comes a "block" in traffic, a block in any proceedings, and the block system of signalling on railways.

BLOCKADE (Fr. *blocus*, Ger. *Blokade*), a term used in maritime warfare. Originally a blockade by sea was probably nothing more than the equivalent in maritime warfare of a blockade or siege on land in which the army investing the blockaded or besieged place is in actual physical possession of a zone through which it can prevent and forbid ingress and egress. An attempt to cross such a zone without the consent of the investing army would be an act of hostility against the besiegers. A maritime blockade, when it formed part of a siege, would obviously also be a close blockade, being part of the military cordon drawn round the besieged place. Even from the first, however, differences would begin to grow up in the conditions arising out of the operations on land and on sea. Thus whereas conveying merchandise across military lines would be a deliberate act of hostility against the investing force, a neutral ship which had sailed in ignorance of the blockade for the blockaded place might in good faith cross the blockade line without committing a hostile act against the investing force. With the development of recognition of neutral rights the involuntary character of the breach would be taken into account, and notice to neutral states and to approaching vessels would come into use. With the employment in warfare of larger vessels in the place of the more numerous small ones of an earlier age, notice, moreover, would tend to take the place of *de facto* investment, and at a time when communication between governments was still slow and precarious, such notice would sometimes be given as a possible measure of belligerent tactics before the blockade could be actually carried out. Out of these circumstances grew up the abuse of "paper blockades."

The climax was reached in the "Continental Blockade" decreed by Napoleon in 1806, which continued till it was abolished by international agreement in 1812. This blockade forbade all countries under French dominion or allied with France to have any communication with Great Britain. Great Britain replied in 1807 by a similar measure. The first nation to protest against these fictitious blockades was the United States. Already in 1800 John Marshall, secretary of state, wrote to the American minister in Great Britain pointing out objections which have since been universally admitted. In the following interesting passage he said:—

> "Ports not effectually blockaded by a force capable of completely investing them have yet been declared in a state of blockade.... If the effectiveness of the blockade be dispensed with, then every port of the belligerent powers may at all times be declared in that state, and the commerce of neutrals be thereby subjected to universal capture. But if this principle be strictly adhered to, the capacity to blockade will be limited by the naval force of the belligerent and, in consequence, the mischief to neutral commerce cannot be very extensive. It is, therefore, of the last importance to neutrals that this principle be maintained unimpaired. I observe that you have pressed this reasoning on the British minister, who

replies that an occasional absence of a fleet from a blockaded port ought not to change the state of the place. Whatever force this observation may be entitled to, where that occasional absence has been produced by an accident, as a storm, which for a moment blows off a fleet and forces it from its station, which station it immediately resumes, I am persuaded that where a part of the fleet is applied, though only for a time, to other objects or comes into port, the very principle requiring an effective blockade, which is that the mischief can only be coextensive with the naval force of the belligerent, requires that during such temporary absence the commerce to the neutrals to the place should be free."[1]

Again in 1803 James Madison wrote to the then American minister in London:—

"The law of nations requires to constitute a blockade that there should be the presence and position of a force rendering access to the prohibited place manifestly difficult and dangerous."[2]

In 1826 and 1827 Great Britain as well as the United States asserted that blockades in order to be binding must be effective. This became gradually the recognized view, and when in 1856 the powers represented at the congress of Paris inserted in the declaration there adopted that "blockades in order to be binding must be effective, that is to say, maintained by a force sufficient really to prevent access to the coast of an enemy," they were merely enunciating a rule which neutral states had already become too powerful to allow belligerents to disregard.

Blockade is universally admitted to be a belligerent right to which under international law neutrals are obliged to submit. It is now also universally admitted that the above-quoted rule of the Declaration of Paris forms part of international law, independently of the declaration. Being, however, exclusively a belligerent right, it cannot be exercised except by a belligerent force. Even a *de facto* belligerent has the right to institute a blockade binding on neutrals if it has the means of making it effective, though the force opposed to it may treat the *de facto* belligerent as rebels.

It is also admitted that, being exclusively a belligerent right, it cannot be exercised in time of peace, but there has been some inconsistency in practice (see Pacific Blockade) which will probably lead governments, in order to avoid protests of neutral powers against belligerent rights being exercised in mere coercive proceedings, to exercise all the rights of belligerents and carry on *de facto* war to entitle them to use violence against neutral infringers. This was done in the case of the blockade of Venezuela by Great Britain, Germany and Italy in 1902-1903.

The points upon which controversy still arises are as to what constitutes an "effective" blockade and what a sufficient notice of blockade to warrant the penalties of violation, viz. confiscation of the ship and of the cargo unless the evidence demonstrates the innocence of the cargo owners. A blockade to be effective must be maintained by a sufficient force to prevent the entrance of neutral vessels into the blockaded port or ports, and it must be duly proclaimed. Subject to these principles being complied with, "the question of the legitimacy and effectiveness of a blockade is one of fact to be determined in each case upon the evidence presented" (Thomas F. Bayard, American secretary of state, to Messrs Kamer & Co., 19th of February 1889). The British manual of naval prize law sums up the cases in which a blockade, validly instituted, ceases to be effectively maintained, as follows:—(1) If the blockading force abandons its position, unless the abandonment be merely temporary or caused by stress of weather, or (2) if it be driven away by the enemy, or (3) if it be negligent in its duties, or (4) if it be partial in the execution of its duties towards one ship rather than another, or towards the ships of one nation rather than those of another. These cases, however, are based on decisions of the British admiralty court and cannot be relied on absolutely as a statement of international law.

As regards notice the following American instructions vere given to blockading officers in June 1898:—

"Neutral vessels are entitled to notification of a blockade before they can be made prize for its attempted violation. The character of this notification is not material. It may be actual, as by a vessel of the blockading force, or *constructive, as by a proclamation of the government maintaining the blockade, or by common notoriety*. If a neutral vessel can be shown to have had notice of the blockade in any way, she is good prize, and should be sent in for adjudication; but should formal notice not have been given, *the rule of constructive knowledge arising from notoriety* should be construed in a manner liberal to the neutral.

"Vessels appearing before a blockaded port, having sailed without notification, are entitled to actual notice by a blockading vessel. They should be boarded by an officer, who should

enter in the ship's log the fact of such notice, such entry to include the name of the blockading vessel giving notice, the extent of the blockade, the date and place, verified by his official signature. The vessel is then to be set free; and should she again attempt to enter the same or any other blockaded port as to which she has had notice, she is good prize. Should it appear from a vessel's clearance that she sailed after notice of blockade had been communicated to the country of her port of departure, or *after the fact of blockade had, by a fair presumption, become commonly known* at that port, she should be sent in as a prize."

The passages in italics are not in accordance with the views held by other states, which do not recognize the binding character of a diplomatic notification or of constructive notice from notoriety.

The subject was brought up at the second Hague Conference (1907). The Italian and Mexican delegations submitted projects, but after a declaration by the British delegate in charge of the subject (Sir E. Satow) that blockade not having been included in the Russian programme, his government had given him no instructions upon it, the subject, at his suggestion, was dropped. A *Voeu*, however, was adopted in favour of formulating rules on all branches of the laws and customs of naval war, and a convention was agreed to for the establishment of an international Prize Court (see PRIZE). Under Art. 7 of the latter convention the Court was to apply the "rules of international law," and in their absence the "general principles of justice and equity." As soon as possible after the close of the second Hague Conference the British government took steps to call a special conference of the maritime powers, which sat from December 4, 1908 to February 26, 1909. Among the subjects dealt with was Blockade, the rules relating to which are as follow:—

Art. 1. A blockade must not extend beyond the ports and coasts belonging to or occupied by the enemy.

Art. 2. In accordance with the Declaration of Paris of 1856, a blockade, in order to be binding, must be effective—that is to say, it must be maintained by a force sufficient really to prevent access to the enemy coastline.

Art. 3. The question whether a blockade is effective is a question of fact.

Art. 4. A blockade is not regarded as raised if the blockading force is temporarily withdrawn on account of stress of weather.

Art. 5. A blockade must be applied impartially to the ships of all nations.

Art. 6. The commander of a blockading force may give permission to a warship to enter, and subsequently to leave, a blockaded port.

Art. 7. In circumstances of distress, acknowledged by an officer of the blockading force, a neutral vessel may enter a place under blockade and subsequently leave it, provided that she has neither discharged nor shipped any cargo there.

Art. 8. A blockade, in order to be binding, must be declared in accordance with Article 9, and notified in accordance with Articles 11 and 16.

Art. 9. A declaration of blockade is made either by the blockading power or by the naval authorities acting in its name. It specifies (1) the date when the blockade begins; (2) the geographical limits of the coastline under blockade; (3) the period within which neutral vessels may come out.

Art. 10. If the operations of the blockading power, or of the naval authorities acting in its name, do not tally with the particulars, which, in accordance with Article 9 (1) and (2), must be inserted in the declaration of blockade, the declaration is void, and a new declaration is necessary in order to make the blockade operative.

Art. 11. A declaration of blockade is notified: (1) to neutral powers, by the blockading power by means of a communication addressed to the governments direct, or to their representatives accredited to it; (2) to the local authorities, by the officer commanding the blockading force. The local authorities will, in turn, inform the foreign consular officers at the port or on the coastline under blockade as soon as possible.

Art. 12. The rules as to declaration and notification of blockade apply to cases where the limits of a blockade are extended, or where a blockade is re-established after having been raised.

Art. 13. The voluntary raising of a blockade, as also any restriction in the limits of a blockade, must be notified in the manner prescribed by Article 11.

Art. 14. The liability of a neutral vessel to capture for breach of blockade is contingent on her knowledge, actual or presumptive, of the blockade.

Art. 15. Failing proof to the contrary, knowledge of the blockade is presumed if the vessel left a neutral port subsequently to the notification of the blockade to the power to which such port belongs, provided that such notification was made in sufficient time.

Art. 16. If a vessel approaching a blockaded port has no knowledge, actual or presumptive, of the blockade, the notification must be made to the vessel itself by an officer of one of the ships of the blockading force. This notification should be entered in the vessel's logbook, and must state the day and hour, and the geographical position of the vessel at the time. If through the negligence of the officer commanding the blockading force no declaration of blockade has been notified to the local authorities, or if in the declaration, as notified, no period has been mentioned within which neutral vessels may come out, a neutral vessel coming out of the blockaded port must be allowed to pass free.

Art. 17. Neutral vessels may not be captured for breach of blockade except within the area of operations of the warships detailed to render the blockade effective.

Art. 18. The blockading forces must not bar access to neutral ports or coasts.

Art. 19. Whatever may be the ulterior destination of a vessel or of her cargo, she cannot be captured for breach of blockade, if, at the moment, she is on her way to a non-blockaded port.

Art. 20. A vessel which has broken blockade outwards, or which has attempted to break blockade inwards, is liable to capture so long as she is pursued by a ship of the blockading force. If the pursuit is abandoned, or if the blockade is raised, her capture can no longer be effected.

Art. 21. A vessel found guilty of breach of blockade is liable to condemnation. The cargo is also condemned, unless it is proved that at the time of the shipment of the goods the shipper neither knew nor could have known of the intention to break the blockade.

(T. Ba.)

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1 John Marshall, secretary of state, to Rufus King, minister to England, 20th of September 1800, Am. State Papers, Class I, For. Rel. II, No. 181, J.B. Moore, *Digest of International Law*, vii. 788.

2 James Madison, secretary of state, to Mr Thornton, 27th of October 1803, 14 MS. Dom. Let. 215. Moore, *Digest of International Law*, vii. 789.

BLOCKHOUSE, in fortification, a small roofed work serving as a fortified post for a small garrison. The word, common since 1500, is of uncertain origin, and was applied to what is now called a *fort d'arrêt*, a detached fort blocking the access to a landing, channel, pass, bridge or defile. The modern blockhouse is a building, sometimes of two storeys, which is loopholed on all sides, and not infrequently, in the case of two-storey blockhouses, provided with a *mâchicoulis* gallery. Blockhouses are built of wood, brick, stone, corrugated iron or any material available. During the South African War (1899-1902) they were often sent from England to the front in ready-made sections.

BLOEMAERT, ABRAHAM (1564-1651), Dutch painter and engraver, was born at Gorinchem, the son of an architect. He was first a pupil of Gerrit Splinter (pupil of Frans Floris) and of Joos de Beer, at Utrecht. He then spent three years in Paris, studying under several masters, and on his return to his native country received further training from Hieronymus Francken. In 1591 he went to Amsterdam, and four years later settled finally at Utrecht, where he became dean of the Gild of St Luke. He excelled more as a colourist than as a draughtsman, was extremely productive, and painted and etched historical and allegorical pictures, landscapes, still-life, animal pictures and flower pieces. Among his pupils are his four sons, Hendrick, Frederick, Cornelis and Adriaan (all of whom achieved considerable reputation as painters or engravers), the two Honthorsts and Jacob G. Cuyp.

BLOEMEN, JAN FRANS VAN (1662-1740), Flemish painter, was born at Antwerp, and studied and lived in Italy. At Rome he was styled Orizonte, on account of his painting of distance in his landscapes, which are reminiscent of Gaspard Poussin and much admired. His brothers Pieter (1657-1719), styled Standaart (from his military pictures), and Norbert (1670-1746), were also well-known painters.

BLOEMFONTEIN, capital of the Orange Free State, in 29º 8′ S., 26º 18′ E. It is situated on the open veld, surrounded by a few low kopjes, 4518 ft. above the sea, 105 m. by rail E. by S. of Kimberley, 750 N.E. by E. of Cape Town, 450 N. by E. of Port Elizabeth, and 257 S.W. of Johannesburg.

Bloemfontein is a very pleasant town, regularly laid out with streets running at right angles and a large central market square. Many of the houses are surrounded by large wooded gardens. Through the town runs the Bloemspruit. After a disastrous flood in 1904 the course of this spring was straightened and six stone bridges placed across it. There are several fine public buildings, mostly built of red brick and a fine-grained white stone quarried in the neighbourhood. The Raadzaal, a building in the Renaissance style, faces Market Square. Formerly the meeting-place of the Orange Free State Raad, it is now the seat of the provincial council. In front of the old Raadzaal (used as law courts) is a statue of President Brand. In Douglas Street is an unpretentious building used in turn as a church, a raadzaal, a court-house and a museum. In it was signed (1854) the convention which recognized the independence of the Free State Boers (see ORANGE FREE STATE: *History*). Among the churches the most important, architecturally, are the Dutch Reformed, a building with two spires, and the Anglican cathedral, which has a fine interior. The chief educational establishment is Grey University College, built 1906-1908 at a cost of £125,000. It stands in grounds of 300 acres, a mile and a half from the town. In the town is the original Grey College, founded in 1856 by Sir George Grey, when governor of Cape Colony. The post and telegraph office in Market Square is one of the finest buildings in the town. The public library is housed in a handsome building in Warden Street. Opposite it is the new national museum.

Bloemfontein possesses few manufactures, but is the trading centre of the province. Having a dry healthy climate, it is a favourite residential town and a resort for invalids, being recommended especially for pulmonary disease. The mean maximum temperature is 76.7° Fahr., the mean minimum 45.8°; the mean annual rainfall about 24 in. There is an excellent water-supply, obtained partly from Bloemspruit, but principally from the Modder river at Sanna’s Post, 22 m. to the east, and from reservoirs at Moches Dam and Magdepoort.

The population in 1904 was 33,883, of whom, including the garrison of 3487, 15,501 were white, compared with a white population of 2077 in 1890. The coloured inhabitants are mostly Bechuana and Basuto. Most of the whites are of British origin, and English is the common language of all, including the Dutch.

The *spruit* or spring which gives its name to the town was called after one of the emigrant farmers, Jan Bloem. The town dates from 1846, in which year Major H.D. Warden, then British resident north of the Orange, selected the site as the seat of his administration. When in 1854 independence was conferred on the country the town was chosen by the Boers as the seat of government. It became noted for the intelligence of its citizens, and for the educational advantages it offered at the time when education among the Boers was thought of very lightly. In 1892 the railway connecting it with Cape Town and Johannesburg was completed. During the Anglo-Boer War of 1899-1902 it was occupied by the British under Lord Roberts without resistance (13th of March 1900), fourteen days after the surrender of General Cronje at Paardeberg. In Market Square on the 28th of the following May the annexation of the Orange Free State to the British dominions was proclaimed. In 1907 the first session of the first parliament elected under the constitution granting the colony self-government was held in Bloemfontein. In 1910 when the colony became a province of the Union of South Africa under its old designation of Orange Free State, Bloemfontein was chosen as the seat of the Supreme Court of South Africa. Its growth as a business centre after the close of the war in 1902 was very marked. The rateable value increased from £709,000 in 1901 to £2,400,000 in 1905.

BLOET, ROBERT (d. 1123), English bishop, was chancellor to William I. and Rufus. From the latter he received the see of Lincoln (1093) in succession to Remigius. His private character was indifferent; but he administered his see with skill and prudence, built largely, and kept a magnificent household, which served as a training-school even for the sons of nobles. Bloet was active in assisting Henry I. during the rebellion of 1102, and became that monarch's justiciar. Latterly, however, he fell out of favour, and, although he had been very rich, was impoverished by the fines which the king extorted from him. Perhaps his wealth was his chief offence in the king's eyes; for he was in attendance on Henry when seized with his last illness. He was the patron of the chronicler Henry of Huntingdon, whom he advanced to an archdeaconry.

Henry of Huntingdon and W. Malmesbury (*De Gestis Pontificum*) are original authorities. See E.A. Freeman's *William Rufus*; Sir James Ramsay, *The Foundations of England*, vol. ii.

(H. W. C. D.)

BLOIS, LOUIS DE (1506-1566), Flemish mystical writer, generally known under the name of Blosius, was born in October 1506 at the château of Donstienne, near Liége, of an illustrious family to which several crowned heads were allied. He was educated at the court of the Netherlands with the future emperor Charles V. of Germany, who remained to the last his staunch friend. At the age of fourteen he received the Benedictine habit in the monastery of Liessics in Hainaut, of which he became abbot in 1530. Charles V. pressed in vain upon him the archbishopric of Cambrai, but Blosius studiously exerted himself in the reform of his monastery and in the composition of devotional works. He died at his monastery on the 7th of January 1566.

Blosius's works, which were written in Latin, have been translated into almost every European language, and have appealed not only to Roman Catholics, but to many English laymen of note, such as W.E. Gladstone and Lord Coleridge. The best editions of his collected works are the first edition by J. Frojus (Louvain, 1568), and the Cologne reprints (1572, 1587). His best-known works are:—the *Institutio Spiritualis* (Eng. trans., *A Book of Spiritual Instruction*, London, 1900); *Consolatio Pusillanimium* (Eng. trans., *Comfort for the Faint-Hearted*, London, 1903); *Sacellum Animae Fidelis* (Eng. trans., *The Sanctuary of the Faithful Soul*, London, 1905); all these three works were translated and edited by Father Bertrand Wilberforce, O.P., and have been reprinted several times; and especially *Speculum Monachorum* (French trans. by Félicité de Lamennais, Paris, 1809; Eng. trans., Paris, 1676; re-edited by Lord Coleridge, London, 1871, 1872, and inserted in "Paternoster" series, 1901).

See Georges de Blois, *Louis de Blois, un Bénédictin au XVI^{ème} siècle* (Paris, 1875), Eng. trans. by Lady Lovat (London, 1878, &c.).

BLOIS, a town of central France, capital of the department of Loir-et-Cher, 35 m. S.W. of Orleans, on the Orleans railway between that city and Tours. Pop. (1906) 18,457. Situated in a thickly-wooded district on the right bank of the Loire, it covers the summits and slopes of two eminences between which runs the principal thoroughfare of the town named after the philosopher Denis Papin. A bridge of the 18th century from which it presents the appearance of an amphitheatre, unites Blois with the suburb of Vienne on the left bank of the river. The streets of the higher and older part of the town are narrow and tortuous, and in places so steep that means of ascent is provided by flights of steps. The famous château of the family of Orleans (see Architecture: *Renaissance Architecture in France*), a fine example of Renaissance architecture, stands on the more westerly of the two hills. It consists of three

main wings, and a fourth and smaller wing, and is built round a courtyard. The most interesting portion is the north-west wing, which was erected by Francis I., and contains the room where Henry, duke of Guise, was assassinated by order of Henry III. The striking feature of the interior façade is the celebrated spiral staircase tower, the bays of which, with their beautifully sculptured balustrades, project into the courtyard (see ARCHITECTURE, Plate VIII. fig. 84). The north-east wing, in which is the entrance to the castle, was built by Louis XII. and is called after him; it contains picture-galleries and a museum. Opposite is the Gaston wing, erected by Gaston, duke of Orleans, brother of Louis XIII., which contains a majestic domed staircase. In the north corner of the courtyard is the Salle des États, which, together with the donjon in the west corner, survives from the 13th century. Of the churches of Blois, the cathedral of St Louis, a building of the end of the 17th century, but in Gothic style, is surpassed in interest by St Nicolas, once the church of the abbey of St Laumer, and dating from the 12th and 13th centuries. The picturesqueness of the town is enhanced by many old mansions, the chief of which is the Renaissance Hôtel d'Alluye, and by numerous fountains, among which that named after Louis XII. is of very graceful design. The prefecture, the law court, the corn-market and the fine stud-buildings are among the chief modern buildings.

Blois is the seat of a bishop, a prefect, and a court of assizes. It has a tribunal of first instance, a tribunal of commerce, a board of trade arbitration, a branch of the Bank of France, a communal college and training-colleges. The town is a market for the agricultural and pastoral regions of Beauce and Sologne, and has a considerable trade in grain, the wines of the Loire valley, and in horses and other live-stock. It manufactures boots and shoes, biscuits, chocolate, upholstering materials, furniture, machinery and earthenware, and has vinegar-works, breweries, leather-works and foundries.

Though of ancient origin, Blois is first distinctly mentioned by Gregory of Tours in the 6th century, and was not of any importance till the 9th century, when it became the seat of a powerful countship (see below). In 1196 Count Louis granted privileges to the townsmen; the commune, which survived throughout the middle ages, probably dated from this time. The counts of the Châtillon line resided at Blois more often than their predecessors, and the oldest parts of the chateau (13th century) were built by them. In 1429 Joan of Arc made Blois her base of operations for the relief of Orleans. After his captivity in England, Charles of Orleans in 1440 took up his residence in the château, where in 1462 his son, afterwards Louis XII., was born. In the 16th century Blois was often the resort of the French court. Its inhabitants included many Calvinists, and it was in 1562 and 1567 the scene of struggles between them and the supporters of the Roman church. In 1576 and 1588 Henry III., king of France, chose Blois as the meeting-place of the states-general, and in the latter year he brought about the murders of Henry, duke of Guise, and his brother, Louis, archbishop of Reims and cardinal, in the château, where their deaths were shortly followed by that of the queen-mother, Catherine de' Medici. From 1617 to 1619 Marie de' Medici, wife of King Henry IV., exiled from the court, lived at the château, which was soon afterwards given by Louis XIII. to his brother Gaston, duke of Orleans, who lived there till his death in 1660. The bishopric dates from the end of the 17th century. In 1814 Blois was for a short time the seat of the regency of Marie Louise, wife of Napoleon I.

See L. de la Saussaye, *Blois et ses environs* (1873); *Histoire du château de Blois* (1873); L. Bergevin et A. Dupré, *Histoire de Blois* (1847).

BLOIS, COUNTSHIP OF. From 865 to about 940 the countship of Blois was one of those which were held in fee by the margrave of Neustria, Robert the Strong, and by his successors, the abbot Hugh, Odo (or Eudes), Robert II. and Hugh the Great. It then passed, about 940 and for nearly three centuries, to a new family of counts, whose chiefs, at first vassals of the dukes of France, Hugh the Great and Hugh Capet, became in 987, by the accession of the Capetian dynasty to the throne of France, the direct vassals of the crown. These new counts were orjginally very powerful. With the countship of Blois they united, from 940 to 1044, that of Touraine, and from about 950 to 1218, and afterwards from 1269 to 1286, the countship of Chartres remained in their possession.

The counts of Blois of the house of the Theobalds (Thibauds) began with Theobald I., the Cheat, who became count about 940. He was succeeded by his son, Odo (Eudes) I., about

975. Theobald II., eldest son of Odo I., became count in 996, and was succeeded by Odo II., younger son of Odo I., about 1005. Odo II. was one of the most warlike barons of his time. With the already considerable domains which he held from his ancestors, he united the heritage of his kinsman, Stephen I., count of Troyes. In 1033 he disputed the crown of Burgundy with the emperor, Conrad the Salic, and perished in 1037 while fighting in Lorraine. He was succeeded in 1037 by his eldest son, Theobald III., who was defeated by the Angevins in 1044, and was forced to give up the town of Tours and its dependencies to the count of Anjou. In 1089 Stephen Henry, eldest son of Theobald III., became count. He took part in the first crusade, fell into the hands of the Saracens, and died in captivity; he married Adela, daughter of William I., king of England. In 1102 Stephen Henry was succeeded by his son, Theobald IV. the Great, who united the countship of Troyes with his domains in 1128. In 1135, on the death of his maternal uncle, Henry I., king of England, he was called to Normandy by the barons of the duchy, but soon renounced his claims on learning that his younger brother, Stephen, had just been proclaimed king of England. In 1152 Theobald V. the Good, second son of Theobald IV., became count; he died in 1191 in Syria, at the siege of Acre. His son Louis succeeded in 1191, took part in the fourth crusade, and after the taking of Constantinople was rewarded with the duchy of Nicaea. He was killed at the battle of Adrianople in 1205, in which year he was succeeded by his son, Theobald VI. the Young, who died childless. In 1218 the countship passed to Margaret, eldest daughter of Theobald V., and to Walter (Gautier) of Avesnes, her third husband.

The Châtillon branch of the counts of Blois began in 1230 with Mary of Avesnes, daughter of Margaret of Blois and her husband, Hugh of Châtillon, count of St Pol. In 1241 her brother, John of Châtillon, became count of Blois, and was succeeded in 1279 by his daughter, Joan of Châtillon, who married Peter, count of Alençon, fifth son of Louis IX., king of France. In 1286 Joan sold the countship of Chartres to the king of France. Hugh of Châtillon, her first-cousin, became count of Blois in 1293, and was succeeded by his son, Guy I., in 1307. In 1342 Louis II., eldest son of Guy I., died at the battle of Crécy, and his brother, Charles of Blois, disputed the duchy of Brittany with John of Montfort. Louis III., eldest son of Louis II., became count in 1346, and was succeeded by John II., second son of Louis II., in 1372. In 1381 Guy II., brother of Louis III. and John II., succeeded in 1381, but died childless. Overwhelmed with debt, he had sold the countship of Blois to Louis I., duke of Orleans, brother of King Charles VI., who took possession of it in 1397.

In 1498 the countship of Blois was united with the crown by the accession of King Louis XII., grandson and second successor of Louis I., duke of Orleans.

See Bernier, *Histoire de Blois* (1682); La Saussaye, *Histoire de la ville de Blois* (1846).

(A. Lo.)

BLOMEFIELD, FRANCIS (1705-1752), English topographer of the county of Norfolk, was born at Fersfield, Norfolk, on the 23rd of July 1705. On leaving Cambridge in 1727 he was ordained, becoming in 1729 rector of Hargham, Norfolk, and immediately afterwards rector of Fersfield, his father’s family living. In 1733 he mooted the idea of a history of Norfolk, for which he had begun collecting material at the age of fifteen, and shortly afterwards, while collecting further information for his book, discovered some of the famous *Paston Letters*. By 1736 he was ready to put some of the results of his researches into type. At the end of 1739 the first volume of the *History of Norfolk* was completed. It was printed at the author’s own press, bought specially for the purpose. The second volume was ready in 1745. There is little doubt that in compiling his book Blomefield had frequent recourse to the existing historical collections of Le Neve, Kirkpatrick and Tanner, his own work being to a large extent one of expansion and addition. To Le Neve in particular a large share of the credit is due. When half-way through his third volume, Blomefield, who had come up to London in connexion with a special piece of research, caught smallpox, of which he died on the 16th of January 1752. The remainder of his work was published posthumously, and the whole eleven volumes were republished in London between 1805 and 1810.

BLOMFIELD, SIR ARTHUR WILLIAM (1829-1899), English architect, son of Bishop C.J. Blomfield, was born on the 6th of March 1829, and educated at Rugby and Trinity, Cambridge. He was then articled as an architect to P.C. Hardwick, and subsequently obtained a large practice on his own account. He became president of the Architectural Association in 1861, and a fellow (1867) and vice-president (1886) of the Royal Institute of British Architects. In 1887 he became architect to the Bank of England, and designed the law courts branch in Fleet Street, and he was associated with A.E. Street in the building of the law courts. In 1889 he was knighted. He died on the 30th of October 1899. He was twice married, and brought up two sons, Charles J. Blomfield and Arthur Conran Blomfield, to his own profession, of which they became distinguished representatives. Among the numerous churches which Sir Arthur Blomfield designed, his work at St Saviour's, Southwark, is a notable example of his use of revived Gothic, and he was highly regarded as a restorer.

BLOMFIELD, CHARLES JAMES (1786-1857), English divine, was born on the 29th of May 1786 at Bury St Edmunds. He was educated at the local grammar school and at Trinity College, Cambridge, where he gained the Browne medals for Latin and Greek odes, and carried off the Craven scholarship. In 1808 he graduated as third wrangler and first medallist, and in the following year was elected to a fellowship at Trinity College. The first-fruits of his scholarship was an edition of the *Prometheus* of Aeschylus in 1810; this was followed by editions of the *Septem contra Thebas, Persae, Choephorae*, and *Agamemnon*, of Callimachus, and of the fragments of Sappho, Sophron and Alcaeus. Blomfield, however, soon ceased to devote himself entirely to scholarship. He had been ordained in 1810, and held in quick succession the livings of Chesterford, Quarrington, Dunton, Great and Little Chesterford, and Tuddenham. In 1817 he was appointed private chaplain to Wm. Howley, bishop of London. In 1819 he was nominated to the rich living of St Botolph's, Bishopsgate, and in 1822 he became archdeacon of Colchester. Two years later he was raised to the bishopric of Chester where he carried through many much-needed reforms. In 1828 he was translated to the bishopric of London, which he held for twenty-eight years. During this period his energy and zeal did much to extend the influence of the church. He was one of the best debaters in the House of Lords, took a leading position in the action for church reform which culminated in the ecclesiastical commission, and did much for the extension of the colonial episcopate; and his genial and kindly nature made him an invaluable mediator in the controversies arising out of the tractarian movement. His health at last gave way, and in 1856 he was permitted to resign his bishopric, retaining Fulham Palace as his residence, with a pension of £6000 per annum. He died on the 5th of August 1857. His published works, exclusive of those above mentioned, consist of charges, sermons, lectures and pamphlets, and of a *Manual of Private and Family Prayers*. He was a frequent contributor to the quarterly reviews, chiefly on classical subjects.

See *Memoirs of Charles James Blomfield, D.D., Bishop of London, with Selections from his Correspondence*, edited by his son, Alfred Blomfield (1863); G.E. Biber, *Bishop Blomfield and his Times* (1857).

BLOMFIELD, EDWARD VALENTINE (1788-1816), English classical scholar, brother of Bishop C.J. Blomfield, was born at Bury St Edmunds on the 14th of February 1788. Going to Caius College, Cambridge, he was thirteenth wrangler in 1811, obtained several of the classical prizes of the university, and became a fellow and lecturer at Emmanuel College. In 1813 he travelled in Germany and made the acquaintance of some of the great scholars of Germany. On his return, he published in the *Museum Criticum* (No. ii.) an interesting paper on "The Present State of Classical Literature in Germany." Blomfield is chiefly known by his translation of Matthiae's *Greek Grammar* (1819), which was prepared for the press by his brother. He died on the 9th of October 1816, his early death depriving Cambridge of one who seemed destined to take a high place amongst her most brilliant classical scholars.

See "Memoir of Edward Valentine Blomfield," by Bishop Monk, in *Museum Criticum*, No.

BLONDEL, DAVID (1591-1655), French Protestant clergyman, was born at Châlons-sur-Marne in 1591, and died on the 6th of April 1655. In 1650 he succeeded G.J. Vossius in the professorship of history at Amsterdam. His works were very numerous; in some of them he showed a remarkable critical faculty, as in his dissertation on Pope Joan (1647, 1657), in which he came to the conclusion, now universally accepted, that the whole story is a mere myth. Considerable Protestant indignation was excited against him on account of this book.

BLONDEL, JACQUES FRANÇOIS (1705-1774), French architect, began life as an architectural engraver, but developed into an architect of considerable distinction, if of no great originality. As architect to Louis XV. from 1755 he necessarily did much in the rococo manner, although it would seem that he conformed to fashion rather than to artistic conviction. He was among the earliest founders of schools of architecture in France, and for this he was distinguished by the Academy; but he is now best remembered by his voluminous work *L'Architecture française*, in which he was the continuator of Marot. The book is a precious collection of views of famous buildings, many of which have disappeared or been remodelled.

BLONDIN (1824-1897), French tight-rope walker and acrobat, was born at St Omer, France, on the 28th of February 1824. His real name was Jean François Gravelet. When five years old he was sent to the École de Gymnase at Lyons and, after six months' training as an acrobat, made his first public appearance as "The Little Wonder." His superior skill and grace as well as the originality of the settings of his acts, made him a popular favourite. He especially owed his celebrity and fortune to his idea of crossing Niagara Falls on a tight-rope, 1100 ft. long, 160 ft. above the water. This he accomplished, first in 1859, a number of times, always with different theatric variations: blindfold, in a sack, trundling a wheelbarrow, on stilts, carrying a man on his back, sitting down midway while he made and ate an omelette. In 1861 Blondin first appeared in London, at the Crystal Palace, turning somersaults on stilts on a rope stretched across the central transept, 170 ft. from the ground. In 1862 he again gave a series of performances at the Crystal Palace, and elsewhere in England, and on the continent. After a period of retirement he reappeared in 1880, his final performance being given at Belfast in 1896. He died at Ealing, London, on the 19th of February 1897.

BLOOD, the circulating fluid in the veins and arteries of animals. The word itself is common to Teutonic languages; the O. Eng. is *blód*, cf. Gothic *bloth*, Dutch *bloed*, Ger. *Blut*. It is probably ultimately connected with the root which appears in "blow," "bloom," meaning flourishing or vigorous. The Gr. word for blood, αἷμα, appears as a prefix *haemo-* in many compound words. As that on which the life depends, as the supposed seat of the passions and emotions, and as that part which a child is believed chiefly to inherit from its parents, the word "blood" is used in many figurative and transferred senses; thus "to have his blood," "to fire the blood," "cold blood," "blood-royal," "half" or "whole blood," &c. The expression "blue blood" is from the Spanish *sangre azul.* The nobles of Castile claimed to be free from

all admixture with the darker blood of Moors or Jews, a proof being supposed to lie in the blue veins that showed in their fairer skins. The common English expletive “bloody,” used as an adjective or adverb, has been given many fanciful origins; it has been supposed to be a contraction of “by our Lady,” or an adaptation of the oath common during the 17th century, “’sblood,” a contraction of “God’s blood.” The exact origin of the expression is not quite clear, but it is certainly merely an application of the adjective formed from “blood.” The *New English Dictionary* suggests that it refers to the use of “blood” for a young rowdy of aristocratic birth, which was common at the end of the 17th century, and later became synonymous with “dandy,” “buck,” &c.; “bloody drunk” meant therefore “drunk as a blood,” “drunk as a lord.” The expression came into common colloquial use as a mere intensive, and was so used till the middle of the 18th century. There can be little doubt that the use of the word has been considerably affected by the idea of blood as the vital principle, and therefore something strong, vigorous, and parallel as an intensive epithet with such expressions as “thundering,” “awfully” and the like.

Anatomy and Physiology

In all living organisms, except the most minute, only a minimum number of cells can come into immediate contact with the general world, whence is to be drawn the food supply for the whole organism. Hence those cells—and they are by far the most numerous—which do not lie on the food-absorbing surface, must gain their nutriment by some indirect means. Further, each living cell produces waste products whose accumulation would speedily prove injurious to the cell, hence they must be constantly removed from its immediate neighbourhood and indeed from the organism as a whole. In this instance again, only a few cells can lie on a surface whence such materials can be directly discharged to the exterior. Hence the main number of the cells of the organism must depend upon some mechanism by which the waste products can be carried away from them to that group of cells whose duty it is to modify them, or discharge them from the body. These two ends are attained by the aid of a circulating fluid, a fluid which is constantly flowing past every cell of the body. From it the cells extract the food materials they require for their sustenance, and into it they discharge the waste materials resulting from their activity. This circulating medium is the blood.

Whilst undoubtedly the two functions of this circulating fluid above given are the more prominent, there are yet others of great importance. For instance, it is known that many tissues as a result of their activity produce certain chemical substances which are of essential importance to the life of other tissue cells. These substances—*internal secretions* as they are termed—are carried to the second tissue by the blood stream. Again, many instances are known in which two distant tissues communicate with one another by means of chemical messengers, bodies termed *hormones* (ὁρμάειν, to stir up), which are produced by one group of cells, and sent to the other group to excite them to activity. Here, also, the path by which such messengers travel is the blood stream. A further and most important manner in which the circulating fluid is utilized in the life of an animal is seen in the way in which it is employed in protecting the body should it be invaded by micro-organisms.

Hence it is clear that the blood is of the most vital importance to the healthy life of the body. But the fact that it is present as a circulating medium exposes the animal to a great danger, viz. that it may be lost should any vessel carrying it become ruptured. This is constantly liable to happen, but to minimize as far as possible any such loss, the blood is endowed with the peculiar property of *clotting*, *i.e.* of setting to a solid or stiff jelly by means of which the orifices of the torn vessels become plugged and the bleeding stayed.

The performance of these essential functions depends upon the maintenance of a continuous flow past all tissue cells, and this is attained by the circulatory mechanism, consisting of a central pump, the heart, and a system of ramifying tubes, the arteries, through which the blood is forced from the heart to every tissue (see Vascular System). A second set of tubes, the veins, collects the blood and returns it to the heart. In many invertebrates the circulating fluid is actually poured into the tissue spaces from the open terminals of the arteries. From these spaces it is in turn drained away by the veins. Such a system is termed a *haemolymph system* and the circulating fluid the haemolymph. Here the essential point gained is that the fluid is brought into direct contact with the tissue cells. In all vertebrates, the ends of the arteries are united to the commencements of the veins by a plexus of extremely minute tubes, the capillaries, consequently the blood is always retained within closed tubes and never comes into contact with the tissue cells. It is while passing through the capillaries that the blood performs its work; here the blood stream is at its

slowest and is brought nearest to the tissue cell, only being separated from it by the extremely thin wall of the capillary and by an equally thin layer of fluid. Through this narrow barrier the interchanges between cell and blood take place.

The advantage gained in the vertebrate animal by retaining the blood in a closed system of tubes lies in the great diminution of resistance to the flow of blood, and the consequent great increase in rate of flow past the tissue cells. Hence any food stuffs which can travel quickly through the capillary wall to the tissue cell outside can be supplied in proportionately greater quantity within a given time, without requiring any very great increase in the concentration of that substance in the blood. Conversely, any highly diffusible substance may be withdrawn from the tissues by the blood at a similarly increased pace. These conditions are more peculiarly of importance for the supply of oxygen and the removal of carbonic acid-especially for the former, because the amount of it which can be carried by the blood is small. But as the rate at which a tissue lives, *i.e.* its activity, depends upon the rate of its chemical reactions, and as these are fundamentally oxidative, the more rapidly oxygen is carried to a tissue the more rapidly it can live, and the greater the amount of work it can perform within a given time. The rate of supply is of much less importance in the case of the other food substances because they are far more soluble in water, so that the supply in sufficient quantity can easily be met by a relatively slow blood flow. Hence we find that the gradual evolution of the animal kingdom goes hand in hand with the gradual development of a greater oxygen-carrying capacity of the blood and an increase in the rate of its flow.

In the groundwork of a tissue are a number of spaces—the *tissue spaces*. They are filled with fluid and intercommunicate freely, finally connecting with a number of fine tubes, the lymphatics, through which excess of fluid or any solid particles present are drained away. The contained fluid acts as an intermediary between the blood and the cell; from it, the cell takes its various food stuffs, these having in the first instance been derived from the blood, and into it the cell discharges its waste products. On the course of the lymphatics a number of typical structures, the lymphatic glands, are placed, and the lymph has to pass through these structures where any deleterious products are retained, and the fluid thus purified is drained away by further lymphatics and finally returned to the blood. Thus there is a second stream of fluid from the tissues, but one vastly slower than that of the blood. The flow is too slow for it to act as the vehicle for the removal of those waste products (carbonic acid, &c.) which must of necessity be removed quickly. These must be removed by the blood. The same is true for the main number of other waste products, which, however, being of small molecular size are readily absorbed into the blood stream.

But in addition to fluid, the tissue spaces may at times be found to contain solid matter in the form of particles, which may represent the debris of destroyed cells, or which are, as is quite commonly the case, micro-organisms. Apparently such material cannot be removed from a tissue by absorption into the blood stream—indeed in the case of living organisms such an absorption would in many instances rapidly prove fatal, and special provision is made to prevent such an accident. These, therefore, are made to travel along the lymphatic channels, and so, before gaining access to the blood stream and thus to the body generally, have to run the gauntlet of the protective mechanism provided by the lymphatic glands, where in the major number of cases they are readily destroyed.

Hence we see that first and foremost we have to regard the blood as a food-carrier to all the cells of the body; in the second place as the vehicle carrying away most if not all the waste products; in a third direction, it is acting as a means for transmitting chemical substances manufactured in one tissue to distant cells of the body for whose nutrition or excitation they may be essential; and in addition to these important functions there is yet another whose value it is almost impossible to overestimate, for it plays the essential rôle in rendering the animal immune to the attacks of invading organisms. The question of immunity is discussed elsewhere, and it is sufficient merely to indicate the chief means by which the blood subserves this essential protective mechanism. Should living organisms find their way into the surface cells or within the tissue spaces, the body fights them in a number of ways, (1) It may produce one or more chemical substances capable of neutralizing the toxic material produced by the organism. (2) It may produce chemical substances which act as poisons to the micro-organism, either paralysing it or actually killing it. Or (3) the organism may be attacked and taken up into the body of wandering cells, *e.g.* certain of the leucocytes, and then digested by them. Such cells are therefore called phagocytes (φάγειν, to eat). Thus, by its power of reacting in these ways the body has become capable of withstanding the attacks of many different varieties of micro-organisms, of both animal and vegetable origin.

General Properties.—Blood is an opaque, viscid liquid of bright red colour possessing a distinct and characteristic odour, especially when warm. Its opacity is due to the presence of a very large number of solid particles, the blood corpuscles, having a higher refractive index than that of the liquid in which they float. The specific gravity in man averages about 1.055. The specific gravity of the liquid portion, the plasma (Gr. πλάσμα, something formed or moulded, πλάσσειν, to mould), is about 1.027, whilst that of the corpuscles amounts to 1.088. To litmus it reacts as a weak alkali.

Blood Plasma.—The plasma is a solution in water of a varied number of substances, and as a solvent it confers on the blood its power of acting as a carrier of food stuffs and waste products. One important food substance, oxygen, is, however, only partly carried in solution, being mainly combined with haemoglobin in the red corpuscles. The food stuffs carried by the plasma are proteins, carbohydrates, salts and water. The main waste products dissolved in it are ammonium carbonate, urea, urates, xanthin bases, creatin and small amounts of other nitrogenous bodies, carbonic acid as carbonates, other carbon compounds such as cholesterin, lecithin and a number of other substances. Thus, if we take mammalian blood as a type, the plasma would have the following approximate composition:—

In 1000 grms. plasma—

Water			901.51
Substances not vaporizing at 120° C.—			
Fibrin		8.06	
Other proteins and organic substances		81.92	
Inorganic substances—			
Chlorine	3.536		
Sulphuric acid	0.129		
Phosphoric acid	0.145		
Potassium	0.314		
Sodium	3.410		
Calcium	0.298		
Magnesium	0.218		
Oxygen	0.455		
	——	8.505	
		——	98.49
			———
			1000.00

Proteins.—The proteins of the blood plasma belong to the two classes of the albumins and the globulins. The globulins present are named fibrinogen and serum-globulin; as its name implies, the chief physiological property of fibrinogen is that it can give rise to fibrin, the solid substance formed when blood clots. It possesses the typical properties of a globulin, *i.e.* it coagulates on heating (in this instance at a temperature of 56°C.), and is precipitated by half saturating its solution with ammonium sulphate. It differs from other globulins in that it is less soluble. It is only present in very small quantities, 0.4%. The other globulin, serum-globulin, is not coagulated until 75°C. is reached, and we now know that it is in reality a mixture of several proteins, but so far these have not been completely separated from one another and obtained in a pure form. On dialysing a solution of serum-globulin a part is precipitated, and this portion has been termed the eu-globulin fraction, the remainder being known, in contradistinction, as the pseudo-globulin. Again, on diluting a solution and adding a small amount of acetic acid a precipitate is formed which in some respects differs from the remainder of the globulin present. Whether in these two instances we are dealing with approximately pure substances is extremely doubtful. A further important point in connexion with the chemistry of the globulins is that dextrose may be found among their decomposition products, *i.e.* that a part of it, or possibly the whole, possesses a glucoside character.

Serum-albumin gives all the typical colour and precipitation reactions of the albumins. If plasma be weakly acidified with sulphuric acid, then treated with crystals of ammonium sulphate until a slight precipitate forms, filtered and the filtrate allowed to evaporate very slowly, typical crystals of serum-albumin may form. According to many it is a uniform and specific substance, but others hold the view that it consists of at least three distinct substances, as shown by the fact that if a solution be gradually heated coagulation will occur at three different temperatures, viz. at 73°, 77° and 84° C. On the other hand the close agreement between different analyses of even the amorphous preparations points to there being but one serum-albumin.

When blood clots two new proteins make their appearance in the fluid part of the blood, or serum, as it is now called. The first of these is fibrin ferment (for its origin see section on *Clotting* below). The other, fibrinoglobulin, possesses all the typical characteristics of the globulins and coagulates at 64° C.

Carbohydrates.—Three several carbohydrates are described as occurring in plasma, viz. glycogen, animal gum and dextrose. If glycogen is present in solution in the plasma it is there in very small quantities only, and has probably arisen from the destruction of the white blood corpuscles, since some leucocytes undoubtedly contain glycogen. A small amount of carbohydrate having the formula for starch and yielding a reducing sugar on hydrolysis with acid has also been described. The constant carbohydrate constituent of plasma, however, is dextrose. This is present to the approximate amount of 0.15% in arterial blood. The amount may be much greater in the blood of the portal vein during carbohydrate absorption, and according to some observers there is less in venous than in arterial blood, but the difference is small and falls within the error of observation. The statement that when no absorption is taking place the blood of the hepatic vein is richer in dextrose than that of the portal vein (Bernard) is denied by Pavy.

Fats.—Plasma or serum is as a rule quite clear, but after a meal rich in fats it may become quite milky owing to the presence of neutral fats in a very fine state of subdivision. This suspended fat rapidly disappears from the blood after fat absorption has ceased. To some extent it varies in composition with that of the fat absorbed, but usually consists of the glycerides of the common fatty acids—palmitic, stearic and oleic. In addition, there is a small amount of fatty acid in solution in the plasma. As to the form in which this occurs there is some uncertainty. It is possibly present as a soap or even as a neutral fat, since a little can be dissolved in plasma, the solvent substance being probably protein or cholesterin. Fatty acids also appear to be present to some extent combined with cholesterin forming cholesterin esters (about 0.06%).

Other Organic Compounds.—In addition to the substances above described, belonging to the three main classes of food stuffs, there are still other organic bodies present in plasma in small amounts, which for convenience we may classify as non-nitrogenous and nitrogenous. Among the former may be mentioned lactic acid, glycerin, a lipochrome, and probably many other substances of a similar type whose separation has not yet been effected.

The non-protein nitrogenous constituents consist of the following: ammonia as carbonate or carbamate (0.2 to 0.6%), urea (0.02 to 0.05%), creatine, creatinine, uric acid, xanthine, hypoxanthine and occasionally hippuric acid. Three ferments are also described as being present: (1) a glycolytic ferment exerting an action upon dextrose; (2) a lipase or fat-splitting ferment; and (3) a diastase capable of converting starch into sugar.

Salts.—The saline constituents of plasma comprise chlorides, phosphates, carbonates and possibly sulphates, of sodium, potassium, calcium and magnesium. The most abundant metal is sodium and the most abundant acid is hydrochloric. These two are present in sufficient amount to form about 0.65% of sodium chloride. The phosphate is present to about 0.02%. Sulphuric acid is always present if the blood has been calcined for the purposes of the analysis, and may then be present to about 0.013%. This is, however, probably produced during the destruction of the protein, since it has been shown that no sulphate can be removed from normal plasma by dialysis. The amount of potassium present (0.03%) is less than one-tenth of that of the sodium, and the quantities of calcium and magnesium are even less.

Formed Elements.—When viewed under the microscope the main number of these are seen to be small yellow bodies of very uniform size, size and shape varying, however, in different animals. When observed in bulk they have a red colour, their presence in fact giving the typical colour to blood. These are the *red blood corpuscles* or *erythrocytes* (Gr. ἐρυθρός, red). Mingled with them in the blood are a smaller number of corpuscles which possess no colour and have therefore been called *white blood corpuscles* or *leucocytes* (Gr. λευκός, white). Lastly, there are present a large number of small lens-shaped structures, less in number than the red corpuscles, and much more difficult to distinguish. These are known as *blood platelets*.

Red Corpuscles.—These are present in very large numbers and, under normal conditions, all possess exactly the same appearance. With rare exceptions their shape is that of a biconcave disk with bevelled edges, the size varying somewhat in different animals, as is seen in the following table which gives their diameters:—

Man	0.0075 mm.

Dog	0.0073 mm.
Rabbit	0.0069 mm.
Cat	0.0065 mm.
Goat	0.0041 mm.

The coloured corpuscles of amphibia as well as of nearly all vertebrates below mammals are biconvex and elliptical. The following are the dimensions of some of the more common:—

Pigeon	0.0147	mm.	long by	0.0065	mm. wide.
Frog	0.0223	”	”	0.0157	” ”
Newt	0.0293	”	”	0.0195	” ”
Proteus	0.0580	”	”	0.0350	” ”
Amphiuma	0.0770	”	”	0.0460	” ”

Their number also varies as follows:—

Man	4,000,000	to 5,000,000	per cub. mm.
Goat	9,000,000	to 10,000,000	” ”
Sheep	13,000,000	to 14,000,000	” ”
Birds	1,000,000	to 4,000,000	” ”
Fish	250,000	to 2,000,000	” ”
Frog	500,000	per cub. mm.	
Proteus	36,000	” ”	

In mammals they are apparently homogeneous in structure, have no nucleus, but possess a thin envelope. Their specific gravity is distinctly higher than that of the plasma (1.088), so that if clotting has been prevented, blood on standing yields a large deposit which may form as much as half the total volume of the blood.

Chemical Composition.—On destruction the red corpuscles yield two chief proteins, haemoglobin and a nucleo-protein, and a number of other substances similar to those usually obtained on the break-down of any cellular tissue, such for instance as lecithin, cholesterin and inorganic salts. The most important protein is the haemoglobin. To it the corpuscle owes its distinctive property of acting as an oxygen carrier, for it possesses the power of combining chemically with oxygen and of yielding up that same oxygen whenever there is a decrease in the concentration of the oxygen in the solvent. Thus in a given solution of haemoglobin the amount of it which is combined with oxygen depends absolutely on the oxygen concentration. The greatest dissociation of oxyhaemoglobin occurs as the oxygen tension falls from about 40 to 20 mm. of mercury. That the oxygen forms a definite compound with the haemoglobin is proved by the fact that haemoglobin thoroughly saturated with oxygen (oxyhaemoglobin) has a definite absorption spectrum showing two bands between the D and E lines, whilst haemoglobin from which the oxygen has been completely removed only gives one band between those lines. In association with this, oxyhaemoglobin has a typical bright red colour, whereas haemoglobin is dark purple. A further striking characteristic of haemoglobin is that it contains iron in its molecule. The amount present, though small bears a perfectly definite quantitative relation to the amount of oxygen with which the haemoglobin is capable of combining (two atoms of oxygen to one of iron). One gram of haemoglobin crystals can combine with 1.34 cc. of oxygen. On destruction with an acid or alkali, haemoglobin yields a pigment portion, haematin, and a protein portion, globin, the latter belonging to the group of the histones (Gr. ἱστός, web, tissue). In this cleavage the iron is found in the pigment. By the use of a strong acid, it may be made to yield iron-free pigment, the remainder of the molecule being much further decomposed.

Destruction and Formation.—In the performance of their work the corpuscles gradually deteriorate. They are then destroyed, chiefly in the liver, but whether the whole of this process is effected by the liver alone is not decided. It is proved, however, that the destruction of the haemoglobin is entirely effected there. It was for a long time considered to be one of the functions of the spleen to examine the red corpuscles and to destroy or in some way to mark those no longer fitted for the performance of their work. It is proved that the destruction of the haemoglobin is entirely effected in the liver, since both the main cleavage products may be traced to this organ, which discharges the pigmentary portion as the bile pigment, but retains the iron-protein moiety at any rate for a time. The amount of bile pigment eliminated during the day indicates that the destruction must be considerable, and since the number of corpuscles does not vary there must be an equivalent formation of new ones. This takes place in the red bone-marrow, where special cells are provided for their continuous production. In embryonic life their formation is effected in another way. Certain mesodermic cells, resembling those of the connective tissue, collect masses of

haemoglobin, and from these elaborate red blood corpuscles which thus come to lie in the fluid part of the cell. By a canalization of the branches of these cells which unite with branches of other cells the precursors of the blood capillaries are formed.

White Blood Corpuscles.—These constitute the second important group of formed elements in the blood, and number about 12,000 to 20,000 per cubic mm. They are typical wandering cells carried to all parts of the body by the blood stream, but often leave that stream and gain the tissue spaces by passing through the capillary wall. They exist in many varieties and were first classified according as, under the microscope, they presented a granular appearance or appeared clear. The cells were also distinguished from one another according as they possessed fine or coarse granules. The granules are confined to the protoplasm of the cell, and it has been shown that they differ chemically, because their staining properties vary. Thus, some granules select an acid stain, and the cells containing them are then designated *acidophile* or *eosinophile*;[1] other granules select a basic stain and are called *basophile*, while yet others prefer a neutral stain (*neutrophile*).

In human blood the following varieties of leucocytes may be distinguished:—

1. *The Polymorphonuclear Cell*.—This possesses a nucleus of very complicated outline and a fair amount of protoplasm filled with numbers of fine granules which stain with eosin. They vary in size but are usually about 0.01 mm. in diameter. They are highly amoeboid and phagocytic, and form about 70% of the total number of leucocytes.

2. *The Coarsely Granular Eosinophile Cell*.—These large cells contain a number of well-defined granules which stain deeply with acid dyes. The nucleus is crescentic. The cells amount to about 2% of the total number of leucocytes, though the proportion varies considerably. They are actively amoeboid.

3. *The Lymphocyte*.—This is the smallest leucocyte, being only about 0.0065 mm. in diameter. It has a large spherical nucleus with a small rim of clear protoplasm surrounding it. It forms from 15 to 40% of the number of leucocytes, and is less markedly amoeboid than the other varieties.

4. *The Hyaline* (Gr. ὑάλινος, glassy, crystalline, ὕαλος, glass) *cell or macrocyte* (Gr. μακρός, long or large).—This is a cell similar to the last with a spherical, oval or indented nucleus, but it has much more protoplasm. It constitutes about 4% of all the leucocytes and is highly amoeboid and phagocytic.

5. *The Basophile Cell*.—This possesses a spherical nucleus and the protoplasm contains a small number of granules staining deeply with basic dyes. It is rarely found in the blood of adults except in certain diseases.

Functions.—These cells act as scavengers or as destroyers of living organisms that may have gained access to the tissue spaces. They play an important part in the chemical processes underlying the phenomena of immunity, and some at least are of importance in starting the process of clotting.

They are constantly suffering destruction in the performance of their work. Many, too, are lost to the body by their passage through the different mucous surfaces. Their origin is still obscure in many points. The lymphocytes are derived from lymphoid tissue, wherever it exists in the different parts of the body. The polymorphonuclear and eosinophile cells are derived from the bone-marrow, each by division of specific mother cells located in that tissue. The macrocyte is believed by many to represent a further stage in the development of the lymphocyte. Their rate of formation may be influenced by a variety of conditions—for instance, they are found to vary in number according to the diet and also, to a considerable extent, in disease.

Platelets.—The platelets or thrombocytes (Gr. θρόμβος, clot) are the third class of formed elements occurring in mammalian blood. There are still, however, many observers who consider that platelets are not present in the normal circulating blood, but only make their appearance after it has been shed or otherwise injured. They are minute lens-shaped structures, and may amount to as many as 800,000 per cubic mm. Under certain conditions, examination has shown that they are protoplasmic and amoeboid, and that each one contains a central body of different staining properties from the remainder of the structure. This has been regarded by some as a nucleus. On being brought into contact with a foreign surface they adhere to it firmly, very rapidly passing through a number of phases resulting ultimately in the formation of granular debris. In shed blood they tend to collect into groups, and during clotting, fibrin filaments may be observed to shoot out from these clumps.

Variations in the Blood of different Animals.—If we contrast the blood of different animals of the vertebrate class we find striking differences both in microscopic appearances and in chemical properties. In the first place, the corpuscles vary in amount and in kind. Thus, whilst in a mammal the corpuscles form 40 to 50% of the total volume of the blood, in the lower vertebrates the volume is much less, *e.g.* in frogs as low as 25% and in fishes even lower. The deficiency is chiefly in the red corpuscles, the ratio of white to red increasing as we examine the blood from animals lower in the scale. The corpuscles themselves are also found to vary, especially the red ones. In the mammal they are biconcave disks with bevelled edges, they do not contain a nucleus so that they are not cells. In the bird they are larger, ellipsoidal in shape and have a large nucleus in the centre of the cell. In reptiles and amphibia the red corpuscles are also nucleated, but the *stroma* portion containing the haemoglobin is arranged in a thickened annular part encircling the nucleus. When seen from the flat they are oval in section. In fishes the corpuscles show very much the same structure. A further very significant difference to be observed between the bloods of different vertebrates is in the amount of haemoglobin they contain; thus in the lower classes, fishes and amphibia, not only is the number of red corpuscles small but the amount of haemoglobin each corpuscle contains is relatively low. The concentration of the haemoglobin in the corpuscles attains its maximum in the mammal and the bird. Since the haemoglobin is practically the same from whatever animal it is obtained and can only combine with the same amount of oxygen, the oxygen-capacity of the blood of any vertebrate is in direct proportion to the amount of haemoglobin it contains. Therefore we see that as we ascend the scale in the vertebrate series the oxygen-carrying capacity of the blood rises. This increase was a natural preliminary condition for the progress of evolution. In order that a more active animal might be developed the main essential was that the chemical processes of the cell should be carried out more rapidly, and as these processes are fundamentally oxidative, increased activity entails an increased rate of supply of oxygen. This latter has been brought about in the animal kingdom in two ways, first by an increase in the concentration of the haemoglobin of the blood effected by an increase both in the number of corpuscles and in the amount of haemoglobin contained in each, and secondly by an increase in the rate at which the blood has been made to pass through the tissues. In the lower vertebrates the blood pressure is low and the haemoglobin content of the blood is low, consequently both rate of blood-flow and oxygen-content are low. In contrast with this, in higher vertebrates the blood pressure is high and the haemoglobin content of the blood is high, consequently both rate of blood-flow and oxygen-content are high. We must associate with this important step in evolution the means employed for the more rapid absorption of oxygen and for its increased rate of discharge to the tissues, the most important features of which are a diminution in the size of the corpuscle and the attainment of its peculiar shape, both resulting in the production of a relatively enormous corpuscular surface in a unit volume of blood.

Variations are also found in the white corpuscles as well as in the red, but these differences are not so striking and lie chiefly in unimportant details of structure of individual cells. Enormous variations are to be found in different species of mammals, but the cells generally conform to the types of secreting cells or phagocytes.

The platelets also differ in the different species. In the frog, for instance, many are spindle-shaped and contain a nucleus-like structure. Birds' blood is stated to contain no platelets. The variations in number of these bodies have not been satisfactorily ascertained on account of the difficulties involved in any attempt to preserve them and to render them visible under the microscope.

Differences are also found in the chemical composition of the plasma. The chief variation is in the amount of protein present, which attains its maximum concentration in birds and mammals, while in reptiles, amphibia and fishes it is much less. The bloods of the latter two classes are much more watery than that of the mammal. Moreover, it has been proved that there are specific differences in the chemical nature of the various proteins present even between different varieties of mammals. Thus the ratio of the globulin fraction to the albumin fraction may vary considerably, and again, one or other of the proteins may be quite specific for the animal from which it is derived.

Clotting.—If a sample of blood be withdrawn from an animal, within a short time it undergoes a series of changes and becomes converted into a stiff jelly. It is said to *clot*. If the process is watched it is seen to start first from the surfaces where it is in contact with any foreign body; thence it extends through the blood until the whole mass sets solid. A short time elapses before this process commences—a time dependent upon two chief conditions, viz. the temperature at which the blood is kept and the extent of foreign surface

with which it is brought into contact. Thus in a mammal the blood clots most quickly at a temperature a little above body temperature, while if the blood be cooled quickly the clotting is considerably delayed and in the case of some animals altogether prevented. For example, human blood kept at body temperature clots in three minutes, while if allowed to cool to room temperature the first sign of clotting may not make its appearance until eight minutes after its removal from the body. The process of clotting is also considerably accelerated by making the blood flow in a thin stream over a wide surface. The full completion of the process occupies some time if the blood be kept quiet, but ultimately the whole mass of the blood becomes converted into a solid. At this stage the containing vessel may be inverted without any drop of fluid escaping. A short time after this stage has been reached drops of a yellow fluid appear upon the surface and, increasing in size and number, run together to form a layer of fluid separated from the clot. This fluid is termed *serum*; its appearance is due to the contraction of the clot, which thus squeezes out the fluid from between its solid constituents. Contraction continues for about twenty-four hours, at the end of which time a large quantity (one-third or more of the total volume) of serum may have been separated. The clot contracts uniformly, thus preserving throughout the same general shape as that of the vessel in which the blood has been collected. Finally the clot swims freely in the serum which it has expressed.

The cause of the clot formation has been found to be the precipitation of a solid from the liquid plasma of the blood. This solid is in the form of very minute threads and hence is termed *fibrin*. The threads traverse the mass of blood in every possible direction, interlacing and thus confining in their meshes all the solid elements of the blood. Soon after their deposition they begin to contract, and as the meshwork they form is very minute they carry with them all the corpuscles of the blood. These with the fibrin form the shrunken clot.

If the rate at which blood clots be retarded either by cooling or by some other process the corpuscles may have time to settle, partially or completely, in which case distinct layers may form. The lowermost of these contains chiefly the red corpuscles, the second layer may be grey owing to the high percentage of leucocytes present, while a third, marked by opalescence only, may be very rich in platelets. Above these a clear layer of fluid may be found. This is *plasma*. The formation of these layers depends solely upon the rate of sedimentation of these elements, the rate depending partly upon differences in specific gravity, and partly upon the tendency the corpuscles have to run into clumps. Horse’s blood offers one of the best instances of the clumping of red corpuscles, and in this animal sedimentation of the red corpuscles is most rapid.

If now such a sedimented blood is allowed to clot the process is found to start in the middle two layers, *i.e.* in those containing the white corpuscles and platelets. From these layers it spreads through the rest of the liquid, being most retarded, however, in the red corpuscle layer, and particularly so if the sedimentation has been very complete. Not only does the clotting process start from the layers containing the leucocytes and platelets, but in them it also proceeds more quickly. These observations clearly indicate that the clotting process is initiated by some change starting from these elements.

The object of the clotting of the blood is quite clear. It is to prevent, as far as possible, any loss of blood when there is an injury to an animal’s vessels. The shed blood becomes converted into a solid, and this, extending into the interior of the ruptured vessel, forms a plug and thus arrests the bleeding. It is found that clotting is especially accelerated whenever the blood touches a foreign tissue, for instance, the outer layers of a torn blood-vessel wall, muscle tissue, &c., *i.e.* in exactly those conditions in which rapid clotting becomes of the greatest importance. Yet another very pregnant fact in connexion with clotting is that if an animal be bled rapidly and the blood collected in successive samples it is found that those collected last clot most quickly. Hence the more excessive the haemorrhage in any case, the greater becomes the onset of the natural cure for the bleeding, viz. clotting.

When we begin to inquire into the nature of clotting we have to determine in the first place whence the fibrin is derived. It has long been known that two chemical substances at least are requisite for its production. Thus certain fluids are known, *e.g.* some samples of hydrocele or pericardial fluid, which will not clot spontaneously, but will clot rapidly when a small quantity of serum or of an old blood-clot is added to it. The constituent substance which is present in the first-named fluids is known as fibrinogen, and that present in the serum or the clot is known as fibrin-ferment or *thrombin*.

Fibrinogen is present in living blood dissolved in the plasma; it is also present in such fluids as hydrocele or pericardial effusions, which, though capable of clotting, do not clot

spontaneously. Thrombin, on the other hand, does not exist in living blood, but only makes its appearance there after blood is shed. It is not yet certain what is the nature of the final reaction between fibrinogen and thrombin. The possibilities are, that thrombin may act—(1) by acting upon fibrinogen, which it in some way converts into fibrin, (2) by uniting with fibrinogen to form fibrin, or (3) by yielding part of itself to the fibrinogen which thus becomes converted into fibrin. The experimental study of the rate of fibrin formation, when different strengths of thrombin solutions are allowed to act upon a fibrinogen solution, leads us to the probable conclusion that the first of these three possibilities is the correct one, and that thrombin therefore exerts a true ferment action upon fibrinogen. It is known that in the reaction, in addition to the formation of fibrin, yet another protein makes its appearance. This is known as fibrinoglobulin, and apparently it arises from the fibrinogen, so that the change would be one of cleavage into fibrin and fibrinoglobulin. It is very noteworthy that although the amount of fibrin formed during the clotting appears very bulky, yet the actual weight is extremely small, not more than 0.4 grms. from 100 cc. of blood.

Having ascertained that the clotting is due to the action of thrombin upon fibrinogen, we now see that the next step to be explained is the origin of thrombin. It has been shown that the final step in its formation consists in the combination of another substance, termed prothrombin, with calcium. Any soluble calcium salt is found to be effective in this respect, and conversely the removal of soluble calcium (*e.g.* by sodium oxalate) will prevent the formation of thrombin and therefore of clotting.

In the next place it can be proved that prothrombin does not exist as such in circulating blood, so that the problem becomes an inquiry as to the origin of prothrombin. Experiment has shown that in its turn prothrombin arises from yet another precursor, which is named thrombogen, and that thrombogen also is not to be found in circulating blood but only makes its appearance after the blood is shed. The conversion of thrombogen into prothrombin has been proved to be due to the action of a second ferment which has been named thrombokinase, and this latter is again absent from living blood. Hence the question arises, whence are derived thrombogen and thrombokinase? In the study of this question it has been found that if the blood of birds be collected direct from an artery through a perfectly clean cannula into a clean and dust-free glass vessel, it does not clot spontaneously. The plasma collected from such blood is found to contain thrombogen but no thrombokinase. A somewhat similar plasma may be prepared from a mammal’s blood by collecting samples of blood from an artery into vessels which have been thoroughly coated with paraffin, though in this instance thrombogen may be absent as well as thrombokinase. If plasma containing thrombogen but no thrombokinase be treated with a saline extract of any tissues it will soon clot. The saline extract contains thrombokinase. This ferment can therefore be derived from most tissues, including also the white blood corpuscles and the platelets. Thrombogen is produced from the leucocytes, but it is not yet certain whether it is also formed from the platelets. The discovery of the origin of the thrombokinase from tissue cells explains a fact that has long been known, namely, that if in collecting blood, it is allowed to flow over cut tissues, clotting is most markedly accelerated. The fact that birds’ blood if very carefully collected will not clot spontaneously tends to prove that thrombokinase is not derived from the leucocytes, and makes probable its origin from the platelets, for it is known that birds’ blood apparently does not contain platelets, at any rate in the form in which they are found in mammalian blood. When examining the general properties of platelets, attention was drawn to the remarkably rapid manner in which they undergo change on coming into contact with a foreign surface. It is apparently the actual contact which initiates these changes, changes which are fundamentally chemical in character, resulting in the production of thrombokinase and possibly also of thrombogen.

Thus as our knowledge at present stands the following statement gives a recapitulated account of the changes which constitute the many phases of clotting. When blood escapes from a blood-vessel it comes into contact with a foreign surface, either a tissue or the damaged walls of the cut vessel. Very speedily this contact results in the discharge of thrombogen and thrombokinase, the former from the white blood corpuscles and also possibly from the platelets, the latter from the platelets or from the tissue with which the blood comes in contact. The interaction of these two bodies next results in the formation of prothrombin, which, combining with the calcium of any soluble lime salt present, forms thrombin or fibrin-ferment. The last step in the change is the action of thrombin upon fibrinogen to form fibrin, and the clot is complete.

The intrinsic value to the animal of these changes is quite plain. The power of clotting and thus stopping haemorrhage is of essential importance, and yet this clotting must not occur within the living blood-vessels, or it would speedily result in death. That the tissues should

be able to accelerate the process is of very obvious value. That the inner lining of the blood-vessels does not act as a foreign tissue is possibly due to the extreme smoothness of their surface.

Further, an animal must always be exposed to a possible danger in the absorption of some thrombin from a mass of clotted blood still retained within the body, and we know that if a quantity of active ferment be injected into the blood-stream intravascular clotting does result. Under all usual conditions this is obviated, the protective mechanism being of a twofold character. First, it is found that thrombin becomes converted very quickly into an inactive modification. Serum, for instance, very quickly loses its power of inducing clotting in fibrinogen solutions. Secondly, the body has been found to possess the power of making a substance, antithrombin, which can combine with thrombin forming a substance which is quite inactive as far as clotting is concerned. Finally, there is evidence that normal blood contains a small quantity of this substance, antithrombin, and that under certain conditions the amount present may be enormously increased.

(T. G. Br.)

Pathology of the Blood.

The changes in the blood in disease are probably as numerous and varied as the diseases which attack the body, for the blood is not only the medium of respiration, but also of nutrition, of defence against organisms and of many other functions, none of which can be affected without corresponding alterations occurring in the circulating fluid. The immense majority of these changes are, however, so subtle that they escape detection by our present methods. But in certain directions, notably in regard to the relations with micro-organisms, changes in the blood-plasma can be made out, though they are not associated in all cases with changes in the formed elements which float in it, nor with any obvious microscopical or chemical alterations.

Immunity.

The phenomena of immunity to the attacks of bacteria or their toxins, of agglutinative action, of opsonic action, of the precipitin tests, and of haemolysis, are all largely dependent on the inherent or acquired characters of the blood serum. It is a commonplace that different people vary in their susceptibility to the attacks of different organisms, and different species of animals also vary greatly. This “natural immunity” is due partly to the power possessed by the leucocytes or white blood corpuscles of taking into their bodies and digesting or holding in an inert state organisms which reach the blood—phagocytosis,—partly to certain bodies in the blood serum which have a bactericidal action, or whose presence enables the phagocytes to deal more easily with the organisms. This natural immunity can be heightened when it exists, or an artificial immunity can be produced in various ways. Doses of organisms or their toxins can be injected on one or several occasions, and provided that the lethal dose be not reached, in most cases an increased power of resistance is produced. The organisms may be injected alive in a virulent condition, or with their virulence lessened by heat or cold, by antiseptics, by cultivation in the presence of oxygen, or by passage through other animals, or they may first be killed, or their toxins alone injected. The method chosen in each case depends on the organism dealt with. The result of this treatment is that in the animal treated protective substances appear in the serum, and these substances can be transferred to the serum of another animal or of man; in other words the active immunity of the experimental animal can be translated into the passive immunity of man. According to the nature of the substances injected into the former, its serum may be antitoxic, if it has been immunized against any particular toxin, or antibacterial, if against an organism. Familiar examples of these are, of the former diphtheria antitoxin, of the latter anti-plague and anti-typhoid sera. An antitoxin exerts its effects by actual combination with the respective toxin, the combination being inert. It is probable that the ultimate source of the antitoxin is to be found in the living cells of the tissues and that it passes from them into the blood. The action of an antibacterial serum depends on the presence in it of a substance known as “immune-body,” which has a special affinity and power of combining with the bacterium used. In order that it may exert this power it requires the presence of a substance normally present in the serum known as “complement.” The development of these “anti-bodies,” though it has been studied mainly in connexion with bacteria and their toxins, is not confined to their action, but can be demonstrated in regard to many other substances, such as ferments, tissue cells, red corpuscles, &c. In some animals, for example, the blood serum has the power of dissolving the red corpuscles of an animal of different species; *e.g.* the guinea-pig’s serum is “haemolytic” to the red corpuscles of the ox. This haemolytic power (haemolysis) can be increased by repeated injections of red corpuscles from the other animal, in this case

also, as in the bacterial case, by the production and action of immune-body and complement. The antiserum produced in the case of the red corpuscles may sometimes, if injected into the first animal, whose red corpuscles were used, cause extensive destruction of its red corpuscles, with haemoglobinuria, and sometimes a fatal result.

Opsonic action depends on the presence of a substance, the “opsonin,” in the serum of an immunized animal, which makes the organism in question more easily taken up by the phagocytes (leucocytes) of the blood. The opsonin becomes fixed to the organisms. It is present to a certain extent in normal serum, but can be greatly increased by the process of immunization; and the “opsonic index,” or relation between the number of organisms taken up by leucocytes when treated with the serum of a healthy person or “control,” and with the serum of a person affected with any bacterial disease and under treatment by immunization, is regarded by some as representing the degree of immunity produced.

Agglutinative action is evidence of the presence in a serum of a somewhat similar set of substances, known as “agglutinins.” When a portion of an antiserum is added to an emulsion of the corresponding organism, the organisms, if they are motile, cease to move, and in any case become gathered together into clumps. In all probability several different bodies are concerned in this process. This reaction, in its practical applications at least, may be regarded as a reaction of infection rather than of immunization as ordinarily understood, for it is found that the blood serum of patients suffering from typhoid, Malta fever, cholera, and many other bacterial diseases, agglutinates the corresponding organisms. This fact has come to be of great importance in diagnosis.

The precipitin test depends on a somewhat analogous reaction. If the serum of an animal be injected repeatedly into another animal of different species, a “precipitin” appears in the serum of the animal treated, which causes a precipitate when added to the serum of the first animal. The special importance of this fact is that it can be utilized as a method of distinguishing between human blood and that of animals, which is often of importance in medical jurisprudence.

In this summary the facts adduced are practically all biological, and are due to the extraordinary activity with which the study of bacteriology (*q.v.*) has been pursued in recent years. The chemistry of the blood has not hitherto been found to give information of clinical or diagnostic importance, and nothing need here be added to what is said above on the physiology of the blood. Enough has been said, however, to show the extraordinary complexity of the apparently simple blood serum.

The methods at present employed in examining the blood clinically are: the enumeration of the red and white corpuscles per cubic millimetre; the estimation of the percentage of haemoglobin and of the specific gravity of the blood; the microscopic examination of freshly-drawn blood and of blood films made upon cover-glasses, fixed and stained. In special cases the alkalinity and the rapidity of coagulation may be ascertained, or the blood may be examined bacteriologically. We have no universally accepted means of estimating, during life, the total amount of blood in the body, though the method of J.S. Haldane and J. Lorrain Smith, in which the total oxygen capacity of the blood is estimated, and its total volume worked out from that datum, has seemed to promise important results (*Journ. of Physiol*. vol. xxv. p. 331, 1900). After death the amount of blood sometimes seems to be increased, and sometimes, as in “pernicious anaemia,” it is certainly diminished. But the high counts of red corpuscles which are occasionally reported as evidence of plethora or increase of the total blood are really only indications of concentration of the fluid except in certain rare cases. It is necessary, therefore, in examining blood diseases, to confine ourselves to the study of the blood-unit, which is always taken as the cubic millimetre, without reference to the number of units in the body.

Anaemia.

Anaemia is often used as a generic term for all blood diseases, for in almost all of them the haemoglobin is diminished, either as a result of diminution in the number of the red corpuscles in which it is contained, or because the individual red corpuscles contain a smaller amount of haemoglobin than the normal. As haemoglobin is the medium of respiratory interchange, its diminution causes obvious symptoms, which are much more easily appreciated by the patient than those caused by alterations in the plasma or the leucocytes. It is customary to divide anaemias into “primary” and “secondary”: the primary are those for which no adequate cause has as yet been discovered; the secondary, those whose cause is known. Among the former are usually included chlorosis, pernicious anaemia, and sometimes the leucocythaemias; among the latter, the anaemias due to such agencies as malignant disease, malaria, chronic metallic poisoning, chronic haemorrhage, tubercle, Bright’s disease, infective processes, intestinal

parasites, &c. As our knowledge advances, however, this distinction will probably be given up, for the causes of several of the primary anaemias have been discovered. For example, the anaemia due to *bothriocephalus*, an intestinal parasite, is clinically indistinguishable from the other forms of pernicious anaemia with which it used to be included, and leucocythaemia has been declared by Löwit, though probably erroneously, to be due to a blood parasite closely related to that of malaria. In all these conditions there is a considerable similarity in the symptoms produced and in the pathological anatomy. The general symptoms are pallor of the skin and mucous membranes, weakness and lassitude, shortness of breath, palpitation, a tendency to fainting, and usually also gastro-intestinal disturbance, headache and neuralgia. The heart is often dilated, and on auscultation the systolic murmurs associated with that condition are heard. In fatal cases the internal organs are found to be pale, and very often their cells contain an excessive amount of fat. In many anaemias there is a special tendency to haemorrhage. Most of the above symptoms and organic changes are directly due to diminished respiratory interchange from the loss of haemoglobin, and to its effect on the various organs involved. The diagnosis depends ultimately in all cases upon the examination of the blood.

Though the relative proportions of the leucocytes are probably continually undergoing change even in health, especially as the result of taking food, the number of red corpuscles remains much more constant. Through the agency of some unknown mechanism, the supply of fresh red corpuscles from the bone-marrow keeps pace with the destruction of effete corpuscles, and in health each corpuscle contains a definite and constant amount of haemoglobin. The disturbance of this arrangement in anaemia may be due to loss or to increased destruction of corpuscles, to the supply of a smaller number of new ones, to a diminution of the amount of haemoglobin in the individual new corpuscles, or to a combination of these causes. It is most easy to illustrate this by describing what happens after a haemorrhage. If this is small, the loss is replaced by the fully-formed corpuscles held in reserve in the marrow, and there is no disturbance. If it is larger, the amount of fluid lost is first made up by fluid drawn from the tissues, so that the number of corpuscles is apparently diminished by dilution of the blood; the erythroblasts, or formative red corpuscles, of the bone-marrow are stimulated to proliferation, and new corpuscles are quickly thrown into the circulation. These are apt, however, to be small and to contain a subnormal amount of haemoglobin, and it is only after some time that they are destroyed and their place taken by normal corpuscles. If the loss has been very great, nucleated red corpuscles may even be carried into the blood-stream. The blood possesses a great power of recovery, if time be given it, because the organ (bone-marrow) which forms so many of its elements never, in health, works at high pressure. Only a part of the marrow, the so-called red marrow, is normally occupied by erythroblastic tissue, the rest of the medullary cavity of the bones being taken up by fat. If any long-continued demand for red corpuscles is made, the fat is absorbed, and its place gradually taken by red marrow. This compensatory change is found in all chronic anaemias, no matter what their cause may be, except in some rare cases in which the marrow does not react.

It is often very difficult, especially in “secondary” anaemias, to say which of the above processes is mainly at work. In acute anaemias, such as those associated with septicaemia, there is no doubt that blood destruction plays the principal part. But if the cause of anaemia is a chronic one, a gastric cancer, for instance, though there may possibly be an increased amount of destruction of corpuscles in some cases, and though there is often loss by haemorrhage, the cancer interferes with nutrition, the blood is impoverished and does not nourish the erythroblasts in the marrow sufficiently, and the new corpuscles which are turned out are few and poor in haemoglobin. In chronic anaemias, regeneration always goes on side by side with destruction, and it is important to remember that the state of the blood in these conditions gives the measure, not of the amount of destruction which is taking place so much as of the amount of regeneration of which the organism is capable. The evidence of destruction has often to be sought for in other organs, or in secretions or excretions.

Of the so-called primary anaemias the most common is *chlorosis*, an anaemia which occurs only in the female sex, between the ages of fifteen and twenty-five as a rule. Its symptoms are those caused by a diminution of haemoglobin, and though it is never directly fatal, and is extremely amenable to treatment with iron preparations, its subjects very frequently suffer from relapses at varying intervals after the first attack. Its causation is probably complex. Bad hygienic conditions, over-fatigue, want of proper food, especially of the iron-containing proteids of meat, the strain put upon the blood and blood-forming organs by the accession of puberty and the occurrence of menstruation, all probably play a part in it. It has also been suggested that internal secretions may be concerned in stimulating the bone-marrow, and that in the female sex in particular the genital organs may act in this way. Imperfect

assumption of function by these organs at puberty, caused perhaps by some of the above-mentioned conditions, might lead to sluggishness in the bone-marrow, and to the supply to the blood of the poorly-formed corpuscles deficient in haemoglobin which are characteristic of the disease. Chlorosis is the type of anaemias from imperfect blood-formation. Lorrain Smith has produced evidence to show that the total amount of haemoglobin in the body is not diminished in this disease, but that the blood-plasma is greatly increased in amount, so that the haemoglobin is diluted and the amount in each blood-unit greatly lessened.

Pernicious anaemia is a rarer disease than chlorosis, occurs usually later in life, and is distributed nearly equally between the two sexes. But it is of great importance because of its almost uniformly fatal termination, though its downward course is generally broken by temporary improvement on one or more occasions. The symptoms are those of a progressive anaemia, in which gastro-intestinal disturbance usually plays a large part, and nervous symptoms are common, and they become at last much more severe than those of any secondary anaemia. The patient may die in the first attack, but more usually, when things seem to be at their worst, improvement sets in, either spontaneously or as the result of treatment, and the patient slowly regains apparent health. This remission may be followed by a relapse, that again by a remission, and so on, but as a rule the disease is fatal within, at the outside, two or three years.

The prime cause of the disease is not known. It seems probable indeed that the causal factors are numerous. Severe malarial infection, syphilis, pregnancy, chronic gastro-intestinal disease, chronic gas-poisoning, are all, in different cases, known to have been causally associated with it, and it is probable that a congenital weakness of the bone-marrow has often to do with its production, as in many cases a family or hereditary history of the disease can be obtained. The condition is now regarded as a chronic toxaemia, partly because of the clinical symptoms and pathological appearances, partly because analogous conditions can be produced experimentally by such poisons as saponin and toluylendiamin, and partly because of the facts of *bothriocephalus* anaemia. The site of production of the toxin, or toxins, for it is possible that several may have the same effect on the blood, is possibly not always the same, but must often be the alimentary canal, as *bothriocephalus* anaemia proves. Not all persons affected with this intestinal tapeworm contract the disease, but only those in whose intestines the worm is dead and decomposing or sometimes only “sick.” The expulsion of the worm puts an end to the absorption of the toxin and the patients recover. No adequate explanation of the formation of the toxin in the immense majority of the cases, in which there is no tapeworm, has yet been given. It is certain that no organism as yet known is concerned.

This toxaemia affects the marrow and through it the blood, the gastro-intestinal apparatus and the nervous system, especially the spinal cord, in different proportions in different cases. The effect upon the marrow is to alter the type of red corpuscle formation, causing a reversion to the embryonic condition, in which the nucleated red corpuscles are large (megaloblasts), and the corpuscles in the blood formed from them are also large, are apparently ill suited to the needs of the adult, and easily break down, as the deposits of iron in the liver, spleen, kidneys and marrow prove. Whether this reversion is due to an exhaustion of the normal process or to an inhibition of it is not definitely known. The result is that the circulating red corpuscles are enormously diminished; it is usual to find 1,000,000 or less in the cubic millimetre instead of the normal 5,000,000. Though the haemoglobin is of course absolutely diminished, it is always, in severe cases, present in relatively higher percentage than the red corpuscles, because the average red corpuscle is larger and contains more haemoglobin than the normal. The large nucleated red corpuscles (megaloblasts) with which the marrow is crowded, often appear in the blood.

Other anaemias, such as those known as *lymphadenoma*, or Hodgkin’s disease, *splenic anaemia*, *chloroma*, *leucanaemia* and the *anaemia pseudo-leucaemica* of children, need not be described here, as they are either rare or their occurrence or nature is still too much under discussion.

Leucocytosis.

The number and nature of the leucocytes in the blood bears no constant or necessary relation to the number or condition of the red corpuscles, and their variations depend on entirely different conditions. The number in the cubic millimetre is usually about 7000, but may vary in health from 5000 to 10,000. A diminution in their number is known as *leucopenia*, and is found in starvation, in some infective diseases, as for example in typhoid fever, in malaria and Malta fever, and in pernicious anaemia. An increase is very much more frequent, and is known as *leucocytosis*, though in this term is usually connoted a relative increase in the proportion of the polymorphonuclear neutrophile leucocytes. Leucocytosis occurs under a great variety of

conditions, normally to a slight extent during digestion, during pregnancy, and after violent exercise, and abnormally after haemorrhage, in the course of inflammations and many infective diseases, in malignant disease, in such toxic states as uraemia, and after the ingestion of nuclein and other substances. It does not occur in some infective diseases, the most important of which are typhoid fever, malaria, influenza, measles and uncomplicated tuberculosis. In all cases where it is sufficiently severe and long continued, the reserve space in the bone-marrow is filled up by the active proliferation of the leucocytes normally found there, and is used as a nursery for the leucocytes required in the blood. In many cases leucocytosis is known to be associated with the defence of the organism from injurious influences, and its amount depends on the relation between the severity of the attack and the power of resistance. There may be an increase in the proportions present in the blood of lymphocytes (*lymphocytosis*), and of eosinophile cells (*eosinophilia*). This latter change is associated specially with some forms of asthma, with certain skin diseases, and with the presence of animal parasites in the body, such as ankylostoma and filaria.

Leucaemia.

The disease in which the number of leucocytes in the blood is greatest is *leucocythaemia* or leucaemia. There are two main forms of this disease, in both of which there are anaemia, enlargement of the spleen and lymphatic glands, or of either of them, leucocytic hypertrophy of the bone-marrow, and deposits of leucocytes in the liver, kidney and other organs. The difference lies in the kind of leucocytes present in excess in the blood, blood-forming organs and deposits in the tissues. In the one form these are lymphocytes, which are found in health mainly in the marrow, the blood itself, the lymph glands and in the lymphatic tissue round the alimentary canal; in the other they are the kinds of leucocytes normally found in the bone-marrow-myelocytes, neutrophile, basophile and eosinophile, and polymorphonuclear cells, also neutrophile, basophile and eosinophile. The clinical course of the two forms may differ. The first, known as lymphatic leucaemia or *lymphaemia*, may be acute, and prove fatal in a few weeks or even days with rapidly advancing anaemia, or may be chronic and last for one or two years or longer. The second, known as spleno-myelogenous leucaemia or *myelaemia*, is almost always chronic, and may last for several years. Recovery does not take place, though remissions may occur. The use of the X-rays has been found to influence the course of this disease very favourably. The most recent view of the pathology of the disease is that it is due to an overgrowth of the bone-marrow leucocytes, analogous in some respects to tumour growth and caused by the removal of some controlling mechanism rather than by stimulation. The anaemia accompanying the disease is due partly to the leucocyte overgrowth, which takes up the space in the marrow belonging of right to red corpuscle formation and interferes with it.

(G. L. G.)

1 The suffix *-phile*, Greek φιλεῖν, to love, prefer, is in scientific terminology frequently applied to substances that exhibit such preference for particular stains or reagents, the names of which form the first part of the word.

BLOOD-LETTING. There are certain morbid conditions when a patient may obtain marked relief from the abstraction of a certain amount of blood, from three or four ounces up to twenty or even thirty in extreme cases. This may be effected by venesection, or the application of leeches, or more rarely by cupping (*q.v.*). Unfortunately, in years gone by, blood-letting was used to such excess, as a cure for almost every known disease, that public opinion is now extremely opposed to it. In certain pathological conditions, however, it brings relief and saves life when no other means would act with sufficient promptness to take its place.

Venesection, in which the blood is usually withdrawn from the median-basilic vein of the arm, has the disadvantage that it can only be performed by the medical man, and that the patient’s friends are generally very much opposed to the idea. But the public are not nearly so prejudiced against the use of leeches; and as the nurse in charge can be instructed to use these if occasion arises, this is the form of blood-letting usually practised to-day. From one to twelve leeches are applied at the time, the average leech withdrawing some two drachms of blood. Should this prove insufficient, as much again can be abstracted by the immediate application of hot fomentations to the wounds. They should always be applied over some

bony prominence, that pressure may be effectively used to stop the haemorrhage afterwards. They should never be placed over superficial veins, or where there is much loose subcutaneous tissue. If, as is often the case, there is any difficulty in making them bite, the skin should be pricked at the desired spot with the point of a sterilized needle, and the leech will then attach itself without further trouble. Also they must be left to fall off of their own accord, the nurse never dragging them forcibly off. If cold and pressure fail to stop the subsequent haemorrhage, a little powdered alum or other styptic may be inserted in the wound. The following are the main indications for their use, though in some cases they are better replaced by venesection, (1) For stagnation of blood on the right side of the heart with constant dyspnoea, cyanosis, &c. In acute lung disease, the sudden obstruction to the passage of blood through the lungs throws such an increased strain on the right ventricle that it may dilate to the verge of paralysis; but by lessening the total volume of blood, the heart's work is lightened for a time, and the danger at the moment tided over. This is a condition frequently met with in the early stages of acute pneumonia, pleurisy and bronchitis, when the obstruction is in the lungs, the heart being normal. But the same result is also met with as a result of failure of compensation with back pressure in certain forms of heart disease (*q.v.*). (2) To lower arterial tension. In the early stages of cerebral haemorrhage (before coma has supervened), when the heart is working vigorously and the tension of the pulse is high, a timely venesection may lead to arrest of the haemorrhage by lowering the blood pressure and so giving the blood in the ruptured vessel an opportunity to coagulate. (3) In various convulsive attacks, as in acute uraemia.

BLOOD-MONEY, colloquially, the reward for betraying a criminal to justice. More strictly it is used of the money-penalty paid in old days by a murderer to the kinsfolk of his victim. These fines completely protected the offender from the vengeance of the injured family. The system was common among the Scandinavian and Teutonic races previous to the introduction of Christianity, and a scale of payments, graduated according to the heinousness of the crime, was fixed by laws, which further settled who could exact the blood-money, and who were entitled to share it. Homicide was not the only crime thus expiable: blood-money could be exacted for all crimes of violence. Some acts, such as killing any one in a church or while asleep, or within the precincts of the royal palace, were "bot-less"; and the death penalty was inflicted. Such a criminal was outlawed, and his enemies could kill him wherever they found him.

BLOODSTONE, the popular name of the mineral heliotrope, which is a variety of dark green chalcedony or plasma, with bright red spots, splashes and streaks. The green colour is due to a chloritic mineral; the red to haematite. Some coarse kinds are opaque, resembling in this respect jasper, and some writers have sought to restrict the name "bloodstone" to green jasper, with red markings, thus making heliotrope a translucent and bloodstone an opaque stone, but, though convenient, such a distinction is not generally recognized. A good deal of bloodstone comes from India, where it occurs in the Deccan traps, and is cut and polished at Cambay. The stone is used for seals, knife-handles and various trivial ornaments. Bloodstone is not very widely distributed, but is found in the basaltic rocks of the Isle of Rum in the west of Scotland, and in a few other localities. Haematite (Gr. αἷμα, blood), or native peroxide of iron, is also sometimes called "bloodstone."

BLOOM (from A.S. *blôma*, a flower), the blossom of flowering plants, or the powdery film on the skin of fresh-picked fruit; hence applied to the surface of newly-minted coins or to a cloudy appearance on the varnish of painting due to moisture; also, in metallurgy, a term

used of the rough billets of iron and steel, which have undergone a preliminary hammering or rolling, and are ready for further working.

BLOOMER, AMELIA JENKS (1818-1894), American dress-reformer and women's rights advocate, was born at Homer, New York, on the 27th of May 1818. After her marriage in 1840 she established a periodical called *The Lily*, which had some success. In 1849 she took up the idea—previously originated by Mrs Elizabeth Smith Miller—of a reform in woman's dress, and the wearing of a short skirt, with loose trousers, gathered round the ankles. The name of "bloomers" gradually became popularly attached to any divided-skirt or knickerbocker dress for women. Until her death on the 30th of December 1894 Mrs Bloomer took a prominent part in the temperance campaign and in that for woman's suffrage.

BLOOMFIELD, MAURICE (1855-), American Sanskrit scholar, was born on the 23rd of February 1855, in Bielitz, Austrian Silesia. He went to the United States in 1867, and ten years later graduated from Furman University, Greenville, South Carolina. He then studied Sanskrit at Yale, under W.D. Whitney, and at Johns Hopkins, to which university he returned as associate professor in 1881 after a stay of two years in Berlin and Leipzig, and soon afterwards was promoted professor of Sanskrit and comparative philology. His papers in the *American Journal of Philology* number a few in comparative linguistics, such as those on assimilation and adaptation in congeneric classes of words, and many valuable "Contributions to the Interpretation of the Vedas," and he is best known as a student of the Vedas. He translated, for Max-Müller's *Sacred Books of the East*, the Hymns of the Atharva-Veda (1897); contributed to the Bühler-Kielhorn *Grundriss der indo-arischen Philologie und Altertumskunde* the section "The Atharva-Veda and the Gopatha Brahmana" (1899); was first to edit the Kauçika-Sutra (1890), and in 1907 published, in the Harvard Oriental series, *A Vedic Concordance*. In 1905 he published *Cerberus, the Dog of Hades*, a study in comparative mythology.

BLOOMFIELD, ROBERT (1766-1823), English poet, was born of humble parents at the village of Honington, Suffolk, on the 3rd of December 1766. He was apprenticed at the age of eleven to a farmer, but he was too small and frail for field labour, and four years later he came to London to work for a shoemaker. The poem that made his reputation, *The Farmer's Boy*, was written in a garret in Bell Alley. The manuscript, declined by several publishers, fell into the hands of Capell Lofft, who arranged for its publication with woodcuts by Bewick in 1800. The success of the poem was remarkable, over 25,000 copies being sold in the next two years. His reputation was increased by the appearance of his *Rural Tales* (1802), *News from the Farm* (1804), *Wild Flowers* (1806) and *The Banks of the Wye* (1811). Influential friends attempted to provide for Bloomfield, but ill-health and possibly faults of temperament prevented the success of these efforts, and the poet died in poverty at Shefford, Bedfordshire, on the 19th of August 1823. His *Remains in Poetry and Verse* appeared in 1824.

BLOOMFIELD, a town of Essex county, New Jersey, U.S.A., about 12 m. W. of New York, and directly adjoining the city of Newark on the N. Pop. (1900) 9668, of whom 2267 were

foreign-born; (1905, state census) 11,668; (1910), 15,070. Area, 5.42 sq. m. Bloomfield is served by the Erie, and the Delaware, Lackawanna & Western railways, and by several electric lines connecting with Newark, Montclair, Orange, East Orange and other neighbouring places. It is a residential suburb of Newark and New York, is the seat of a German theological school (Presbyterian, 1869) and has the Jarvie Memorial library (1902). There is a Central Green, and in 1908 land was acquired for another park. Among the town's manufactures are silk and woollen goods, paper, electric elevators, electric lamps, rubber goods, safety pins, hats, cream separators, brushes and novelties. The value of the town's factory products increased from $3,370,924 in 1900 to $4,645,483 in 1905, or 37.8%. First settled about 1670-1675 by the Dutch and by New Englanders from the Newark colony, Bloomfield was long a part of Newark, the principal settlement at first being known as Wardsesson. In 1796 it was named Bloomfield in honour of General Joseph Bloomfield (1753-1823), who served (1775-1778) in the War of American Independence, reaching the rank of major, was governor of New Jersey in 1801-1802 and 1803-1812, brigadier-general in the United States army during the War of 1812, and a Democratic representative in Congress from 1817 to 1821. The township of Bloomfield was incorporated in 1812. From it were subsequently set off Belleville (1839), Montclair (1868) and Glen Ridge (1895).

BLOOMINGTON, a city and the county-seat of McLean county, Illinois, U.S.A., in the central part of the state, about 125 m. S.W. of Chicago. Pop. (1890) 20,484; (1900) 23,286, of whom 3611 were foreign-born, there being a large German element; (1910 census) 25,768. The city is served by the Chicago & Alton, the Illinois Central, the Cleveland, Chicago, Cincinnati & St Louis, and the Lake Erie & Western railways, and by electric inter-urban lines. Bloomington is the seat of the Illinois Wesleyan University (Methodist Episcopal, co-educational, founded in 1850), which comprises a college of liberal arts, an academy, a college of law, a college of music and a school of oratory, and in 1907 had 1350 students. In the town of NORMAL (pop. in 1900, 3795), 2 m. north of Bloomington, are the Illinois State Normal University (opened at Bloomington in 1857 and removed to its present site in 1860), one of the first normal schools in the Middle West, and the state soldiers' orphans' home (1869). Bloomington has a public library, and Franklin and Miller parks; among its principal buildings are the court house, built of marble, and the Y.M.C.A. building. Among the manufacturing establishments are foundries and machine shops, including the large shops of the Chicago & Alton railway, slaughtering and meat-packing establishments, flour and grist mills, printing and publishing establishments, a caramel factory and lumber factories. The value of the city's factory products increased from $3,011,899 in 1900 to $5,777,000 in 1905, or 91.8%. There are valuable coal mines in and near the city, and the city is situated in a fine farming region. Bloomington derives its name from Blooming Grove, a small forest which was crossed by the trails leading from the Galena lead mines to Southern Illinois, from Lake Michigan to St Louis, and from the Eastern to the far Western states. The first settlement was made in 1822, but the town was not formally founded until 1831, when it became the county-seat of McLean county. The first city charter was obtained in 1850, and in 1857 the public school system was established. In 1856 Bloomington was the meeting place of a state convention called by the Illinois editors who were opposed to the Kansas-Nebraska Bill (see DECATUR). This was the first convention of the Republican party in Illinois; among the delegates were Abraham Lincoln, Richard Yates, John M. Palmer and Owen Lovejoy. The city has been the residence of a number of prominent men, including David Davis (1815-1886), an associate justice of the United States Supreme Court in 1862-1877, a member of the United States Senate in 1877-1883, and president *pro tempore* of the Senate in 1881-1883; Governor John M. Hamilton (1847-1905), Governor Joseph W. Fifer (b. 1840); and Adlai Ewing Stevenson (b. 1835), a Democratic representative in Congress in 1875-1877 and 1879-1881, and vice-president of the United States in 1893-1897. Bloomington's prosperity increased after 1867, when coal was first successfully mined in the vicinity.

In the *Transactions* of the Illinois State Historical Society for 1905 may be found a paper, "The Bloomington Convention of 1856 and Those Who Participated in it."

BLOOMINGTON, a city and the county-seat of Monroe county, Indiana, U.S.A., about 45 m. S. by W. of Indianapolis. Pop. (1890) 4018; (1900) 6460, including 396 negroes; (1910) 8838. It is served by the Chicago, Indianapolis & Louisville and the Indianapolis Southern (Illinois Central) railways. Bloomington is the seat of the Indiana University (co-educational since 1868), established as a state seminary in 1820, and as Indiana College in 1828, and chartered as the State university in 1838; in 1907-1908 it had 80 instructors, 2051 students, and a library of 65,000 volumes; its school of law was established in 1842, suspended in 1877 and re-established in 1889; its school of medicine was established in 1903; but most of the medical course is given in Indianapolis; a graduate school was organized in 1904; and a summer school (or summer term of eleven weeks) was first held in 1905. Dr David Starr Jordan was the first president of the university in 1885-1891, when it was thoroughly reorganized and its curriculum put on the basis of major subjects and departments. The university's biological station is on Winona Lake, Kosciusko county. Among the manufactures of Bloomington are furniture and wooden ware. There are valuable limestone quarries in the vicinity. The city was first settled about 1818.

BLOOMSBURG, a town and the county-seat of Columbia county, Pennsylvania, U.S.A., on Fishing Creek, 2 m. from its confluence with the Susquehanna, and about 40 m. S.W. of Wilkes-Barre. Pop. (1890) 4635; (1900) 6170 (213 foreign-born); (1910) 7413. It is served by the Delaware, Lackawanna & Western, the Philadelphia & Reading, and the Bloomsburg & Sullivan and the Susquehanna, Bloomsburg & Berwick railways (the last two only 30 m. and 39 m. long respectively); and is connected with Berwick, Catawissa and Danville by electric lines. The town is built on a bluff commanding extensive views. Among the manufactures of Bloomsburg are railway cars, carriages, silk and woollen goods, furniture, carpets, wire-drawing machines and gun carriages. Iron ore was formerly obtained from the neighbouring hills. The town is the seat of a state normal school, established as such in 1869. Bloomsburg was laid out as a town in 1802, became the county-seat in 1846, and was incorporated in 1870.

BLOUNT, CHARLES (1654-1693), English author, was born at Upper Holloway on the 27th of April 1654. His father, Sir Henry Blount (1602-1682), was the author of a *Voyage to the Levant*, describing his own travels. He gave his son a careful education, and is said to have helped him in his *Anima Mundi; or An Historical Narration of the Opinions of the Antients concerning Man's Soul after his Life, according to unenlightened Nature* (1679), which gave great offence by the sceptical views expressed in it. It was suppressed by order of the bishop of London, and even burnt by some over-zealous official, but a re-issue was permitted. Blount was an admirer of Hobbes, and published his "Last Sayings" (1679), a pamphlet consisting of extracts from *The Leviathan. Great is Diana of the Ephesians, or the Original of Idolatry, together with the Political Institution of the Gentiles' Sacrifices* (1680) attracted severe criticism on the ground that in deprecating the evils of priestcraft Blount was attacking Christianity itself. His best-known book, *The Two First Books of Philostratus concerning the Life of Apollonius Tyaneus...* (1680), is said to have been prohibited in 1693, chiefly on account of the notes, which are stated by Bayle (note, *s.v. Apollonius*) to have been taken mainly from a MS. of Lord Herbert of Cherbury. Blount contributed materially to the removal of the restrictions on the freedom of the press, with two pamphlets (1693) by "Philopatris," mainly derived from Milton's *Areopagitica*. He also laid a successful trap for the censor, Edmund Bohun. Under the name of "Junius Brutus" he wrote a pamphlet entitled "King William and Queen Mary Conquerors." The title-page set forth the theory of the justice of title by conquest, which Blount knew to be agreeable to Bohun. It was duly licensed, but was ordered by the House of Commons to be burnt by the common hangman, as being diametrically opposed to the attitude of William's government on the subject. These proceedings showed the futility of the censorship, and hastened its overthrow.

Blount had fallen in love with his deceased wife's sister, and, in despair of overcoming her scruples as to the legality of such a marriage, shot himself in the head. He survived for some

time, refusing help except from his sister-in-law. Alexander Pope asserted (*Epilogue to the Satires*, Note, i. 124) that he wounded himself in the arm, pretending to kill himself, and that the result was fatal contrary to his expectations. He died in August 1693.

Shortly before his death a collection of his pamphlets and private papers was printed with a preface by Charles Gildon, under the title of the *Oracles of Reason*. His *Miscellaneous Works* (1695) is a fuller edition by the same editor.

BLOUNT (or BLUNT), **EDWARD** (b. 1565?), the printer, in conjunction with Isaac Jaggard, of *Mr William Shakespeares Comedies, Histories and Tragedies. Published according to the true Originall Copies* (*1623*), usually known as the first folio of Shakespeare. It was produced under the direction of John Heming (d. 1630) and Henry Condell (d. 1627), both of whom had been Shakespeare's colleagues at the Globe theatre, but as Blount combined the functions of printer and editor on other occasions, it is fair to conjecture that he to some extent edited the first folio. The Stationers' *Register* states that he was the son of Ralph Blount or Blunt, merchant tailor of London, and apprenticed himself in 1578 for ten years to William Ponsonby, a stationer. He became a freeman of the Stationers' Company in 1588. Among the most important of his publications are Giovanni Florio's Italian-English dictionary and his translation of Montaigne, Marlowe's *Hero and Leander*, and the *Sixe Court Comedies* of John Lyly. He himself translated *Ars Aulica, or the Courtier's Arte* (1607) from the Italian of Lorenzo Ducci, and *Christian Policie* (1632) from the Spanish of Juan de Santa Maria.

BLOUNT, THOMAS (1618-1679), English antiquarian, was the son of one Myles Blount, of Orleton in Herefordshire. He was born at Bordesley, Worcestershire. Few details of his life are known. It appears that he was called to the bar at the Inner Temple, but, being a zealous Roman Catholic, his religion interfered considerably with the practice of his profession. Retiring to his estate at Orleton, he devoted himself to the study of the law as an amateur, and also read widely in other branches of knowledge. He died at Orleton on the 26th of December 1679. His principal works are *Glossographia; or, a dictionary interpreting the hard words of whatsoever language, now used in our refined English tongue* (1656, reprinted in 1707), which went through several editions and remains most amusing and instructive reading; *Nomolexicon: a law dictionary interpreting such difficult and, obscure words and terms as are found either in our common or statute, ancient or modern lawes* (1670; third edition, with additions by W. Nelson, 1717); and *Fragmenta Antiquitatis: Ancient Tenures of land, and jocular customs of some mannors* (1679; enlarged by J. Beckwith and republished, with additions by H.M. Beckwith, in 1815; again revised and enlarged by W.C. Hazlitt, 1874). Blount's *Boscobel* (1651), giving an account of Charles II.'s preservation after Worcester, with the addition of the king's own account dictated to Pepys, has been edited with a bibliography by C.G. Thomas (1894).

BLOUNT, SIR THOMAS POPE (1649-1697), English author, eldest son of Sir Henry Blount and brother of Charles Blount (*q.v.*), was born at Upper Holloway on the 12th of September 1649. He succeeded to the estate of Tittenhanger on his mother's death in 1678, and in the following year was created a baronet. He represented the borough of St Albans in the two last parliaments of Charles II. and was knight of the shire from the revolution till his death. He married Jane, daughter of Sir Henry Caesar, by whom he had five sons and nine daughters. He died at Tittenhanger on the 30th of June 1697. His *Censura celebrorum authorum sive tractatus in quo varia virorum doctorum de clarissimis cujusque seculi scriptoribus judicia traduntur* (1690) was originally compiled for Blount's own use, and is a

dictionary in chronological order of what various eminent writers have said about one another. This necessarily involved enormous labour in Blount's time. It was published at Geneva in 1694 with all the quotations from modern languages translated into Latin, and again in 1710. His other works are *A Natural History, containing many not common observations extracted out of the best modern writers* (1693), *De re poetica, or remarks upon Poetry, with Characters and Censures of the most considerable Poets....* (1694), and *Essays on Several Occasions* (1692). It is on this last work that his claims to be regarded as an original writer rest. The essays deal with the perversion of learning, a comparison between the ancients and the moderns (to the advantage of the latter), the education of children, and kindred topics. In the third edition (1697) he added an eighth essay, on religion, in which he deprecated the multiplication of ceremonies. He displays throughout a hatred of pedantry and convention, which makes his book still interesting.

See A. Kippis, *Biographia Britannica* (1780), vol. ii. For an account of Blount's family see Robert Clutterbuck. *History and Antiquities of the County of Hertford* (1815), vol. i. pp. 207-212.

BLOUNT, WILLIAM (1749-1800), American politician, was born in Bertie county, North Carolina, on the 26th of March 1749. He was a member of the Continental Congress in 1783-1784 and again in 1786-1787, of the constitutional convention at Philadelphia in 1787, and of the state convention which ratified the Federal constitution for North Carolina in 1789. From 1790 until 1796 he was, by President Washington's appointment, governor of the "Territory South of the Ohio River," created out of land ceded to the national government by North Carolina in 1789. He was also during this period the superintendent of Indian affairs for this part of the country. In 1791 he laid out Knoxville (Tennessee) as the seat of government. He presided over the constitutional convention of Tennessee in 1796, and, on the state being admitted to the Union, became one of its first representatives in the United States Senate. In 1797 his connexion became known with a scheme, since called "Blount's Conspiracy," which provided for the co-operation of the American frontiersmen, assisted by Indians, and an English force, in the seizure on behalf of Great Britain of the Floridas and Louisiana, then owned by Spain, with which power England was then at war. As this scheme, if carried out, involved the corrupting of two officials of the United States, an Indian agent and an interpreter, a breach of the neutrality of the United States, and the breach of Article V. of the treaty of San Lorenzo el Real (signed on the 27th of October 1795) between the United States and Spain, by which each power agreed not to incite the Indians to attack the other, Blount was impeached by the House of Representatives on the 7th of July 1797, and on the following day was formally expelled from the Senate for "having been guilty of high misdemeanor, entirely inconsistent with his public trust and duty as a senator." On the 29th of January 1798 articles of impeachment were adopted by the House of Representatives. On the 14th of January 1799, however, the Senate, sitting as a court of impeachment, decided that it had no jurisdiction, Blount not then being a member of the Senate, and, in the Senate's opinion, not having been, even as a member, a civil officer of the United States, within the meaning of the constitution. The case is significant as being the first case of impeachment brought before the United States Senate. "In a legal point of view, all that the case decides is that a senator of the United States who has been expelled from his seat is not after such expulsion subject to impeachment" (Francis Wharton, *State Trials*). In effect, however, it also decided that a member of Congress was not in the meaning of the constitution a civil officer of the United States and therefore could not be impeached. The "conspiracy" was disavowed by the British government, which, however, seems to have secretly favoured it. Blount was enthusiastically supported by his constituents, and upon his return to Tennessee was made a member and the presiding officer of the state senate. He died at Knoxville on the 21st of March 1800.

For a defence of Blount, see General Marcus J. Wright's *Account of the Life and Services of William Blount* (Washington, D.C., 1884).

BLOUSE, a word (taken from the French) used for any loosely fitting bodice belted at the waist. In France it meant originally the loose upper garment of linen or cotton, generally blue, worn by French workmen to preserve their clothing, and, by transference, the workman himself.

BLOW, JOHN (1648-1708), English musical composer, was born in 1648, probably at North Collingham in Nottinghamshire. He became a chorister of the chapel royal, and distinguished himself by his proficiency in music; he composed several anthems at an unusually early age, including *Lord, Thou hast been our refuge; Lord, rebuke me not*; and the so-called "club anthem," *I will always give thanks*, the last in collaboration with Pelham Humphrey and William Turner, either in honour of a victory over the Dutch in 1665, or—more probably—simply to commemorate the friendly intercourse of the three choristers. To this time also belongs the composition of a two-part setting of Herrick's *Goe, perjur'd man*, written at the request of Charles II. to imitate Carissimi's *Dite, o cieli*. In 1669 Blow became organist of Westminster Abbey. In 1673 he was made a gentleman of the chapel royal, and in the September of this year he was married to Elizabeth Braddock, who died in childbirth ten years later. Blow, who by the year 1678 was a doctor of music, was named in 1685 one of the private musicians of James II. Between 1680 and 1687 he wrote the only stage composition by him of which any record survives, the *Masque for the Entertainment of the King: Venus and Adonis*. In this Mary Davies played the part of Venus, and her daughter by Charles II., Lady Mary Tudor, appeared as Cupid. In 1687 he became master of the choir of St Paul's church; in 1695 he was elected organist of St Margaret's, Westminster, and is said to have resumed his post as organist of Westminster Abbey, from which in 1680 he had retired or been dismissed to make way for Purcell. In 1699 he was appointed to the newly created post of composer to the chapel royal. Fourteen services and more than a hundred anthems by Blow are extant. In addition to his purely ecclesiastical music Blow wrote *Great sir, the joy of all our hearts*, an ode for New Year's day 1681-1682; similar compositions for 1683, 1686, 1687, 1688, 1689, 1693 (?), 1694 and 1700; odes, &c., for the celebration of St Cecilia's day for 1684, 1691, 1695 and 1700; for the coronation of James II. two anthems, *Behold, O God, our Defender*, and *God spake sometimes in visions*; some harpsichord pieces for the second part of Playford's *Musick's Handmaid* (1869); *Epicedium for Queen Mary* (1695); *Ode on the Death of Purcell* (1696). In 1700 he published his Amphion Anglicus, a collection of pieces of music for one, two, three and four voices, with a figured-bass accompaniment. A famous page in Burney's *History of Music* is devoted to illustrations of "Dr Blow's Crudities," most of which only show the meritorious if immature efforts in expression characteristic of English music at the time, while some of them (where Burney says "Here we are lost") are really excellent. Blow died on the 1st of October 1708 at his house in Broad Sanctuary, and was buried in the north aisle of Westminster Abbey.

BLOW-GUN, a weapon consisting of a long tube, through which, by blowing with the mouth, arrows or other missiles can be shot accurately to a considerable distance. Blow-guns are used both in warefare and the chase by the South American Indian tribes inhabiting the region between the Amazon and Orinoco rivers, and by the Dyaks of Borneo. In the 18th century they were also known to certain North American Indians, especially the Choctaws and Cherokees of the lower Mississippi. Captain Bossu, in his *Travels through Louisiana* (1756), says of the Choctaws: "They are very expert in shooting with an instrument made of reeds about 7 ft. long, into which they put a little arrow feathered with the wool of the thistle (wild cotton?)." The blow-guns of the South American Indians differ in style and workmanship. That of the Macusis of Guiana, called *pucuna*, is the most perfect. It is made of two tubes, the inner of which, called *oorah*, is a light reed ½ in. in diameter which often grows to a length of 15 ft. without a joint. This is enclosed, for protection and solidity, in an outer tube of a variety of palm (*Iriartella setigera*). The mouth-piece is made of a circlet of silk-grass, and the farther end is feruled with a kind of nut, forming a sight. A rear open sight is formed of two teeth of a small rodent. The length of the *pucuna* is about 11 ft.

and its weight 1½ lb. The arrows, which are from 12 to 18 in. long and very slender, are made of ribs of the cocorite palm-leaf. They are usually feathered with a tuft of wild cotton, but some have in place of the cotton a thin strip of bark curled into a cone, which, when the shooter blows into the *pucuna*, expands and completely fills the tube, thus avoiding windage. Another kind of arrow is furnished with fibres of bark fixed along the shaft, imparting a rotary motion to the missile, a primitive example of the theory of the rifle. The arrows used in Peru are only a few inches long and as thin as fine knitting-needles. All South American blow-gun arrows are steeped in poison. The natives shoot very accurately with the *pucuna* at distances up to 50 or 60 yds.

The blow-gun of the Borneo Dyaks, called *sumpitan*, is from 6 to 7 ft. long and made of ironwood. The bore, of ½ in., is made with a long pointed piece of iron. At the muzzle a small iron hook is affixed, to serve as a sight, as well as a spear-head like a bayonet and for the same purpose. The arrows used with the *sumpitan* are about 10 in. long, pointed with fish-teeth, and feathered with pith. They are also envenomed with poison.

Poisoned arrows are also used by the natives of the Philippine island of Mindanao, whose blow-pipes, from 3 to 4 ft. long and made of bamboo, are often richly ornamented and even jewelled.

The principle of the blow-gun is, of course, the same as that of the common “pea-shooter.”

See *Sport with Rod and Gun in American Woods and Waters*, by A.M. Mayer, vol. ii. (Edinburgh, 1884); *Wanderings in South America*, &c., by Charles Waterton (London, 1828); *The Head Hunters of Borneo*, by Carl Bock (London, 1881).

BLOWITZ, HENRI GEORGES STEPHAN ADOLPHE DE (1825-1903), Anglo-French journalist, was born, according to the account given in his memoirs, at his father’s chateau in Bohemia on the 28th of December 1825. At the age of fifteen he left home, and travelled over Europe for some years in company with a young professor of philology, acquiring a thorough knowledge of French, German and Italian and a mixed general education. The finances of his family becoming straitened, young Blowitz was on the point of starting to seek his fortune in America, when he became acquainted in Paris with M. de Falloux, minister of public instruction, who appointed him professor of foreign languages at the Tours Lycée, whence, after some years, he was transferred to the Marseilles Lycée. After marrying in 1859 he resigned his professorship, but remained at Marseilles, devoting himself to literature and politics. In 1869 information which he supplied to a legitimist newspaper at Marseilles with regard to the candidature of M. de Lesseps as deputy for that city led to a demand for his expulsion from France. He was, however, allowed to remain, but had to retire to the country. In 1870 his predictions of the approaching fall of the Empire caused the demand for his expulsion to be renewed. While his case was under discussion the battle of Sedan was fought, and Blowitz effectually ingratiated himself with the authorities by applying for naturalization as a French subject. Once naturalized, he returned to Marseilles, where he was fortunately able to render considerable service to Thiers, who subsequently employed him in collecting information at Versailles, and when this work was finished offered him the French consulship at Riga. Blowitz was on the point of accepting this post when Laurence Oliphant, then Paris correspondent of *The Times*, for which Blowitz had already done some occasional work, asked him to act as his regular assistant for a time, Frederick Hardman, the other Paris correspondent of *The Times*, being absent. Blowitz accepted the offer, and when, later on, Oliphant was succeeded by Hardman he remained as assistant correspondent. In 1873 Hardman died, and Blowitz became chief Paris correspondent to *The Times*. In this capacity he soon became famous in the world of journalism and diplomacy. In 1875 the duc de Decazcs, then French foreign minister, showed Blowitz a confidential despatch from the French ambassador in Berlin (in which the latter warned his government that Germany was contemplating an attack on France), and requested the correspondent to expose the German designs in *The Times*. The publication of the facts effectually aroused European public opinion, and any such intention was immediately thwarted. Blowitz’s most sensational journalistic feat was achieved in 1878, when his enterprise enabled *The Times* to publish the whole text of the treaty of Berlin at the actual moment that the treaty was being signed in Germany. In 1877 and again in 1888 Blowitz rendered considerable service to the French government by his exposure of internal

designs upon the Republic. He died on the 18th of January 1903.

My Memoirs, by H.S. de Blowitz, was published in 1903.

BLOWPIPE, in the arts and chemistry, a tube for directing a jet of air into a fire or into the flame of a lamp or gas jet, for the purpose of producing a high temperature by accelerating the combustion. The blowpipe has been in common use from the earliest times for soldering metals and working glass, but its introduction into systematic chemical analysis is to be ascribed to A.F. Cronstedt, and not to Anton Swab, as has been maintained (see J. Landauer, *Ber*. 26, p. 898). The first work on this application of the blowpipe was by G. v. Engeström, and was published in 1770 as an appendix to a treatise on mineralogy. Its application has been variously improved at the hands of T.O. Bergman, J.G. Gahn, J.J. Berzelius, C.F. Plattner and others, but more especially by the two last-named chemists.

The simplest and oldest form of blowpipe is a conical brass tube, about 7 in. in length, curved at the small end into a right angle, and terminating in a small round orifice, which is applied to the flame, while the larger end is applied to the mouth. Where the blast has to be kept up for only a few seconds, this instrument is quite serviceable, but in longer chemical operations inconvenience arises from the condensation of moisture exhaled by the lungs in the tube. Hence most blowpipes are now made with a cavity for retaining the moisture. Cronstedt placed a bulb in the centre of his blowpipe. Dr Joseph Black’s instrument consists of a conical tube of tin plate, with a small brass tube, supporting the nozzle, inserted near the wider end, and a mouth-piece at the narrow end.

The sizes of orifice recommended by Plattner are 0.4 and 0.5 mm. A trumpet mouth-piece is recommended from the support it gives to the cheeks when inflated. The mode of blowing is peculiar, and requires some practice; an uninterrupted blast is kept up by the muscular action of the cheeks, while the ordinary respiration goes on through the nostrils.

If the flame of a candle or lamp be closely examined, it will be seen to consist of four parts —(*a*) a deep blue ring at the base, (*b*) a dark cone in the centre, (*c*) a luminous portion round this, and (*d*) an exterior pale blue envelope (see FLAME). In blowpipe work only two of these four parts are made use of, viz. the pale envelope, for oxidation, and the luminous portion, for reduction. To obtain a good *oxidizing flame*, the blowpipe is held with its nozzle inserted in the edge of the flame close over the level of the wick, and blown into gently and evenly. A conical jet is thus produced, consisting of an inner cone, with an outer one commencing near its apex—the former, corresponding to (*a*) in the free flame, blue and well defined; the latter corresponding to (*d*), pale blue and vague. The heat is greatest just beyond the point of the inner cone, combustion being there most complete. Oxidation is better effected (if a very high temperature be not required) the farther the substance is from the apex of the inner cone, for the air has thus freer access. To obtain a good *reducing flame* (in which the combustible matter, very hot, but not yet burned, is disposed to take oxygen from any compound containing it), the nozzle, with smaller orifice, should just touch the flame at a point higher above the wick, and a somewhat weaker current of air should be blown. The flame then appears as a long, narrow, luminous cone, the end being enveloped by a dimly visible portion of flame corresponding to that which surrounds the free flame, while there is also a dark nucleus about the wick. The substance to be reduced is brought into the luminous portion, where the reducing power is strongest.

Various materials are used as supports for substances in the blowpipe flame; the principal are charcoal, platinum and glass or porcelain. Charcoal is valuable for its infusibility and low conductivity for heat (allowing substances to be strongly heated upon it), and for its powerful reducing properties; so that it is chiefly employed in testing the fusibility of minerals and in reduction. The best kind of charcoal is that of close-grained pine or alder; it is cut in short prisms, having a flat smooth surface at right angles to the rings of growth. In this a shallow hole is made for receiving the substance to be held in the flame. Gas-carbon is sometimes used, since it is more permanent in the flame than wood charcoal. *Platinum* is employed in oxidizing processes, and in the fusion of substances with fluxes; also in observing the colouring effect of substances on the blowpipe flame (which effect is apt to be somewhat masked by charcoal). Most commonly it is used in the form of wire, with a small bend or loop at the end.

The mouth blowpipe is unsuitable for the production of a large flame, and cannot be used for any lengthy operations; hence recourse must be made to types in which the air-blast is occasioned by mechanical means. The laboratory form in common use consists of a bellows worked by either hand or foot, and a special type of gas burner formed of two concentric tubes, one conveying the blast, the other the gas; the supply of air and gas being regulated by stopcocks. The *hot blast blowpipe* of T. Fletcher, in which the blast is heated by passing through a copper coil heated by a separate burner, is only of service when a pointed flame of a fairly high temperature is required. Blowpipes in which oxygen is used as the blast have been manufactured by Fletcher, Russell & Co., and have proved of great service in conducting fusions which require a temperature above that yielded by the air-blowpipe.

For the applications of the blowpipe in chemical analysis see CHEMISTRY: *Analytical*.

BLÜCHER, GEBHARD LEBERECHT VON (1742-1819), Prussian general field marshal, prince of Wahlstadt in Silesia, was born at Rostock on the 16th of December 1742. In his fourteenth year he entered the service of Sweden, and in the Pomeranian campaign of 1760 he was taken prisoner by the Prussians. He was persuaded by his captors to enter the Prussian service. He took part in the later battles of the Seven Years' War, and as a hussar officer gained much experience of light cavalry work. In peace, however, his ardent spirit led him into excesses of all kinds, and being passed over for promotion he sent in his resignation, to which Frederick replied, "Captain Blücher can take himself to the devil" (1773). He now settled down to farming, and in fifteen years he had acquired an honourable independence. But he was unable to return to the army until after the death of Frederick the Great. He was then reinstated as major in his old regiment, the Red Hussars. He took part in the expedition to Holland in 1787, and in the following year became lieutenant-colonel. In 1789 he received the order *pour le mérite*, and in 1794 he became colonel of the Red Hussars. In 1793 and 1794 he distinguished himself in cavalry actions against the French, and for his success at Kirrweiler he was made a major-general. In 1801 he was promoted lieutenant-general.

He was one of the leaders of the war party in Prussia in 1805-1806, and served as a cavalry general in the disastrous campaign of the latter year. At Auerstädt Blücher repeatedly charged at the head of the Prussian cavalry, but without success. In the retreat of the broken armies he commanded the rearguard of Prince Hohenlohe's corps, and upon the capitulation of the main body of Prenzlau he carried off a remnant of the Prussian army to the northward, and in the neighbourhood of Lübeck he fought a series of combats, which, however, ended in his being forced to surrender at Ratkau (November 7, 1806). His adversaries testified in his capitulation that it was caused by "want of provisions and ammunition." He was soon exchanged for General Victor, and was actively employed in Pomerania, at Berlin, and at Königsberg until the conclusion of the war. After the war, Blücher was looked upon as the natural leader of the patriot party, with which he was in close touch during the period of Napoleonic domination. His hopes of an alliance with Austria in the war of 1809 were disappointed. In this year he was made general of cavalry. In 1812 he expressed himself so openly on the alliance of Russia with France that he was recalled from his military governorship of Pomerania and virtually banished from the court.

When at last the Napoleonic domination was ended by the outbreak of the War of Liberation in 1813, Blücher of course was at once placed in high command, and he was present at Lützen and Bautzen. During the armistice he worked at the organization of the Prussian forces, and when the war was resumed Blücher became commander-in-chief of the Army of Silesia, with Gneisenau and Müffling as his principal staff officers, and 40,000 Prussians and 50,000 Russians under his control. The autumn campaign of 1813 will be found described in the article NAPOLEONIC CAMPAIGNS, and it will here be sufficient to say that the most conspicuous military quality displayed by Blücher was his unrelenting energy. The irresolution and divergence of interests usual in allied armies found in him a restless opponent, and the knowledge that if he could not induce others to co-operate he was prepared to attempt the task in hand by himself often caused other generals to follow his lead. He defeated Marshal Macdonald at the Katzbach, and by his victory over Marmont at Möckern led the way to the decisive overthrow of Napoleon at Leipzig, which place was stormed by Blücher's own army on the evening of the last day of the battle. On the day of Mockern (October 16, 1813) Blücher was made a general field marshal, and after the victory

he pursued the routed French with his accustomed energy. In the winter of 1813-1814 Blücher, with his chief staff officers, was mainly instrumental in inducing the allied sovereigns to carry the war into France itself. The combat of Brienne and the battle of La Rothière were the chief incidents of the first stage of the celebrated campaign of 1814, and they were quickly followed by the victories of Napoleon over Blücher at Champaubert, Vauxchamps and Montmirail. But the courage of the Prussian leader was undiminished, and his great victory of Laon (March 9 to 10) practically decided the fate of the campaign. After this Blücher infused some of his own energy into the operations of Prince Schwarzenberg's Army of Bohemia, and at last this army and the Army of Silesia marched in one body direct upon Paris. The victory of Montmartre, the entry of the allies into the French capital, and the overthrow of the First Empire were the direct consequences. Blücher was disposed to make a severe retaliation upon Paris for the calamities that Prussia had suffered from the armies of France had not the allied commanders intervened to prevent it. Blowing up the bridge of Jena was said to be one of his contemplated acts. On the 3rd of June 1814 he was made prince of Wahlstadt (in Silesia on the Katzbach battlefield), and soon afterwards he paid a visit to England, being received everywhere with the greatest enthusiasm.

After the peace he retired to Silesia, but the return of Napoleon soon called him to further service. He was put in command of the Army of the Lower Rhine with General Gneisenau as his chief of staff (see Waterloo Campaign). In the campaign of 1815 the Prussians sustained a very severe defeat at the outset at Ligny (June 16), in the course of which the old field marshal was ridden over by cavalry charges, his life being saved only by the devotion of his aide-de-camp, Count Nostitz. He was unable to resume command for some hours, and Gneisenau drew off the defeated army. The relations of the Prussian and the English headquarters were at this time very complicated, and it is uncertain whether Blücher himself was responsible for the daring resolution to march to Wellington's assistance. This was in fact done, and after an incredibly severe march Blücher's army intervened with decisive and crushing effect in the battle of Waterloo. The great victory was converted into a success absolutely decisive of the war by the relentless pursuit of the Prussians, and the allies re-entered Paris on the 7th of July. Prince Blücher remained in the French capital for some months, but his age and infirmities compelled him to retire to his Silesian residence at Krieblowitz, where he died on the 12th of September 1819, aged seventy-seven. He retained to the end of his life that wildness of character and proneness to excesses which had caused his dismissal from the army in his youth, but however they may be regarded, these faults sprang always from the ardent and vivid temperament which made Blücher a dashing leader of horse. The qualities which made him a great general were his patriotism and the hatred of French domination which inspired every success of the War of Liberation. He was twice married, and had, by his first marriage, two sons and a daughter. Statues were erected to his memory at Berlin, Breslau and Rostock.

Of the various lives of Prince Blücher, that by Varnhagen von Ense (1827) is the most important. His war diaries of 1793-1794, together with a memoir (written in 1805) on the subject of a national army, were edited by Golz and Ribbentrop (Campagne Journal 1793-4 von *Gl. Lt. v. Blücher*).

BLUE (common in different forms to most European languages), the name of a colour, used in many colloquial phrases. From the fact of various parties, political and other, having adopted the colour blue as their badge, various classes of people have come to be known as "blue" or "blues"; thus "true blue" meant originally a staunch Presbyterian, the Covenanters having adopted blue as their colour as opposed to red, the royal colour; similarly, in the navy, there was in the 18th century a "Blue Squadron," Nelson being at one time "Rear-Admiral of the Blue"; again, in 1690, the Royal Horse Guards were called the "Blues" from their blue uniforms, or, from their leader, the earl of Oxford, the "Oxford Blues"; also, from the blue ribbon worn by the knights of the Garter comes the use of the phrase as the highest mark of distinction that can be worn, especially applied on the turf to the winning of the Derby. The "blue Peter" is a rectangular blue flag, with a white square in the centre, hoisted at the top of the foremast as a signal that a vessel is about to leave port. At Oxford and Cambridge a man who represents his university in certain athletic sports is called a "blue" from the "colours" he is then entitled to wear, dark blue for Oxford and light blue for Cambridge.

BLUEBEARD, the monster of Charles Perrault's tale of *Barbe Bleue*, who murdered his wives and hid their bodies in a locked room. Perrault's tale was first printed in his *Histoires et contes du temps passé* (1697). The essentials of the story—Bluebeard's prohibition to his wife to open a certain door during his absence, her disobedience, her discovery of a gruesome secret, and her timely rescue from death—are to be found in other folklore stories, none of which, however, has attained the fame of *Bluebeard*. A close parallel exists in an Esthonian legend of a husband who had already killed eleven wives, and was prevented from killing the twelfth, who had opened a secret room, by a gooseherd, the friend of her childhood. In "The Feather Bird" of Grimm's *Hausmärchen*, three sisters are the victims, the third being rescued by her brothers. Bluebeard, though Perrault does not state the number of his crimes, is generally credited with the murder of seven wives. His history belongs to the common stock of folklore, and has even been ingeniously fitted with a mythical interpretation. In France the Bluebeard legend has its local habitation in Brittany, but whether the existing traditions connecting him with Gilles de Rais (*q.v.*) or Comorre the Cursed, a Breton chief of the 6th century, were anterior to Perrault's time, we have no means of determining. The identification of Bluebeard with Gilles de Rais, the *bête d'extermination* of Michelet's forcible language, persists locally in the neighbourhood of the various castles of the baron, especially at Machecoul and Tiffauges, the chief scenes of his infamous crimes. Gilles de Rais, however, had only one wife, who survived him, and his victims were in the majority of cases young boys. The traditional connexion may arise simply from the not improbable association of two monstrous tales. The less widespread identification of Bluebeard with Comorre is supported by a series of frescoes dating only a few years later than the publication of Perrault's story, in a chapel at St Nicolas de Bieuzy dedicated to St Tryphine, in which the tale of Bluebeard is depicted as the story of the saint, who in history was the wife of Comorre. Comorre or Conomor had his original headquarters at Carhaix, in Finistère. He extended his authority by marriage with the widow of Iona, chief of Domnonia, and attempted the life of his stepson Judwal, who fled to the Frankish court. About 547 or 548 he obtained in marriage, through the intercession of St Gildas, Tryphine, daughter of Weroc, count of Vannes. The pair lived in peace at Castel Finans for some time, but Comorre, disappointed in his ambitions in the Vannetais, presently threatened Tryphine. She took flight, but her husband found her hiding in a wood, when he gave her a wound on the skull and left her for dead. She was tended and restored to health by St Gildas, and after the birth of her son retired to a convent of her own foundation. Eventually Comorre was defeated and slain by Judwal. In legend St Tryphine was decapitated and miraculously restored to life by Gildas. Alain Bouchard (*Grandes croniques*, Nantes, 1531) asserts that Comorre had already put several wives to death before he married Tryphine. In the *Légendes bretonnes* of the count d'Amezeuil the church legend becomes a charming fairy tale.

See also E.A. Vizetclly, *Bluebeard* (1902); E. Sidney Hartland, "The Forbidden Chamber," in *Folklore*, vol. iii. (1885); and the editions of the *Contes* of Charles Perrault (*q.v.*). Cf. A. France, *Les Sept Femmes de Barbe Bleue* (1909).

BLUE-BOOK, the general name given to the reports and other documents printed by order of the parliament of the United Kingdom, so called from their being usually covered with blue paper, though some are bound in drab and others have white covers. The printing of its proceedings was first adopted by the House of Commons in 1681, and in 1836 was commenced the practice of selling parliamentary papers to the public. All notices of questions, resolutions, votes and proceedings in both Houses of Parliament are issued each day during the session; other publications include the various papers issued by the different government departments, the reports of committees and commissions of inquiry, public bills, as well as returns, correspondence, &c., specially ordered to be printed by either house. The papers of each session are so arranged as to admit of being bound up in regular order, and are well indexed. The terms upon which blue-books, single papers, &c., are issued to the general public are one halfpenny per sheet of four pages, but for an annual subscription of

£20 all the parliamentary publications of the year may be obtained; but subscriptions can be arranged so that almost any particular class of publication can be obtained—for example, the daily votes and proceedings can be obtained for an annual subscription of £3, the House of Lords papers for £10, or the House of Commons papers for £15. Any publication can also be purchased separately.

Most foreign countries have a distinctive colour for the binding of their official publications. That of the United Slates varies, but foreign diplomatic correspondence is bound in red. The United States government publications are not only on sale (as a rule) but are widely supplied gratis, with the result that important publications soon get out of print, and it is difficult to obtain access to many valuable reports or other information, except at a public library. German official publications are bound in white; French, in yellow; Austrian, in red; Portuguese, in white; Italian, in green; Spanish, in red; Mexican, in green; Japanese, in grey; Chinese, in yellow.

BLUESTOCKING, a derisive name for a literary woman. The term originated in or about 1750, when Mrs Elizabeth Montagu (*q.v.*) made a determined effort to introduce into society a healthier and more intellectual tone, by holding assemblies at which literary conversation and discussions were to take the place of cards and gossip. Most of those attending were conspicuous by the plainness of their dress, and a Mr Benjamin Stillingfleet specially caused comment by always wearing blue or worsted stockings instead of the usual black silk. It was in special reference to him that Mrs Montagu’s friends were called the Bluestocking Society or Club, and the women frequenting her house in Hill Street came to be known as the “Bluestocking Ladies” or simply “bluestockings.” As an alternative explanation, the origin of the name is attributed to Mrs Montagu’s deliberate adoption of blue stockings (in which fashion she was followed by all her women friends) as the badge of the society she wished to form. She is said to have obtained the idea from Paris, where in the 17th century there was a revival of a social reunion in 1590 on the lines of that formed in 1400 at Venice, the ladies and men of which wore blue stockings. The term had been applied in England as early as 1653 to the Little Parliament, in allusion to the puritanically plain and coarse dress of the members.

BLUFF (a word of uncertain origin; possibly connected with an obsolete Dutch word, *blaf*, broad), an adjective used of a ship, meaning broad and nearly vertical in the bows; similarly, of a cliff or shore, presenting a bold and nearly perpendicular front; of a person, good-natured and frank, with a rough or abrupt manner. Another word “bluff,” perhaps connected with German *verblüffen*, to baffle, meant originally a horse’s blinker, the corresponding verb meaning to blindfold: it survives as a term in such games as poker, where “to bluff” means to bet heavily on a hand so as to make an opponent believe it to be stronger than it is; hence such phrases as “the game of bluff,” “a policy of bluff.”

BLUM, ROBERT FREDERICK (1857-1903), American artist, was born in Cincinnati, Ohio, on the 9th of July 1857. He was employed for a time in a lithographic shop, and studied at the McMicken Art School of Design in Cincinnati, and at the Pennsylvania Academy of Fine Arts in Philadelphia, but he was practically self-taught, and early showed great and original talent. He settled in New York in 1879, and his first published sketches—of Japanese jugglers—appeared in *St Nicholas*. His most important work is a large frieze in the Mendelssohn Music Hall, New York, “Music and the Dance” (1895). His pen-and-ink work for the Century magazine attracted wide attention, as did his illustrations for Sir Edwin Arnold’s *Japonica*. In the country and art of Japan he had been interested for many

years. “A Daughter of Japan,” drawn by Blum and W.J. Baer, was the cover of *Scribner’s Magazine* for May 1893, and was one of the earliest pieces of colour-printing for an American magazine. In *Scribner’s* for 1893 appeared also his “Artist’s Letters from Japan.” He was an admirer of Fortuny, whose methods somewhat influenced his work. Blum’s Venetian pictures, such as “A Bright Day at Venice” (1882), had lively charm and beauty. He died on the 8th of June 1903 in New York City. He was a member of the National Academy of Design, being elected after his exhibition in 1892 of “The Ameya”; and was president of the Painters in Pastel. Although an excellent draughtsman and etcher, it was as a colourist that he chiefly excelled.

BLUMENBACH, JOHANN FRIEDRICH (1752-1840), German physiologist and anthropologist, was born at Gotha on the 11th of May 1752. After studying medicine at Jena, he graduated doctor at Göttingen in 1775, and was appointed extraordinary professor of medicine in 1776 and ordinary professor in 1778. He died at Göttingen on the 22nd of January 1840. He was the author of *Institutiones Physiologicae* (1787), and of a *Handbuch der vergleichenden Anatomie* (1804), both of which were very popular and went through many editions, but he is best known for his work in connexion with anthropology, of which science he has been justly called the founder. He was the first to show the value of comparative anatomy in the study of man’s history, and his craniometrical researches justified his division of the human race into several great varieties or families, of which he enumerated five—the Caucasian or white race, the Mongolian or yellow, the Malayan or brown race, the Negro or black race, and the American or red race. This classification has been very generally received, and most later schemes have been modifications of it. His most important anthropological work was his description of sixty human crania published originally in *fasciculi* under the title *Collectionis suae craniorum diversarum gentium illustratae decades* (Göttingen, 1790-1828).

BLUMENTHAL, LEONHARD, Count von (1810-1900), Prussian field marshal, son of Captain Ludwig von Blumenthal (killed in 1813 at the battle of Dennewitz), was born at Schwedt-on-Oder on the 30th of July 1810. Educated at the military schools of Culm and Berlin, he entered the Guards as 2nd lieutenant in 1827. After serving in the Rhine provinces, he joined the topographical division of the general staff in 1846. As lieutenant of the 31st foot he took part in 1848 in the suppression of the Berlin riots, and in 1849 was promoted captain on the general staff. The same year he served on the staff of General von Bonin in the Schleswig-Holstein campaign, and so distinguished himself, particularly at Fredericia, that he was appointed chief of the staff of the Schleswig-Holstein army. In 1850 he was general staff officer of the mobile division under von Tietzen in Hesse-Cassel. He was sent on a mission to England in that year (4th class of Red Eagle), and on several subsequent occasions. Having attained the rank of lieutenant-colonel, he was appointed personal adjutant to Prince Frederick Charles in 1859. In 1860 he became colonel of the 31st, and later of the 71st, regiment. He was chief of the staff of the III. army corps when, on the outbreak of the Danish War of 1864, he was nominated chief of the general staff of the army against Denmark, and displayed so much ability, particularly at Düppel and the passage to Alsen island, that he was promoted major-general and given the order *pour le mérite*. In the war of 1866 Blumenthal occupied the post of chief of the general staff to the crown prince of Prussia, commanding the 2nd army. It was upon this army that the brunt of the fighting fell, and at Königgrätz it decided the fortunes of the day. Blumenthal’s own part in these battles and in the campaign generally was most conspicuous. On the field of Königgrätz the crown prince said to his chief of staff, “I know to whom I owe the conduct of my army,” and Blumenthal soon received promotion to lieutenant-general and the oak-leaf of the order *pour le mérite*. He was also made a knight of the Hohenzollern Order. From 1866 to 1870 he commanded the 14th division at Düsseldorf. In the Franco-German War of 1870-71 he was chief of staff of the 3rd army under the crown prince. Blumenthal’s soldierly qualities and talent were never more conspicuous than in the critical days preceding the

battle of Sedan, and his services in the war have been considered as scarcely less valuable and important than those of Moltke himself. In 1871 Blumenthal represented Germany at the British manoeuvres at Chobham, and was given the command of the IV. army corps at Magdeburg. In 1873 he became a general of infantry, and ten years later he was made a count. In 1888 he was made a general field marshal, after which he was in command of the 4th and 3rd army inspections. He retired in 1896, and died at Quellendorf near Köthen on the 21st of December 1900.

Blumenthal's diary of 1866 and 1870-1871 has been edited by his son, Count Albrecht von Blumenthal (*Tagebuch des G.F.M. von Blumenthal*), 1902; an English translation (*Journals of Count von Blumenthal*) was published in 1903.

BLUNDERBUSS (a corruption of the Dutch *donder*, thunder, and the Dutch *bus*; cf. Ger. *Büchse*, a box or tube, hence a thunder-box or gun), an obsolete muzzle-loading firearm with a bell-shaped muzzle. Its calibre was large so that it could contain many balls or slugs, and it was intended to be fired at a short range, so that some of the charge was sure to take effect. The word is also used by analogy to describe a blundering and random person or talker.

BLUNT, JOHN HENRY (1823-1884), English divine, was born at Chelsea in 1823, and before going to the university of Durham in 1850 was for some years engaged in business as a manufacturing chemist. He was ordained in 1852 and took his M.A. degree in 1855, publishing in the same year a work on *The Atonement*. He held in succession several preferments, among them the vicarage of Kennington near Oxford (1868), which he vacated in 1873 for the crown living of Beverston in Gloucestershire. He had already gained some reputation as an industrious theologian, and had published among other works an annotated edition of the Prayer Book (1867), a *History of the English Reformation* (1868), and a *Book of Church Law* (1872), as well as a useful *Dictionary of Doctrinal and Historical Theology* (1870). The continuation of these labours was seen in a *Dictionary of Sects and Heresies* (1874), an *Annotated Bible* (3 vols., 1878-1879), and a *Cyclopaedia of Religion* (1884), and received recognition in the shape of the D.D. degree bestowed on him in 1882. He died in London on the 11th of April 1884.

BLUNT, JOHN JAMES (1794-1855), English divine, was born at Newcastle-under-Lyme in Staffordshire, and educated at St John's College, Cambridge, where he took his degree as fifteenth wrangler and obtained a fellowship (1816). He was appointed a Wort's travelling bachelor 1818, and spent some time in Italy and Sicily, afterwards publishing an account of his journey. He proceeded M.A. in 1819, B.D. 1826, and was Hulsean Lecturer in 1831-1832 while holding a curacy in Shropshire. In 1834 he became rector of Great Oakley in Essex, and in 1839 was appointed Lady Margaret professor of divinity at Cambridge. In 1854 he declined the see of Salisbury, and he died on the 18th of June 1855. His chief book was *Undesigned Coincidences in the Writings both of the Old and New Testaments* (1833; fuller edition, 1847). Some of his writings, among them the *History of the Christian Church during the First Three Centuries* and the lectures *On the Right Use of the Early Fathers*, were published posthumously.

A short memoir of him appeared in 1856 from the hand of William Selwyn, his successor in the divinity professorship.

BLUNT, WILFRID SCAWEN (1840-), English poet and publicist, was born on the 17th of August 1840 at Petworth House, Sussex, the son of Francis Scawen Blunt, who served in the Peninsular War and was wounded at Corunna. He was educated at Stonyhurst and Oscott, and entered the diplomatic service in 1858, serving successively at Athens, Madrid, Paris and Lisbon. In 1867 he was sent to South America, and on his return to England retired from the service on his marriage with Lady Anne Noel, daughter of the earl of Lovelace and a grand-daughter of the poet Byron. In 1872 he succeeded, by the death of his elder brother, to the estate of Crabbet Park, Sussex, where he established a famous stud for the breeding of Arab horses. Mr and Lady Anne Blunt travelled repeatedly in northern Africa, Asia Minor and Arabia, two of their expeditions being described in Lady Anne's *Bedouins of the Euphrates* (2 vols., 1879) and *A Pilgrimage to Nejd* (2 vols., 1881). Mr Blunt became known as an ardent sympathizer with Mahommedan aspirations, and in his *Future of Islam* (1888) he directed attention to the forces which afterwards produced the movements of Pan-Islamism and Mahdism. He was a violent opponent of the English policy in the Sudan, and in *The Wind and the Whirlwind* (in verse, 1883) prophesied its downfall. He supported the national party in Egypt, and took a prominent part in the defence of Arabi Pasha. *Ideas about India* (1885) was the result of two visits to that country, the second in 1883-1884. In 1885 and 1886 he stood unsuccessfully for parliament as a Home Ruler; and in 1887 he was arrested in Ireland while presiding over a political meeting in connexion with the agitation on Lord Clanricarde's estate, and was imprisoned for two months in Kilmainham. His best-known volume of verse, *Love Sonnets of Proteus* (1880), is a revelation of his real merits as an emotional poet. *The Poetry of Wilfrid Blunt* (1888), selected and edited by W.E. Henley and Mr George Wyndham, includes these sonnets, together with "Worth Forest, a Pastoral," "Griselda" (described as a "society novel in rhymed verse"), translations from the Arabic, and poems which had appeared in other volumes.

BLUNTSCHLI, JOHANN KASPAR (1808-1881), Swiss jurist and politician, was born at Zürich on the 7th of March 1808, the son of a soap and candle manufacturer. From school he passed into the *Politische Institut* (a seminary of law and political science) in his native town, and proceeding thence to the universities of Berlin and Bonn, took the degree of *doctor juris* in the latter in 1829. Returning to Zurich in 1830, he threw himself with ardour into the political strife which was at the time unsettling all the cantons of the Confederation, and in this year published *Über die Verfassung der Stadt Zürich* (On the Constitution of the City of Zurich). This was followed by *Das Volk und der Souverän* (1830), a work in which, while pleading for constitutional government, he showed his bitter repugnance of the growing Swiss radicalism. Elected in 1837 a member of the Grosser Rath (Great Council), he became the champion of the moderate conservative party. Fascinated by the metaphysical views of the philosopher Friedrich Rohmer (1814-1856), a man who attracted little other attention, he endeavoured in *Psychologische Studien über Staat und Kirche* (1844) to apply them to political science generally, and in particular as a panacea for the constitutional troubles of Switzerland. Bluntschli, shortly before his death, remarked, "I have gained renown as a jurist, but my greatest desert is to have comprehended Rohmer." This philosophical essay, however, coupled with his uncompromising attitude towards both radicalism and ultramontanism, brought him many enemies, and rendered his continuance in the council, of which he had been elected president, impossible. He resigned his seat, and on the overthrow of the Sonderbund in 1847, perceiving that all hope of power for his party was lost, took leave of Switzerland with the pamphlet *Stimme eines Schweizers über die Bundesreform* (1847), and settled at Munich, where he became professor of constitutional law in 1848.

At Munich he devoted himself with energy to the special work of his chair, and, resisting the temptation to identify himself with politics, published *Allgemeines Staatsrecht* (1851-1852); *Lehre vom modernen Staat* (1875-1876); and, in conjunction with Karl Ludwig Theodor Brater (1819-1869), *Deutsches Staats-wörterbuch* (II vols., 1857-1870: abridged by Edgar Loening in 3 vols., 1869-1875). Meanwhile he had assiduously worked at his code for the canton of Zürich, *Privatrechtliches Gesetzbuch für den Kanton Zürich* (4 vols., 1854-1856), a work which was much praised at the time, and which, particularly the section devoted to contracts, served as a model for codes both in Switzerland and other countries. In 1861 Bluntschli received a call to Heidelberg as professor of constitutional law (Staatsrecht), where he again entered the political arena, endeavouring in his *Geschichte*

des allgemeinen Staatsrechts und der Politik (1864) “to stimulate,” as he said, “the political consciousness of the German people, to cleanse it of prejudices and to further it intellectually.” In his new home, Baden, he devoted his energies and political influence, during the Austro-Prussian War of 1866, towards keeping the country neutral. From this time Bluntschli became active in the field of international law, and his fame as a jurist belongs rather to this province than to that of constitutional law. His *Das moderne Kriegsrecht* (1866); *Das moderns Völkerrecht* (1868), and *Das Beuterecht im Krieg* (1878) are likely to remain invaluable text-books in this branch of the science of jurisprudence. He also wrote a pamphlet on the “Alabama” case.

Bluntschli was one of the founders, at Ghent in 1873, of the Institute of International Law, and was the representative of the German emperor at the conference on the international laws of war at Brussels. During the latter years of his life he took a lively interest in the *Protestantenverein*, a society formed to combat reactionary and ultramontane views of theology. He died suddenly at Karlsruhe on the 21st of October 1881. His library was acquired by Johns Hopkins University at Baltimore, U.S.A.

Among his works, other than those before mentioned, may be cited *Deutsches Privatrecht* (1853-1854); *Deutsche Staatslehre für Gebildete* (1874); and *Deutsche Staatslehre und die heutige Staatenwelt* (1880).

> For notices of Bluntschli’s life and works see his interesting autobiography, *Denkwurdiges aus meinem Leben* (1884); von Holtzendorff, *Bluntschli und seine Verdienste um die Staatswissenschaften* (1882); Brockhaus, *Konversations-Lexicon* (1901); and a biography by Meyer von Kronau, in *Allgemeine deutsche Biographie*.

BLYTH, a market town and seaport of Northumberland, England, in the parliamentary borough of Morpeth, 9 m. E.S.E. of that town, at the mouth of the river Blyth, on a branch of the North Eastern railway. Pop. of urban district (1901) 5472. This is the port for a considerable coal-mining district, and its harbour, on the south side of the river, is provided with mechanical appliances for shipping coal. There are five dry docks, and upwards of 1 ½ m. of quayage. Timber is largely imported. Some shipbuilding and the manufacture of rope, sails and ship-fittings are carried on, and the fisheries are valuable. Blyth is also in considerable favour as a watering-place; there are a pleasant park, a pier, protecting the harbour, about 1 m. in length, and a sandy beach affording sea-bathing. The river Blyth rises near the village of Kirkheaton, and has an easterly course of about 25 m. through a deep, well-wooded and picturesque valley.

B’NAI B’RITH (or Sons of the Covenant), **INDEPENDENT ORDER OF,** a Jewish fraternal society. It was founded at New York in 1843 by a number of German Jews, headed by Henry Jones, and is the oldest as well as the largest of the Jewish fraternal organizations. Its membership in 1908 was 35,870, its 481 lodges and 10 grand lodges being distributed over the United States, Germany, Austria-Hungary, Rumania, Egypt and Palestine. Its objects are to promote a high morality among Jews, regardless of differences as to dogma and ceremonial customs, and especially to inculcate the supreme virtues of charity and brotherly love. Political and religious discussions were from the first excluded from the debates of the order. In 1851 the first grand lodge was established at New York; in 1856, the number of district lodges having increased, the supreme authority was vested in a central body consisting of one member from each lodge; and by the present constitution, adopted in 1868, this authority is vested in a president elected for five years, an executive committee and court of appeals (elected as before). The first lodge in Germany was instituted at Berlin in 1883. A large number of charitable and other public institutions have been established in the United States and elsewhere by the order, of which may be mentioned the large orphan asylum in Cleveland, the home for the aged and infirm at Yonkers, N.Y., the National Jewish hospital for consumptives at Denver, and the Maimonides library in New York City. The B’nai B’rith society has also co-operated largely with other Jewish philanthropic

organizations in succouring distressed Israelites throughout the world.

See the *Jewish Encyclopaedia* (1902), *s.v.*

BOA, a name formerly applied to all large serpents which, devoid of poison fangs, kill their prey by constriction; but now confined to that subfamily of the *Boidae* which are devoid of teeth in the praemaxilla and are without supraorbital bones. The others are known as pythons (*q.v.*). The true boas comprise some forty species; most of them are American, but the genus *Eryx* inhabits North Africa, Greece and south-western Asia; the genus *Enygrus* ranges from New Guinea to the Fiji; *Casarea dussumieri* is restricted to Round Island, near Mauritius; and two species of *Boa* and one of *Corallus* represent this subfamily in Madagascar, while all the other boas live in America, chiefly in tropical parts. All *Boidae* possess vestiges of pelvis and hind limbs, appearing externally as claw-like spurs on each side of the vent, but they are so small that they are practically without function in climbing. The usually short tail is prehensile.

One of the commonest species of the genus *Boa* is the *Boa constrictor*, which has a wide range from tropical Mexico to Brazil. The head is covered with small scales, only one of the preoculars being enlarged. The general colour is a delicate pale brown, with about a dozen and a half darker cross-bars, which are often connected by a still darker dorso-lateral streak, enclosing large oval spots. On each side is a series of large dark brown spots with light centres. On the tail the markings become bolder, brick red with black and yellow. The under parts are yellowish with black dots. This species rarely reaches a length of more than 10 ft. It climbs well, prefers open forest in the neighbourhood of water, is often found in plantations where it retires into a hole in the ground, and lives chiefly on birds and small mammals. Like most true boas, it is of a very gentle disposition and easily domesticates itself in the palm or reed thatched huts of the natives, where it hunts the rats during the night.

The term “boa” is applied by analogy to a long article of women’s dress wound round the neck.

BOABDIL (a corruption of the name Abu Abdullah), the last Moorish king of Granada, called *el chico*, the little, and also *el zogoybi*, the unfortunate. A son of Muley Abu’l Hassan, king of Granada, he was proclaimed king in 1482 in place of his father, who was driven from the land. Boabdil soon after sought to gain prestige by invading Castile. He was taken prisoner at Lucena in 1483, and only obtained his freedom by consenting to hold Granada as a tributary kingdom under Ferdinand and Isabella, king and queen of Castile and Aragon. The next few years were consumed in struggles with his father and his uncle Abdullah ez Zagal. In 1491 Boabdil was summoned by Ferdinand and Isabella to surrender the city of Granada, and on his refusal it was besieged by the Castilians. Eventually, in January 1492, Granada was surrendered, and the king spent some time on the lands which he was allowed to hold in Andalusia. Subsequently he crossed to Africa, and is said to have been killed in battle fighting for his kinsman, the ruler of Fez. The spot from which Boabdil looked for the last time on Granada is still shown, and is known as “the last sigh of the Moor” (*el ultimo suspire del Moro*).

See J.A. Conde, *Dominácion de los Arabes en España* (Paris, 1840), translated into English by Mrs J. Foster (London, 1854-1855); Washington Irving, *The Alhambra* (New York, ed. 1880).

BOADICEA, strictly Boudicca, a British queen in the time of the emperor Nero. Her husband Prasutagus ruled the Icěni (in what is now Norfolk) as an autonomous prince under Roman suzerainty. On his death (A.D. 61) without male heir, his dominions were annexed, and the annexation was carried out brutally. He had by his will divided his private wealth between his two daughters and Nero, trusting thereby to win imperial favour for his family. Instead, his wife was scourged (doubtless for resisting the annexation), his daughters outraged, his chief tribesmen plundered. The proud, fierce queen and her people rose, and not alone. With them rose half Britain, enraged, for other causes, at Roman rule. Roman taxation and conscription lay heavy on the province; in addition, the Roman government had just revoked financial concessions made a few years earlier, and L. Annaeus Seneca, who combined the parts of a moralist and a money-lender, had abruptly recalled large loans made from his private wealth to British chiefs. A favourable chance for revolt was provided by the absence of the governor-general, Suetonius Paulinus, and most of his troops in North Wales and Anglesey. All south-east Britain joined the movement. Paulinus rushed back without waiting for his troops, but he could do nothing alone. The Britons burnt the Roman municipalities of Verulam and Colchester, the mart of London, and several military posts, massacred "over 70,000" Romans and Britons friendly to Rome, and almost annihilated the Ninth Legion marching from Lincoln to the rescue. At last Paulinus, who seems to have rejoined his army, met the Britons in the field. The site of the battle is unknown. One writer has put it at Chester; others at London, where King's Cross had once a narrow escape of being christened Boadicea's Cross, and actually for many years bore the name of Battle Bridge, in supposed reference to this battle. Probably, however, it was on Watling Street, between London and Chester. In a desperate soldiers' battle Rome regained the province. Boadicea took poison; thousands of Britons fell in the fight or were hunted down in the ensuing guerrilla. Finally, Rome adopted a kindlier policy, and Britain became quiet. But the scantiness of Romano-British remains in Norfolk may be due to the severity with which the Icěni were crushed.

See Tacitus, *Annals*, xiv.; *Agric*. xv.; Dio lxii. The name Boudicca seems to mean in Celtic much the same as Victoria.

(F. J. H.)

BOAR (O. Eng. *bār*; the word is found only in W. Ger. languages, cf. Dutch *beer*, Ger. *Eber*), the name given to the un-castrated male of the domestic pig (*q.v.*), and to some wild species of the family *Suidae* (see Swine). The European wild boar (*Sus scrofa*) is distributed over Europe, northern Africa, and central and northern Asia. It has long been extinct in the British Isles, where it once abounded, but traces have been found of its survival in Chartley Forest, Staffordshire, in an entry of 1683 in an account-book of the steward of the manor, and it possibly remained till much later in the more remote parts of Scotland and Ireland (J.E. Harting, *Extinct British Animals*, 1880). The wild boar is still found in Europe, in marshy woodland districts where there is plenty of cover, and it is fairly plentiful in Spain, Austria, Russia and Germany, particularly in the Black Forest.

From the earliest times, owing to its great strength, speed, and ferocity when at bay, the boar has been one of the favourite beasts of the chase. Under the old forest laws of England it was one of the "beasts of the forest," and, as such, under the Norman kings the unprivileged killing of it was punishable by death or the loss of a member. It was hunted in England and in Europe on foot and on horseback with dogs, while the weapon of attack was always the spear. In Europe the wild boar is still hunted with dogs, but the spear, except when used in emergencies and for giving the *coup de grâce*, has been given up for the gun. It is also shot in great forest drives in Austria, Germany and Russia. The Indian wild boar (*Sus cristatus*) is slightly taller than *Sus scrofa*, standing some 30 to 40 in. at the shoulder. It is found throughout India, Ceylon and Burma. Here the horse and spear are still used, and the sport is one of the most popular in India. (See Pig-sticking.)

The boar is one of the four heraldic beasts of venery, and was the cognizance of Richard III., king of England. As an article of food the boar's head was long considered a special delicacy, and its serving was attended with much ceremonial. At Queen's College, Oxford, the dish is still brought on Christmas day in procession to the high-table, accompanied by the singing of a carol.

BOARD (O. Eng. *bord*), a plank or long narrow piece of timber. The word comes into various compounds to describe boards used for special purposes, or objects like boards (drawing-board, ironing-board, sounding-board, chess-board, cardboard, back-board, notice-board, scoring-board). The phrase "to keep one's name on the boards," at Cambridge University, signifies to remain a member of a college; at Oxford it is "on the books." In bookbinding, pasteboard covers are called boards. Board was early used of a table, hence such phrases as "bed and board," "board and lodging"; or of a gaming-table, as in the phrase "to sweep the board," meaning to pocket all the stakes, hence, figuratively, to carry all before one. The same meaning leads to "Board of Trade," "Local Government Board," &c.

From the meaning of border or side, and especially ship's side, comes "sea-board," meaning sea-coast, and the phrases "aboard" (Fr. *abord*), "over-board," "by the board"; similarly "weather-board," the side of a ship which is to windward; "larboard and starboard" (the former of uncertain origin, Mid. Eng. *laddeboard* or *latheboard*; the latter meaning "steering side," O. Eng. *steorbord*, the rudder of early ships working over the steering side), signifying (to one standing at the stern and looking forward) the left and right sides of the ship respectively.

BOARDING-HOUSE, a private house in which the proprietor provides board and lodging for paying guests. The position of a guest in a boarding-house differs in English law, to some extent, on the one hand from that of a lodger in the ordinary sense of the term, and on the other from that of a guest in an inn. Unlike the lodger, he frequently has not the exclusive occupation of particular rooms. Unlike the guest in an inn, his landlord has no lien upon his property for rent or any other debt due in respect of his board (*Thompson v. Lacy*, 1820, 3 B. and Ald. 283). The landlord is under an obligation to take reasonable care for the safety of property brought by a guest into his house, and is liable for damages in case of breach of this obligation (*Scarborough v. Cosgrove*, 1905, 2 K.B. 803). Again, unlike the innkeeper, a boarding-house keeper does not hold himself out as ready to receive all travellers for whom he has accommodation, for which they are ready to pay, and of course he is entitled to get rid of any guest on giving reasonable notice (see *Lamond v. Richard*, 1897, I Q.B. 541, 548). What is reasonable notice depends on the terms of the contract; and, subject thereto, the course of payment of rent is a material circumstance (see LANDLORD AND TENANT). Apparently the same implied warranty of fitness for habitation at the commencement of the tenancy which exists in the case of furnished lodgings (see LODGER AND LODGINGS) exists also in the case of boarding-houses; and the guest in a boarding-house, like a lodger, is entitled to all the usual and necessary conveniences of a dwelling-house.

The law of the United States is similar to English law.

Under the French Code Civil, claims for subsistence furnished to a debtor and his family during the last year of his life by boarding-house keepers (*maîtres de pension*) are privileged over the generality of moveables, the privilege being exerciseable after legal expenses, funeral expenses, the expenses of the last illness, and the wages of servants for the year elapsed and what is due for the current year (art. 2101 (5)). Keepers of taverns (*aubergistes*) and hotels (*hôteliers*) are responsible for the goods of their guests—the committal of which to their custody is regarded as a deposit of necessity (*dépôt nécessaire*). They are liable for the loss of such goods by theft, whether by servants or strangers, but not where the loss is due to *force majeure* (arts. 1952-1954). Their liability for money and bearer securities not actually deposited is limited to 1000 francs (law of 18th of April 1889). These provisions are reproduced in substance in the Civil Codes of Quebec (arts. 1814, 1815, 1994, 2006) and of St Lucia (art. 1889). In Quebec, boarding-house keepers have a lien on the goods of their guests for the value or price of any food or accommodation furnished to them, and have also a right to sell their baggage and other property, if the amount remains unpaid for three months, under conditions similar to those imposed on innkeepers in England (art. 1816 A; and see INNS AND INNKEEPERS); also in the Civil Code of St Lucia (arts. 1578, 1714, 1715)

(A. W. R.)

BOARDING-OUT SYSTEM, in the English poor law, the boarding-out of orphan or deserted children with suitable foster-parents. The practice was first authorized in 1868, though for many years previously it had been carried out by some boards of guardians on their own initiative. Boarding-out is governed by two orders of the Local Government Board, issued in 1889. The first permits guardians to board-out children within their own union, except in the metropolis. The second governs the boarding-out of children in localities outside the union. The sum payable to the foster-parents is not to exceed 4s. per week for each child. The system has been much discussed by authorities on the administration of the poor law. It has been objected that few working-men with an average-sized family can afford to devote such an amount for the maintenance of each child, and that, therefore, boarded-out children are better off than the children of the independent (Fawcett, *Pauperism*). Working-class guardians, also, do not favour the system, being suspicious as to the disinterestedness of the foster-parents. On the other hand, it is argued that from the economic and educational point of view much better results are obtained by boarding-out children; they are given a natural life, and when they grow up they are without effort merged in the general population (Mackay, *Hist. Eng. Poor Law*). See also Poor Law.

The "boarding-out" of lunatics is, in Scotland, a regular part of the lunacy administration. It has also been successfully adopted in Belgium. (See Insanity.)

BOARDMAN, GEORGE DANA (1801-1831), American Baptist missionary, was born at Livermore, Me., and educated at Waterville College and Andover Theological Seminary. In 1825 he went to India as a missionary, and in 1827 to Burma, where his promising work among the Karens was cut short by his early death. His widow married another well-known Burmese missionary, Adoniram Judson.

His son, George Dana Boardman, the younger (1828-1903), made the voyage from Burma to America alone when six years of age. He graduated in 1852 at Brown University, and from the Newton Theological Institution in 1855. He held Baptist pastorates at Rochester (1856-1864), and at Philadelphia, and was president of the American Baptist Missionary Union, 1880-1884. At Philadelphia he is said to have taken his congregation through every verse of the New Testament in 643 Wednesday evening lectures, which occupied nearly eighteen years, and afterwards to have begun on the Old Testament in similar fashion. Among his published works are *Studies in the Model Prayer* (1879), and *Epiphanies of the Risen Lord* (1879).

BOASE, HENRY SAMUEL (1799-1883), English geologist, the eldest son of Henry Boase (1763-1827), banker, of Madron, Cornwall, was born in London on the 2nd of September 1799. Educated partly at Tiverton grammar-school, and partly at Dublin, where he studied chemistry, he afterwards proceeded to Edinburgh and took the degree of M.D. in 1821. He then settled for some years as a medical practitioner at Penzance; there geology engaged his particular attention, and he became secretary of the Royal Geological Society of Cornwall. The results of his observations were embodied in his *Treatise on Primary Geology* (1834), a work of considerable merit in regard to the older crystalline and igneous rocks and the subject of mineral veins. In 1837 he removed to London, where he remained for about a year, being elected F.R.S. In 1838 he became partner in a firm of bleachers at Dundee. He retired in 1871, and died on the 5th of May 1883.

BOAT (O. Eng. *bât*; the true etymological connexion with Dutch and Ger. *boot*, Fr. *bateau*, Ital. *battello* presents great difficulties; Celtic forms are from O. Eng.), a comparatively small open craft for conveyance on water, usually propelled by some form of oar or sail.

The origin of the word "boat" is probably to be looked for in the A.S. *bât* = a stem, a stick, a piece of wood. If this be so, the term in its inception referred to the material of which the primitive vessel was constructed, and in this respect may well be contrasted with the word "ship," of which the primary idea was the *process* by which the material was fashioned and adapted for the use of man.

We may assume that primitive man, in his earliest efforts to achieve the feat of conveying himself and his belongings by water, succeeded in doing so—(1) by fastening together a quantity of material of sufficient buoyancy to float and carry him above the level of the water; (2) by scooping out a fallen tree so as to obtain buoyancy enough for the same purpose. In these two processes is to be found the genesis of both boat and ship, of which, though often used as convertible terms, the former is generally restricted to the smaller type of vessel such as is dealt with in this article. For the larger type the reader is referred to SHIP.

Great must have been the triumph of the man who first discovered that the rushes or the trunks he had managed to tie together would, propelled by a stick or a branch (cf. *ramus* and *remus*) used as pole or paddle, convey him safely across the river or lake, which had hitherto been his barrier. But use multiplies wants, discovers deficiencies, suggests improvements. Man soon found out that he wanted to go faster than the raft would move, that the water washed over and up through it, and this need of speed, and of dry carrying power, which we find operative throughout the history of the boat down to the present day, drove him to devise other modes of flotation as well as to try to improve his first invention.

The invention of the hollowed trunk, of the "dug-out" (monoxylon), however it came about, whenever and wherever it came into comparison with the raft, must have superseded the latter for some purposes, though not by any means for all. It was superior to the raft in speed, and was, to a certain extent, water-tight. On the other hand it was inferior in carrying power and stability. But the two types once conceived had come to stay, and to them severally, or to attempts to combine the useful properties of both, may be traced all the varieties of vessel to which the name of boat may be applied.

The development of the raft is admirably illustrated in the description, given us by Homer in the Odyssey, of the construction by the hero Ulysses of a vessel of the kind. Floating timber is cut down and carefully shaped and planed with axe and adze, and the timbers are then exactly fitted face to face and compacted with trenails and dowels, just as the flat floor of a lump or lighter might be fashioned and fitted nowadays. A platform is raised upon the floor and a bulwark of osiers contrived to keep out the wash of the waves (cf. *infra*, Malay boats). It seems as if the poet, who was intimately acquainted with the sea ways of his time, intended to convey the idea of progress in construction, as illustrated by the technical skill of his hero, and the use of the various tools with which he supplies him.

On the other hand the dug-out had its limitations. The largest tree that could be thrown and scooped out afforded but a narrow space for carrying goods, and presented problems as to stability which must have been very difficult to solve. The shaping of bow and stern, the bulging out of the sides, the flattening of the bottom, the invention of a keel piece, the attempt to raise the sides by building up with planks, all led on towards the idea of constructing a boat properly so called, or perhaps to the invention of the canoe, which in some ways may be regarded as the intermediate stage between dug-out and boat.

Meanwhile the raft had undergone improvements such as those which Homer indicates. It had arrived at a floor composed of timbers squared and shaped. It had risen to a platform, the prototype of a deck. It was but a step to build up the sides and turn up the ends, and at this point we reach the genesis of ark and punt, of sanpan and junk, or, in other words, of all the many varieties of flat-bottomed craft.

When once we have reached the point at which the improvements in the construction of the raft and dug-out bring them, as it were, within sight of each other, we can enter upon the history of the development of boats properly so called, which, in accordance with the uses and the circumstances that dictated their build, may be said to be descended from the raft or the dug-out, or from the attempt to combine the respective advantages of the two original types.

Uses and circumstances are infinite in variety and have produced an infinite variety of

boats. But we may safely say that in all cases the need to be satisfied, the nature of the material available, and the character of the difficulties to be overcome have governed the reason and tested the reasonableness of the architecture of the craft in use.

It is not proposed in this article to enter at any length into the details of the construction of boats, but it is desirable, for the sake of clearness, to indicate certain broad distinctions in the method of building, which, though they run back into the far past, in some form or other survive and are in use at the present day.

The tying of trunks together to form a raft is still not unknown in the lumber trade of the Danube or of North America, nor was it in early days confined to the raft. It extended to many boats properly so called, even to many of those built by the Vikings of old. It may still be seen in the Madras surf boats, and in those constructed out of driftwood by the inhabitants of Easter Island in the south Pacific. Virgil, who was an archaeologist, represents Charon's boat on the Styx as of this construction, and notes the defect, which still survives, in the craft of the kind when loaded—

"Gemuit sub pondere cymba
Sutilis, et multam accepit rimosa paludem!"
Aen. vi. 303.

Next to the raft, and to be counted in direct descent from it, comes the whole class of flat-bottomed boats including punts and lighters. As soon as the method of constructing a solid floor, with trenails and dowels, had been discovered, the method of converting it into a water-tight box was pursued, sides were attached plank fashion, with strong knees to stiffen them, and cross pieces to *yoke* or *key* (cf. ζύγον κλείς) them together. These thwarts once fixed naturally suggested seats for those that plied the paddle or the oar. The ends of the vessel were shaped into bow or stern, either turned up, or with the side planking convergent in stem or stern post, or joined together fore and aft by bulkheads fitted in, while interstices were made water-tight by caulking, and by smearing with bitumen or some resinous material.

The evolution of the boat as distinct from the punt, or flat-bottomed type, and following the configuration of the dug-out in its length and rounded bottom, must have taxed the inventive art and skill of constructors much more severely than that of the raft. It is possible that the coracle or the canoe may have suggested the construction of a framework of sufficient stiffness to carry a water-tight wooden skin, such as would successfully resist the pressure of wind and water. And in this regard two methods were open to the builder, both of which have survived to the present day: (1) the construction first of the shell of the boat, into which the stiffening ribs and cross ties were subsequently fitted; (2) the construction first of a framework of requisite size and shape, on to which the outer skin of the boat was subsequently attached.

Further, besides the primitive mode of tying the parts together, two main types of build must be noticed, in accordance with which a boat is said to be either carvel-built or clinker-built. (1) A boat is carvel-built when the planks are laid edge to edge so that they present a smooth surface without. (2) A boat is clinker-built when each plank is laid on so as to overlap the one below it, thus presenting a series of ledges running longitudinally.

The former method is said to be of Mediterranean, or perhaps of Eastern origin. The latter was probably invented by the old Scandinavian builders, and from them handed down through the fishing boats of the northern nations to our own time.

Ancient boats.

The accounts of vessels used by the Egyptians and Phoenicians generally refer to larger craft which naturally fall under the head of Ship (*q.v.*). The Nile boats, however, described by Herodotus (ii. 60), built of acacia wood, were no doubt of various sizes, some of them quite small, but all following the same type of construction, built up brick fashion, the blocks being fastened internally to long poles secured by cross pieces, and the interstices caulked with papyrus. The ends rose high above the water, and to prevent hogging were often attached by a truss running longitudinally over crutches from stem to stern.

The Assyrian and Babylonian vessels described by Herodotus (i. 194), built up of twigs and boughs, and covered with skins smeared with bitumen, were really more like huge coracles and hardly deserve the name of boats.

The use of boats by the Greeks and Romans is attested by the frequent reference to them in Greek and Latin literature, though, as regards such small craft, the details given are

hardly enough to form the basis of an accurate classification.

We hear of small boats attendant on a fleet (κελήτιον, Thuc. i. 53), and of similar craft employed in piracy (Thuc. iv. 9), and in one case of a sculling boat, or pair oar (ἀκάτιον ἀμφηρικόν, Thuc. iv. 67), which was carted up and down between the town of Megara and the sea, being used for the purpose of marauding at night. We are also familiar with the passage in the Acts (xxvii.) where in the storm they had hard work "to come by the boat"; which same boat the sailors afterwards "let down into the sea, under colour as though they would have cast anchors out of the foreship," and would have escaped to land in her themselves, leaving the passengers to drown, if the centurion and soldiers acting upon St Paul's advice had not cut off the ropes of the boat and let her fall off.

There can be little doubt that boat races were in vogue among the Greeks (see Prof. Gardner, *Journal of Hellenic Studies*, ii. 91 ff.), and probably formed part of the Panathenaic and Isthmian festivals. It is, however, difficult to prove that small boats took part in these races, though it is not unlikely that they may have done so. The testimony of the coins, such as it is, points to galleys, and the descriptive term (νεῶν ἅμιλλα) leads to the same conclusion.

It is hardly possible now to define the differences which separated ἄκατος, ἀκάτιον, from κέλης, κελήτιον, or from λέμβος or κάραβος. They seem all to have been rowing boats, probably carvel-built, some with keels (*acatii modo carinata*, Plin. ix. 19), and to have varied in size, some being simply sculling boats, and others running up to as many as thirty oars.

Similarly in Latin authors we have frequent mention of boats accompanying ships of war. Of this there is a well-known instance in the account of Caesar's invasion of Britain (*B.G.* iv. 26), when the boats of the fleet, and the pinnaces, were filled with soldiers and sent to assist the Legionaries who were being fiercely attacked as they waded on to the shore. There is also an instance in the civil war, which is a prototype of a modern attack of torpedo boats upon men of war, when Antonius manned the pinnaces of his large ships to the number of sixty, and with them attacked and defeated an imprudent squadron of Quadriremes (*B.C.* iii. 24). The class of boats so frequently mentioned as *actuariae* seems to have contained craft of all sizes, and to have been used for all purposes, whether as pleasure boats or as despatch vessels, or for piracy. In fact the term was employed vaguely just as we speak of craft in general.

The *lembus*, which is often referred to in Livy and Polybius, seems to have been of Illyrian origin, with fine lines and sharp bows. The class contained boats of various sizes and with a variable number of oars (biremis, Livy xxiv. 40, sexdecim, Livy xxxiv. 35); and it is interesting to note the origin in this case, as the invention of the light Liburnian galleys, which won the battle of Actium, and altered the whole system of naval construction, came from the same seaboard.

Besides these, the piratical *myoparones* (see Cic. *In Verrem*), and the poetical *phaselus*, deserve mention, but here again we are met with the difficulty of distinguishing boats from ships. There is also an interesting notice in Tacitus (*Hist*. iii. 47) of boats hastily constructed by the natives of the northern coast of Asia Minor, which he describes as of broad beam with narrow sides (probably meaning that the sides "tumbled home"), joined together without any fastenings of brass or iron. In a sea-way the sides were raised with planks added till they were cased in as with a roof, whence their name *camarae*, and so they rolled about in the waves, having prow and stern alike and convertible rowlocks, so that it was a matter of indifference and equally safe, or perhaps unsafe, whichever way they rowed.

Similar vessels were constructed by Germanicus in his north German campaign (*Ann*. ii. 6) and by the Suiones (*Ger*. 44). These also had stem and stern alike, and remind us of the old Norse construction, being rowed either way, having the oars loose in the rowlock, and not, as was usual in the south, attached by a thong to the thowl pin.

Lastly, as a class of boat directly descended from the raft, we may notice the flat-bottomed boats or punts or lighters which plied on the Tiber as ferry-boats, or carrying goods, which were called *codicariae* from *caudex*, the old word for a plank.

It is difficult to trace any order of development in the construction of boats during the Byzantine period, or the middle ages. Sea-going vessels according to their size carried one or more boats, some of them small boats with two or four oars, others boats of a larger size fitted with masts and sail as well as with oars. We find *lembus* and *phaselus* as generic names in the earlier period, but the indications as to size and character are vague and variable. The same may be said of the *batelli, coquets, chaloupes, chalans, gattes*, &c., of

which, in almost endless number and variety, the nautical erudition of M. Jal has collected the names in his monumental works, *Archéologie navale* and the *Glossaire nautique*.

It is clear, however, that in many instances the names, originally applied to boats properly so called, gradually attached themselves to larger vessels, as in the case of *chaloupe* and others, a fact which leads to the conclusion that the type of build followed originally in smaller vessels was often developed on a larger scale, according as it was found useful and convenient, while the name remained the same. Many of these types still survive and may be found in the Eastern seas, or in the Mediterranean or in the northern waters, each of which has its own peculiarities of build and rig.

Existing types.

It would be impossible within our limits to do justice to the number and variety of existing types in sea-going boats, and for more detailed information concerning them the reader would do well to consult *Mast and Sail in Europe and Asia*, by H. Warington Smyth, an excellent and exhaustive work, from which much of the information which follows regarding them has been derived.

In the Eastern seas the Chinese *sanpan* is ubiquitous. Originally a small raft of three timbers with fore end upturned, it grew into a boat in very early times, and has given its name to a very large class of vessels. With flat bottom, and considerable width in proportion to its length, the normal sanpan runs out into two tails astern, the timbers rounding up, and the end being built in like a bulkhead, with room for the rudder to work between it and the transom which connects the two projecting upper timbers of the stern. Some of them are as much as 30 ft. in length and 8 to 10 ft. in beam. They are good carriers and speedy under sail.

The Chinese in all probability were the earliest of all peoples to solve the chief problems of boat building, and after their own fashion to work out the art of navigation, which for them has now been set and unchanged for thousands of years. They appear to have used the lee-board and centre-board in junks and sanpans, and to have extended their trade to India and even beyond, centuries before anything like maritime enterprise is heard of in the north of Europe.

As regards the practice of long boat racing on rivers or tidal waters the Chinese are easily antecedent in time to the rest of the world. On great festivals in certain places the Dragon boat race forms part of the ceremony. The Dragon boats are just over 73 ft. long, with 4 ft. beam, and depth 21 in. The rowing or paddling space is about 63 ft. and the number of thwarts 27, thus giving exactly the same number of rowers as that of the Zygites in the Greek trireme. The two extremities of the boat are much cambered and rise to about 2 ft. above the water. At about 15 ft. from each end the single plank gives place to three, so as to offer a concave surface to the water. The paddle blade is spade-like in form and about 6½ in. broad.

Both in Siam and Burma there is a very large river population, and boat racing is on festival days a common amusement. The typical craft, however, is the Duck-boat, which in the shape of hull is in direct contrast to the dug-out form, and primarily intended for sailing. It is interesting to note that the Siamese method of slinging and using quarter rudders is the oldest used by men in sailing craft, being in fact the earliest development from the simple paddle rudder, which has in all ages been the first method of steering boats. The king of Siam’s state barge, we are told, is steered by long paddles, precisely in the same way as is figured in the case of the Egyptian boats of the 3rd dynasty (6000 B.C.). On the other hand the slung quarter rudders are the same in fashion as those used by Roman and Greek merchantmen, by Norsemen and Anglo-Saxons, and by medieval seamen down to about the 14th century.

The Malays have generally the credit of being expert boat-builders, but the local conditions are not such as to favour the construction of a good type of boat. “Small displacement, hollow lines, **V**-shaped sections, shallow draught and lack of beam” result in want of stability and weatherliness. But it is among them that the ancient process of dug-out building still survives and flourishes, preserving all the primitive and ingenious methods of hollowing the tree trunk, of forcing its sides outwards, and in many cases building them up with added planks, so that from the dug-out a regular boat is formed, with increased though limited carrying power, increased though still hardly sufficient stability.

To ensure this last very necessary quality many devices and contrivances are resorted to.

In some cases (just as Ulysses is described as doing by Homer, *Od.* v. 256) the boatman fastens bundles of reeds or of bamboos all along the sides of his boat. These being very

buoyant not only act as a defence against the wash of the waves, but are sufficient to keep the boat afloat in any sea.

But the most characteristic device is the outrigger, a piece of floating wood sharpened at both ends, which is fixed parallel to the longer axis of the boat, at a distance of two or three beams, by two or more poles laid at right angles to it. This, while not interfering materially with the speed of the boat, acts as a counterpoise to any pressure on it which would tend, owing to its lack of stability, to upset it, and makes it possible for the long narrow dug-out to face even the open sea. It is remarkable that this invention, which must have been seen by the Egyptians and Phoenicians in very early times, was not introduced by them into the Mediterranean. Possibly this was owing to the lack of large timber suitable for dug-outs, and the consequent evolution by them of boat from raft, with sufficient beam to rely upon for stability.

On the other hand in the boats of India the influence of Egyptian and Arab types of build is apparent, and the dinghy of the Hugli is cited as being in form strangely like the ancient Egyptian model still preserved in the Ghizeh museum. Coming westward the dominant type of build is that of the Arab *dhow*, the boat class of which has all the characteristics of the larger vessel developed from it, plenty of beam, overhanging stem and transom stern. The planking of the shell over the wooden frame has a double thickness which conduces to dryness and durability in the craft.

On the Nile it is interesting to find the *naggar* preserving, in its construction out of blocks of acacia wood pinned together, the old-world fashion of building described by Herodotus. The *gaiassa* and *dahabiah* are too large to be classed as boats, but they and their smaller sisters follow the Arab type in build and rig.

It is noteworthy that nothing apparently of the ancient Egyptian or classical methods of build survives in the Mediterranean, while the records of the development of boat-building in the middle ages are meagre and confusing. The best illustrations of ancient methods of construction, and of ancient seamanship, are to be found, if anywhere, in the East, that conservative storehouse of types and fashions, to which they were either communicated, or from which they were borrowed, by Egyptians or Phoenicians, from whom they were afterwards copied by Greeks and Romans.

In the Mediterranean the chief characteristics of the types belonging to it are “carvel-build, high bow, round stern and deep rudder hung on stern post outside the vessel.”

In the eastern basin the long-bowed wide-sterned *caique* of the Bosporus is perhaps the type of boat best known, but both Greek and Italian waters abound with an unnumbered variety of boats of “beautiful lines and great carrying power.” In the Adriatic, the Venetian gondola, and the light craft generally, are of the type developed from the raft, flat-bottomed, and capable of navigating shallow waters with minimum of draught and maximum of load.

In the western basin the majority of the smaller vessels are of the sharp-sterned build. Upon the boats of the *felucca* class, long vessels with easy lines and low free-board, suitable for rowing as well as sailing, the influence of the long galley of the middle ages was apparent. In Genoese waters at the beginning of the 19th century there were single-decked rowing vessels, which preserved the name of galley, and were said to be the descendants of the Liburnians that defeated the many-banked vessels of Antonius at Actium. But the introduction of steam vessels has already relegated into obscurity these memorials of the past.

Along the Riviera and the Spanish coast a type of boat is noticeable which is peculiar for the inward curve of both stem and stern from a keel which has considerable camber, enabling them to be beached in a heavy surf.

On the Douro, in Portugal, it is said that the boats which may be seen laden with casks of wine, trailing behind them an enormously long steering paddle, are of Phoenician ancestry, and that the curious signs, which many of them have painted on the cross board over the cabin, are of Semitic origin though now undecipherable.

Coming to the northern waters, as with men, so with boats, we meet with a totally different type. Instead of the smooth exterior of the carvel-build, we have the more rugged form of clinker-built craft with great beam, and raking sterns and stems, and a wide flare forward. In the most northern waters the strakes of the sea-going boats are wide and of considerable thickness, of oak or fir, often compacted with wooden trenails, strong and fit to do battle with the rough seas and rough usage which they have to endure.

In most of these the origin of form and character is to be sought for in the old Viking vessels or long *keeles* of the 5th century A.D., with curved and elevated stem and stern posts, and without decks or, at the most, half decked.

In the Baltic and the North Sea most of the fishing boats follow this type, with, however, considerable variety in details. It is noticeable that here also, as in other parts of the world, and at other times, the pressing demand for speed and carrying power has increased the size in almost all classes of boats till they pass into the category of ships. At the same time the carvel-build is becoming more common, while, in the struggle for life, steam and motor power are threatening to obliterate the old types of rowing and sailing boats altogether.

Next to the Norse skiff and its descendants, perhaps the oldest type of boat in northern waters is to be found in Holland, where the conditions of navigation have hardly altered for centuries. It is to the Dutch that we chiefly owe the original of our pleasure craft, but, though we have developed these enormously, the Dutch boats have remained pretty much the same. The clinker-build and the wide rounded bow are now very much of the same character as they are represented in the old pictures of the 17th and 18th centuries.

The development of boat-building in the British Isles during the 19th century has been unceasing and would need a treatise to itself to do it justice. The expansion of the fishing industry and the pressure of competition have stimulated constant improvement in the craft engaged, and here also are observable the same tendencies to substitute carvel, though it is more expensive, for clinker build, and to increase the length and size of the boats, and the gradual supersession of sail and oar by steam power. Under these influences we hear of the *fifie* and the *skaffie* classes, old favourites in northern waters, being superseded by the more modern *Zulu*, which is supposed to unite the good qualities of both; and these in turn running to such a size as to take them outside the category of boats. But even in the case of smaller boats the *Zulu* model is widely followed, so that they have actually been imported to the Irish coast for the use of the crofter fishermen in the congested districts.

For the Shetland *sexern* and the broad boats of the Orkneys, and the *nabbies* of the west coast of Scotland, the curious will do well to refer to H. Warington Smyth’s most excellent account.

On the eastern coast of England the influence of the Dutch type of build is manifest in many of the flat-bottomed and mostly round-ended craft, such as the Yorkshire *Billyboy*, and partly in the *coble*, which latter is interesting as built for launching off beaches against heavy seas, and as containing relics of Norse influence, though in the main of Dutch origin.

The life-boats of the eastern coast are in themselves an admirable class of boat, with fine lines, great length, and shallow draught, wonderful in their daring work in foul weather and heavy seas, in which as a rule their services are required. Here, however, as in the fishing boats, the size is increasing, and steam is appropriating to itself the provinces of the sail and the oar.

The wherry of the Norfolk Broads has a type of its own, and is often fitted out as a pleasure boat. It is safe and comfortable for inland waters, but not the sort of boat to live in a sea-way in anything but good weather.

The Thames and its estuary rejoice in a great variety of boats, of which the old *Peter* boat (so called after the legend of the foundation of the abbey on Thorney Island) preserved a very ancient type of build, shorter and broader than the old Thames pleasure wherry. But these and the old *hatch* boat have now almost disappeared. Possibly survivors may still be seen on the upper part of the tidal river. Round the English coast from the mouth of the Thames southwards the conditions of landing and of hauling up boats above high-water mark affect the type, demanding strong clinker-build and stout timbers. Hence there is a strong family resemblance in most of the short boats in use from the North Foreland round to Brighton. Among these are the life-boats of Deal and the other Channel ports, which have done and are still doing heroic work in saving life from wrecks upon the Goodwins and the other dangerous shoals that beset the narrowing sleeve of the English Channel.

Farther down, along the southern coast, and to the west, where harbours are more frequent, a finer and deeper class of boats, chiefly of carvel-build, is to be found. The Cornish ports are the home of a great boat-building industry, and from them a large number of the finest fishing boats in the world are turned out annually. Most of them are built with stem and stern alike, with full and bold quarters, and ample floor.

It is not possible here to enumerate, much less to describe in detail, the variety of types in sea-going boats which have been elaborated in England and in America. For this purpose

reference should be made to the list of works given at the end of the article.

The following is a list of the boats at present used in the royal navy. They have all of them a deep fore foot, and with the exception of the whalers and Berthon boats, upright stems and transom sterns. The whalers have a raking stem and a sharp stern, and a certain amount of sheer in the bows.

	Length. Feet.	Beam. Ft. In.	Depth. Ft. In.
1a. Dinghy. Freeboard about 9 in. Weight 3 cwt. 2 qr. Between thwarts 2 ft. 9 in. Elm.	13½	4′ 8″	2′ 2″
1b. Skiff dinghy for torpedo boats. Freeboard about 9 in. Carry about ten men in moderate weather. Between thwarts 2 ft. 7½ in. Weight 3 cwt. 4 lb. Yellow pine.	16	4′ 6″	1′ 10″
2a. Whaler for destroyers. 5 in. sheer. Yellow pine.	25	5′ 6″	2′
2b. Whaler. Between thwarts 2 ft. 10 in. Freeboard about 12 in. Weight, 8 cwt. Strakes No. 13. Lap ¾ in. Elm. (All have bilge strakes with hand-holes.)	27	5′ 6″	2′ 2″
3. Gig. Between thwarts 2 ft. 9½ in. Weight 8 cwt. 2 qr. 15 lb. 13 Strakes. Elm.	30	5′ 6″	2′ 2″
4. Cutter. Between thwarts 3 ft. 1 in. To carry 49 men. Carvel built.	30	8′ 1″	2′ 8½″
5. Pinnace. Between thwarts 3 ft. Carvel-built. Elm.	36	10′ 2″	3′ 5″
6. Launch. Between thwarts 3 ft. 1 in. To carry 140 men. Double skin diagonal. Teak.	42	11′ 6″	4′ 6″
7. Berthon collapsible boats weighing 7 cwt. for destroyers.			

With the exception of the larger classes, viz. cutters, pinnaces and launches, the V-shape of bottom is still preserved, which does not tend to stability, and it is difficult to see why the smaller classes have not followed the improvement made in their larger sisters.

Pleasure boats and racing.

Though the number and variety of sea-going boats is of much greater importance, no account of boats in general would be complete without reference to the development of pleasure craft upon rivers and inland waters, especially in England, during the past century. There is a legend, dating from Saxon times, which tells of King Edgar the Peaceable being rowed on the Dee from his palace in Chester to the church of St John, by eight kings, himself the ninth, steering this ancient 8-oar; but not much is heard of rowing in England until 1453, when John Norman, lord mayor of London, set the example of going by water to Westminster, which, we are told, made him popular with the watermen of his day, as in consequence the use of pleasure boats by the citizens became common. Thus it was that the old Thames pleasure wherry, with its high bows and low sharp stern and V-shaped section, and the old skiff came into vogue, both of which have now given way to boats, mostly of clinker-build, but with rounder bottoms and greater depth, safer and more comfortable to row in.

In 1715 Thomas Doggett (*q.v.*) founded a race which is still rowed in peculiar sculling boats, straked, and with sides flaring up to the sill of the rowlock. Strutt tells us of a regatta in 1775 in which watermen contended in pair-oared boats or skiffs.

At the beginning of the 19th century numerous rowing clubs flourished on the upper tidal waters of the Thames, and we hear of four-oared races from Westminster to Putney, and from Putney to Kew, in what we should now consider large and heavy boats, clinker-built, with bluff entry.

Longer boats, 8-oars, and 10-oars, seem to have been existent at the end of the 18th century. Eton certainly had one 10-oar, and three 8-oars, and two 6-oars, before 1811. The record of 8-oar races at Oxford begins in 1815, at Cambridge in 1827. Pair-oar and sculling races in lighter boats seem to have come in soon after 1820, and the first Oxford and Cambridge eight-oared race was rowed in 1829, in which year also Eton and Westminster contended at Putney.

Henley regatta was founded in 1839, and since that date the building of racing boats, eights, fours, pairs, and sculling boats, has made great progress. The products of the present time are such, in lightness of build and swiftness of propulsion, as would have been thought impossible between 1810 and 1830.

In the middle of the 19th century the long boats in use were mostly clinker-built with a

keel. At Oxford the torpids were rowed, as now, in clinker-built craft, but the summer races were rowed in carvel-built boats, which also had a keel.

In 1855 the first keelless 8-oar made its appearance at Henley, built by Mat Taylor for the Royal Chester Rowing Club. The new type was constructed on moulds, bottom upwards, a cedar skin bent and fitted on to the moulds, and the ribs built in after the boat had been turned over.

In 1857 Oxford rowed in a similar boat at Putney, 55 ft. long, 25 in. beam. From that time the keelless racing boat has held its own, fours and pairs and sculling boats all following suit. But with the introduction of sliding seats racing eights have developed in length to 63 ft. or more, with considerable camber, and a beam of 23-24 in. There are, however, still advocates of the shorter type with broader beam, and it is noticeable that the Belgian boat that won the Grand Challenge at Henley in 1906 did not exceed 60 ft. The boat in which Oxford won the University race in 1901 was 56 ft. long with 27 in. of beam.

In sculling boats the acceptance of the Australian type of build has led to the construction of a much shorter boat with broader beam than that which was in vogue twenty years ago. The same tendency has not shown itself so pronouncedly in pair oars, but will no doubt be manifest in time as the build improves. In fact we may expect the controversy between long and short racing boats, and the proper method of propelling them respectively, to be carried a step farther. The tendency, with the long slide, and long type of boat, is to try to avoid “pinch” by adopting the scullers’ method of easy beginning, and strong drive with the legs, and sharp finish to follow, but it remains to be seen whether superior pace is not to be obtained in a shorter boat by sharp beginning at a reasonable angle to the boat’s side, and a continuous drive right out to the finish of the stroke.

Appended is a list of pleasure boats in use (1909) on the Thames, with their measurements (in feet and inches).

Class of Boat.	Length.	Beam.	Depth.
Racing eight	56′ to 63′	23″ to 27″	9″ to 10″
Clinker eight	56′ to 60′	24″ to 27″	9″ to 10″
Clinker four	38′ to 42′	23″ to 24″	8″ to 9″
Tub fours	30′ to 32′	3′8″-3′10″	13″ from keel to top of stem
Outrigger pair	30′ to 34′	14″ to 16″	7″ to 8″
Outrigger sculls	25′ to 30′	10″ to 13″	5½” to 6″
Coaching gigs	26′ to 28′	3′ to 3′4″	10½” to 14″
Skiffs (Thames)	24′ to 26′	3′9″ to 4′	12″
Skiffs (Eton)	27′	2′3″	9½”
Gigs (pleasure)	24′ to 36′	4′	15″ to 16″
Randans	27′ to 30′	4′ to 4′6″	13″ from keel to top of stem
Whiffs	20′ to 23′	1′4″ to 1′6″	6″ from keel to top of stem
Whiff Gigs	19′ to 20′	2′8″ to 2′10″	12″ over all
Punts racers	30′ to 34′	1′3″ to 1′6″	6″ to 7″
” semi racers	28′ to 30′	2′	9″ to 10½”
” pleasure	26′ to 28′	2′9″ to 3′	12″ to 13″

AUTHORITIES.—For ancient boats: *Dict. Ant.*, “Navis”; C. Torr, *Ancient Ships*; Smith, *Voyage and Shipwreck of St Paul*; Graser, *De re navali*; Breusing, *Die Nautik der Alten*; Contre-amiral Serre, *La Marine des anciens*; Jules Var, *L’Art nautique dans l’antiquité*. Medieval: Jal, *Archéologie navale*, and *Glossaire nautique*; Marquis de Folin, *Bateaux et navires, progrès de la construction navale*; W.S. Lindsay, *History of Merchant Shipping and Ancient Commerce*. Modern: H. Warington Smyth, *Mast and Sail in Europe and Asia*; Dixon Kempe, *Manual of Yacht and Boat Sailing*; H.C. Folkhard, *The Sailing Boat*; F.G. Aflato, *The Sea Fishing Industry of England and Wales*; R.C. Leslie, *Old Sea Wings*, &c.

(E. WA.)

BOATSWAIN (pronounced “bo’sun”; derived from “boat” and “swain,” a servant), the warrant officer of the navy who in sailing-ships had particular charge of the boats, sails, rigging, colours, anchors and cordage. He superintended the rigging of the ship in dock, and it was his duty to summon the crew to work by a whistle. The office still remains, though

with functions modified by the introduction of steam. In a merchant ship the boatswain is the foreman of the crew and is sometimes also third or fourth mate.

BOBBILI, a town of British India, in the Vizagapatam district of Madras, 70 m. north of Vizagapatam town. Pop. (1901) 17,387. It is the residence of a raja of old family, whose estate covers an area of 227 sq. m.; estimated income, £40,000; permanent land revenue, £9000.

The attack on the fort at Bobbili made by General Bussy in 1756 is one of the most memorable episodes in Indian history. There was a constant feud between the chief of Bobbili and the raja of Vizianagram; and when Bussy marched to restore order the raja persuaded him that the fault lay with the chief of Bobbili and joined the French with 11,000 men against his rival. In spite of the fact that the French field-pieces at once made practicable breaches in the mud walls of the fort, the defenders held out with desperate valour. Two assaults were repulsed after hours of hand-to-hand fighting; and when, after a fresh bombardment, the garrison saw that their case was hopeless, they killed their women and children, and only succumbed at last to a third assault because every man of them was either killed or mortally wounded. An old man, however, crept out of a hut with a child, whom he presented to Bussy as the son of the dead chief. Three nights later four followers of the chief of Bobbili crept into the tent of the raja of Vizianagram and stabbed him to death. The child, Chinna Ranga Rao, was invested by Bussy with his father’s estate, but during his minority it was seized by his uncle. After a temporary arrangement of terms with the raja of Vizianagram the old feud broke out again, and the Bobbili chief was forced to take refuge in the nizam’s country. In 1794, however, on the break-up of the Vizianagram estate, Chinna Ranga Rao was restored by the British, and in 1801 a permanent settlement was made with his son. The title of raja was recognized as hereditary in the family; that of maharaja was conferred as a personal distinction on Sir Venkataswetachalapati Ranga Rao, K.C.I.E., the adopted great-great-grandson of Chinna Ranga Rao.

For the siege see *Imp. Gazetteer of India* (Oxford, 1908), *s.v.* “Bobbili Estate.”

BOBBIO, a town and episcopal see of Lombardy, Italy, in the province of Pavia, 32½ m. S.W. of Piacenza by road. Pop. (1901) 4848. Its most important building is the church dedicated to St Columban, who became first abbot of Bobbio in 595 or 612, and died there in 615. It was erected in Lombard style in the 11th or 12th century (to which period the campanile belongs) and restored in the 13th. The cathedral is also interesting. Bobbio was especially famous for the manuscripts which belonged to the monastery of St Columban, and are now dispersed, the greater part being in the Vatican library at Rome, and others at Milan and Turin. The cathedral archives contain documents of the 10th and 11th centuries.

See M. Stokes, *Six Months in the Apennines* (London, 1892), 154 seq.; C. Cipolla, in *L’Arte* (1904), 241.

BOBER, a river of Germany, the most considerable of the left bank tributaries of the Oder; it rises at an altitude of 2440 ft., on the northern (Silesian) side of the Riesengebirge. In its upper course it traverses a higher plateau, whence, after passing the town of Landeshut, it descends through a narrow and fertile valley to Kupferberg. Here its romantic middle course begins, and after dashing through a deep ravine between the towns of Hirschberg and Löwenberg, it gains the plain. In its lower course it meanders through pleasant pastures, bogland and pine forests in succession, receives the waters of various mountain streams, passes close by Bunzlau and through Sagan, and finally, after a course of

160 m., joins the Oder at Crossen. Swollen by the melting of the winter snows and by heavy rains in the mountains, it is frequently a torrent, and is thus, except in the last few miles, unnavigable for either boats or rafts.

BOBRUISK, a town and formerly a first-class fortress of Russia, in the government of Minsk, and 100 m. by rail S.E. of the town of Minsk, in 53° 15′ N. lat. and 28° 52′ E. long., on the right bank of the Berezina river, and on the railway from Libau and Vilna to Ekaterinoslav. Pop. (1860) 23,761; (1897) 35,177, of whom one-half were Jews. In the reign of Alexander I. there was erected here, at the confluence of the Bobruiska with the Berezina, nearly a mile from the town, a fort, which successfully withstood a bombardment by Napoleon in 1812, and was made equal to the best in Europe by the emperor Nicholas I. It was demolished in 1897, the defences being antiquated. The town has a military hospital and a departmental college. There are ironworks and flour-mills; and corn and timber are shipped to Libau. The town was half burnt down in 1902.

BOCAGE, MANUEL MARIA BARBOSA DE (1765-1805), Portuguese poet, was a native of Setubal. His father had held important judicial and administrative appointments, and his mother, from whom he took his last surname, was the daughter of a Portuguese vice-admiral of French birth who had fought at the battle of Matapan. Bocage began to make verses in infancy, and being somewhat of a prodigy grew up to be flattered, self-conscious and unstable. At the age of fourteen, he suddenly left school and joined the 7th infantry regiment; but tiring of garrison life at Setubal after two years, he decided to enter the navy. He proceeded to the royal marine academy in Lisbon, but instead of studying he pursued love adventures, and for the next five years burnt incense on many altars, while his retentive memory and extraordinary talent for improvisation gained him a host of admirers and turned his head. The Brazilian *modinhas*, little rhymed poems sung to a guitar at family parties, were then in great vogue, and Bocage added to his fame by writing a number of these, by his skill in extemporizing verses on a given theme, and by allegorical idyllic pieces, the subjects of which are similar to those of Watteau’s and Boucher’s pictures. In 1786 he was appointed *guardamarinha* in the Indian navy, and he reached Goa by way of Brazil in October. There he came into an ignorant society full of petty intrigue, where his particular talents found no scope to display themselves; the glamour of the East left him unmoved and the climate brought on a serious illness. In these circumstances he compared the heroic traditions of Portugal in Asia, which had induced him to leave home, with the reality, and wrote his satirical sonnets on “The Decadence of the Portuguese Empire in Asia,” and those addressed to Affonso de Albuquerque and D. João de Castro. The irritation caused by these satires, together with rivalries in love affairs, made it advisable for him to leave Goa, and early in 1789 he obtained the post of lieutenant of the infantry company at Damaun; but he promptly deserted and made his way to Macao, where he arrived in July-August. According to a modern tradition much of the *Lusiads* had been written there, and Bocage probably travelled to China under the influence of Camoens, to whose life and misfortunes he loved to compare his own. Though he escaped the penalty of his desertion, he had no resources and lived on friends, whose help enabled him to return to Lisbon in the middle of the following year.

Once back in Portugal he found his old popularity, and resumed his vagabond existence. The age was one of reaction against the Pombaline reforms, and the famous intendant of police, Manique, in his determination to keep out French revolutionary and atheistic propaganda, forbade the importation of foreign classics and the discussion of all liberal ideas. Hence the only vehicle of expression left was satire, which Bocage employed with an unsparing hand. His poverty compelled him to eat and sleep with friends like the turbulent friar José Agostinho de Macedo (*q.v.*), and he soon fell under suspicion with Manique. He became a member of the New Arcadia, a literary society founded in 1790, under the name of Elmano Sadino, but left it three years later. Though including in its ranks most of the poets of the time, the New Arcadia produced little of real merit, and before long its adherents became enemies and descended to an angry warfare of words. But Bocage’s reputation

among the general public and with foreign travellers grew year by year. Beckford, the author of *Vathek*, for instance, describes him as “a pale, limber, odd-looking young man, the queerest but perhaps the most original of God’s poetical creatures. This strange and versatile character may be said to possess the true wand of enchantment which at the will of its master either animates or petrifies.” In 1797 enemies of Bocage belonging to the New Arcadia delated him to Manique, who on the pretext afforded by some anti-religious verses, the *Epistola á Marilia*, and by his loose life, arrested him when he was about to flee the country and lodged him in the Limoeiro, where he spent his thirty-second birthday. His sufferings induced him to a speedy recantation, and after much importuning of friends, he obtained his transfer in November from the state prison to that of the Inquisition, then a mild tribunal, and shortly afterwards recovered his liberty. He returned to his bohemian life and subsisted by writing empty *Elogios Dramaticos* for the theatres, printing volumes of verses and translating the didactic poems of Delille, Castel and others, some second-rate French plays and Ovid’s *Metamorphoses*. These resources and the help of brother Freemasons just enabled him to exist, and a purifying influence came into his life in the shape of a real affection for the two beautiful daughters of D. Antonio Bersane Leite, which drew from him verses of true feeling mixed with regrets for the past. He would have married the younger lady, D. Anna Perpetua (Analia), but excesses had ruined his health. In 1801 his poetical rivalry with Macedo became more acute and personal, and ended by drawing from Bocage a stinging extempore poem, *Pena de Talião*, which remains a monument to his powers of invective. In 1804 the malady from which he suffered increased, and the approach of death inspired some beautiful sonnets, including one directed to D. Maria (*Marcia*), elder sister of Analia, who visited and consoled him. He became reconciled to his enemies, and breathed his last on the 21st of December 1805. His end recalled that of Camoens, for he expired in poverty on the eve of the French invasion, while the singer of the *Lusiads* just failed to see the occupation of Portugal by the duke of Alva’s army. The gulf that divides the life and achievements of these two poets is accounted for, less by difference of talent and temperament than by their environment, and it gives an accurate measure of the decline of Portugal in the two centuries that separate 1580 from 1805.

To Beckford, Bocage was “a powerful genius,” and Link was struck by his nervous expression, harmonious versification and the fire of his poetry. He employed every variety of lyric and made his mark in all. His roundels are good, his epigrams witty, his satires rigorous and searching, his odes often full of nobility, but his fame must rest on his sonnets, which almost rival those of Camoens in power, elevation of thought and tender melancholy, though they lack the latter’s scholarly refinement of phrasing. So dazzled were contemporary critics by his brilliant and inspired extemporizations that they ignored Bocage’s licentiousness, and overlooked the slightness of his creative output and the artificial character of most of his poetry. In 1871 a monument was erected to the poet in the chief square of Setubal, and the centenary of his death was kept there with much circumstance in 1905.

The best editions of his collected works are those of I.F. da Silva, with a biographical and literary study by Rebello da Silva, in 6 vols. (Lisbon, 1853), and of Dr Theophilo Braga, in 8 vols. (Oporto, 1875-1876). See also I.F. da Silva *Diccionario Bibliographico Portuguez*, vol. vi. pp. 45-53, and vol. xvi. pp. 260-264; Dr T. Braga, *Bocage, sua vida e epoca litteraria* (Oporto, 1902). A striking portrait of Bocage by H.J. da Silva was engraved by Bartolozzi, who spent his last years in Lisbon.

(E. Pr.)

BOCAGE (from O. Fr. *boscage*, Late Lat. *boscum*, a wood), a French topographical term applied to several regions of France, the commonest characteristics of which are a granite formation and an undulating or hilly surface, consisting largely of heath or reclaimed land, and dotted with clumps of trees. The most important districts designated by the word are (1) the Bocage of Normandy, which comprises portions of the departments of Calvados, Manche and Orne; (2) the Bocage of Vendée, situated in the departments of Vendée, Deux-Sèvres, Maine-et-Loire, and Loire-Inférieure.

BOCCACCIO, GIOVANNI (1313-1375), Italian author, whose *Decameron* is one of the classics of literature, was born in 1313, as we know from a letter of Petrarch, in which that poet, who was born in 1304, calls himself the senior of his friend by nine years. The place of his birth is somewhat doubtful—Florence, Paris and Certaldo being all mentioned by various writers as his native city. Boccaccio undoubtedly calls himself a Florentine, but this may refer merely to the Florentine citizenship acquired by his grandfather. The claim of Paris has been supported by Baldelli and Tiraboschi, mainly on the ground that his mother was a lady of good family in that city, where she met Boccaccio's father. There is a good deal in favour of Certaldo, a small town or castle in the valley of the Elsa, 20 m. from Florence, where the family had some property, and where the poet spent much of the latter part of his life. He always signed his name Boccaccio da Certaldo, and named that town as his birthplace in his own epitaph. Petrarch calls his friend Certaldese; and Filippo Villani, a contemporary, distinctly says that Boccaccio was born in Certaldo.

Boccaccio, an illegitimate son, as is put beyond dispute by the fact that a special licence had to be obtained when he desired to become a priest, was brought up with tender care by his father, who seems to have been a merchant of respectable rank. His elementary education he received from Giovanni da Strada, an esteemed teacher of grammar in Florence. But at an early age he was apprenticed to an eminent merchant, with whom he remained for six years, a time entirely lost to him, if we may believe his own statement. For from his tenderest years his soul was attached to that "*alma poesis*," which, on his tombstone, he names as the task and study of his life. In one of his works he relates that, in his seventh year, before he had ever seen a book of poetry or learned the rules of metrical composition, he began to write verse in his childish fashion, and earned for himself amongst his friends the name of "the poet." It is uncertain where Boccaccio passed these six years of bondage; most likely he followed his master to various centres of commerce in Italy and France. We know at least that he was in Naples and Paris for some time, and the youthful impressions received in the latter city, as well as the knowledge of the French language acquired there, were of considerable influence on his later career. Yielding at last to his son's immutable aversion to commerce, the elder Boccaccio permitted him to adopt a course of study somewhat more congenial to the literary tastes of the young man. He was sent to a celebrated professor of canon law, at that time an important field of action both to the student and the practical jurist. According to some accounts—far from authentic, it is true—this professor was Cino da Pistoia, the friend of Dante, and himself a celebrated poet and scholar. But, whoever he may have been, Boccaccio's master was unable to inspire his pupil with scientific ardour. "Again," Boccaccio says, "I lost nearly six years. And so nauseous was this study to my mind, that neither the teaching of my master, nor the authority and command of my father, nor yet the exertions and reproof of my friends, could make me take to it, for my love of poetry was invincible."

About 1333 Boccaccio settled for some years at Naples, apparently sent there by his father to resume his mercantile pursuits, the canon law being finally abandoned. The place, it must be confessed, was little adapted to lead to a practical view of life one in whose heart the love of poetry was firmly rooted. The court of King Robert of Anjou at Naples was frequented by many Italian and French men of letters, the great Petrarch amongst the number. At the latter's public examination in the noble science of poetry by the king, previous to his receiving the laurel crown at Rome, Boccaccio was present,—without, however, making his personal acquaintance at this period. In the atmosphere of this gay court, enlivened and adorned by the wit of men and the beauty of women, Boccaccio lived for several years. We can imagine how the tedious duties of the market and the counting-house became more and more distasteful to his aspiring nature. We are told that, finding himself by chance on the supposed grave of Virgil, near Naples, Boccaccio on that sacred spot took the firm resolution of devoting himself for ever to poetry. But perhaps another event, which happened some time after, led quite as much as the first-mentioned occurrence to this decisive turning-point in his life. On Easter-eve, 1341, in the church of San Lorenzo, Boccaccio saw for the first time the natural daughter of King Robert, Maria, whom he immortalized as Fiammetta in the noblest creations of his muse. Boccaccio's passion on seeing her was instantaneous, and (if we may accept as genuine the confessions contained in one of her lover's works) was returned with equal ardour on the part of the lady. But not till after much delay did she yield to the amorous demands of the poet, in spite of her honour and her duty as the wife of another. All the information we have with regard to Maria or Fiammetta is derived from the works of Boccaccio himself, and owing to several apparently contradictory statements occurring in these works, the very existence of the lady has been doubted by commentators, who seem to forget that, surrounded by the chattering tongues of a court, and watched perhaps by a jealous husband, Boccaccio had all possible reason to give the appearance of

fictitious incongruity to the effusions of his real passion. But there seems no more reason to call into question the main features of the story, or even the identity of the person, than there would be in the case of Petrarch's Laura or of Dante's Beatrice. It has been ingeniously pointed out by Baldelli, that the fact of her descent from King Robert being known only to Maria herself, and through her to Boccaccio, the latter was the more at liberty to refer to this circumstance,—the bold expression of the truth serving in this case to increase the mystery with which the poets of the middle ages loved, or were obliged, to surround the objects of their praise. From Boccaccio's *Ameto* we learn that Maria's mother was, like his own, a French lady, whose husband, according to Baldelli's ingenious conjecture, was of the noble house of Aquino, and therefore of the same family with the celebrated Thomas Aquinas. Maria died, according to his account, long before her lover, who cherished her memory to the end of his life, as we see from a sonnet written shortly before his death.

The first work of Boccaccio, composed by him at Fiammetta's command, was the prose tale, *Filocopo*, describing the romantic love and adventures of Florio and Biancafiore, a favourite subject with the knightly minstrels of France, Italy and Germany. The treatment of the story by Boccaccio is not remarkable for originality or beauty, and the narrative is encumbered by classical allusions and allegorical conceits. The style also cannot be held worthy of the future great master of Italian prose. Considering, however, that this prose was in its infancy, and that this was Boccaccio's first attempt at remoulding the unwieldy material at his disposal, it would be unjust to deny that *Filocopo* is a highly interesting work, full of promise and all but articulate power. Another work, written about the same time by Fiammetta's desire and dedicated to her, is the *Teseide*, an epic poem, and indeed the first heroic epic in the Italian language. The name is chosen somewhat inappropriately, as King Theseus plays a secondary part, and the interest of the story centres in the two noble knights, Palemone and Arcito, and their wooing of the beautiful Emelia. The *Teseide* is of particular interest to the student of poetry, because it exhibits the first example of the *ottava rima*, a metre which was adopted by Tasso and Ariosto, and in English by Byron in *Don Juan*. Another link between Boccaccio's epic and English literature is formed by the fact of Chaucer having in the *Knight's Tale* adopted its main features.

Boccaccio's poetry has been severely criticized by his countrymen, and most severely by the author himself. On reading Petrarch's sonnets, Boccaccio resolved in a fit of despair to burn his own attempts, and only the kindly encouragement of his great friend prevented the holocaust. Posterity has justly differed from the author's sweeping self-criticism. It is true, that compared with Dante's grandeur and passion, and with Petrarch's absolute mastership of metre and language, Boccaccio's poetry seems to be somewhat thrown into shade. His verse is occasionally slip-shod, and particularly his epic poetry lacks what in modern parlance is called poetic diction,—the quality, that is, which distinguishes the elevated pathos of the recorder of heroic deeds from the easy grace of the mere *conteur*. This latter feature, so charmingly displayed in Boccaccio's prose, has to some extent proved fatal to his verse. At the same time, his narrative is always fluent and interesting, and his lyrical pieces, particularly the poetic interludes in the *Decameron*, abound with charming gallantry, and frequently rise to lyrical pathos.

About the year 1341 Boccaccio returned to Florence by command of his father, who in his old age desired the assistance and company of his son. Florence, at that time disturbed by civil feuds, and the silent gloom of his father's house could not but appear in an unfavourable light to one accustomed to the gay life of the Neapolitan court. But more than all this, Boccaccio regretted the separation from his beloved Fiammetta. The thought of her at once embittered and consoled his loneliness. Three of his works owe their existence to this period. With all of them Fiammetta is connected; of one of them she alone is the subject. The first work, called *Ameto*, describes the civilizing influence of love, which subdues the ferocious manners of the savage with its gentle power. Fiammetta, although not the heroine of the story, is amongst the nymphs who with their tales of true love soften the mind of the huntsman. *Ameto* is written in prose alternating with verse, specimens of which form occur in old and middle Latin writings. It is more probable, however, that Boccaccio adopted it from that sweetest and purest blossom of medieval French literature, *Aucassin et Nicolette*, which dates from the 13th century, and was undoubtedly known to him. So pleased was Boccaccio with the idea embodied in the character of *Ameto* that he repeated its essential features in the Cimone of his *Decameron* (Day 5th, tale i.). The second work referred to is a poem in fifty chapters, called *L'amorosa Visione*. It describes a dream in which the poet, guided by a lady, sees the heroes and lovers of ancient and medieval times. Boccaccio evidently has tried to imitate the celebrated *Trionfi* of Petrarch, but without much success. There is little organic development in the poem, which reads like the *catalogue raisonné* of a

picture gallery; but it is remarkable from another point of view. It is perhaps the most astounding instance in literature of ingenuity wasted on trifles; even Edgar Poe, had he known Boccaccio's puzzle, must have confessed himself surpassed. For the whole of the *Amorosa Visione* is nothing but an acrostic on a gigantic scale. The poem is written, like the *Divina Commedia*, in *terza rima*, and the initial letters of all the triplets throughout the work compose three poems of considerable length, in the first of which the whole is dedicated to Boccaccio's lady-love, this time under her real name of Maria. In addition to this, the initial letters of the first, third, fifth, seventh and ninth lines of the dedicatory poem form the name of Maria; so that here we have the acrostic in the second degree. No wonder that thus entrammelled the poet's thought begins to flag and his language to halt. The third important work written by Boccaccio during his stay at Florence, or soon after his return to Naples, is called *L'amorosa Fiammetta*; and although written in prose, it contains more real poetry than the elaborate production just referred to. It purports to be Fiammetta's complaint after her lover, following the call of filial duty, had deserted her. Bitterly she deplores her fate, and upbraids her lover with coldness and want of devotion. Jealous fears add to her torture, not altogether unfounded, if we believe the commentators' assertion that the heroine of *Ameto* is in reality the beautiful Lucia, a Florentine lady loved by Boccaccio. Sadly Fiammetta recalls the moments of former bliss, the first meeting, the stolen embrace. Her narrative is indeed our chief source of information for the incidents of this strange love-story. It has been thought unlikely, and indeed impossible, that Boccaccio should thus have become the mouthpiece of a real lady's real passion for himself; but there seems nothing incongruous in the supposition that after a happy reunion the poet should have heard with satisfaction, and surrounded with the halo of ideal art, the story of his lady's sufferings. Moreover, the language is too full of individual intensity to make the conjecture of an entirely fictitious love affair intrinsically probable. *L'amorosa Fiammetta* is a monody of passion sustained even to the verge of dulness, but strikingly real, and therefore artistically valuable.

By the intercession of an influential friend, Boccaccio at last obtained (in 1344) his father's permission to return to Naples, where in the meantime Giovanna, grand-daughter of King Robert, had succeeded to the crown. Being young and beautiful, fond of poetry and of the praise of poets, she received Boccaccio with all the distinction due to his literary fame. For many years she remained his faithful friend, and the poet returned her favour with grateful devotion. Even when the charge of having instigated, or at least connived at, the murder of her husband was but too clearly proved against her, Boccaccio was amongst the few who stood by her, and undertook the hopeless task of clearing her name from the dreadful stain. It was by her desire, no less than by that of Fiammetta, that he composed (between 1344 and 1350) most of the stories of his *Decameron*, which afterwards were collected and placed in the mouths of the Florentine ladies and gentlemen. During this time he also composed the *Filostrato*, a narrative poem, the chief interest of which, for the English reader, lies in its connexion with Chaucer. With a boldness pardonable only in men of genius, Chaucer adopted the main features of the plot, and literally translated parts of Boccaccio's work, without so much as mentioning the name of his Italian source.

In 1350 Boccaccio returned to Florence, owing to the death of his father, who had made him guardian to his younger brother Jacopo. He was received with great distinction, and entered the service of the Republic, being at various times sent on important missions to the margrave of Brandenburg, and to the courts of several popes, both in Avignon and Rome. Boccaccio boasts of the friendly terms on which he had been with the great potentates of Europe, the emperor and pope amongst the number. But he was never a politician in the sense that Dante and Petrarch were. As a man of the world he enjoyed the society of the great, but his interest in the internal commotions of the Florentine state seems to have been very slight. Besides, he never liked Florence, and the expressions used by him regarding his fellow-citizens betray anything but patriotic prejudice. In a Latin eclogue he applies to them the term "Batrachos" (frogs), by which, he adds parenthetically—*Ego intelligo Florentinorum morem; loquacissimi enim sumus, verum in rebus bellicis nihil valemus.* The only important result of Boccaccio's diplomatic career was his intimacy with Petrarch. The first acquaintance of these two great men dates from the year 1350, when Boccaccio, then just returned to Florence, did all in his power to make the great poet's short stay in that city agreeable. When in the following year the Florentines were anxious to draw men of great reputation to their newly-founded university, it was again Boccaccio who insisted on the claims of Petrarch to the most distinguished position. He himself accepted the mission of inviting his friend to Florence, and of announcing to Petrarch at the same time that the forfeited estates of his family had been restored to him. In this manner an intimate friendship grew up between them to be parted only by death. Common interests and

common literary pursuits were the natural basis of their friendship, and both occupy prominent positions in the early history of that great intellectual revival commonly called the Renaissance.

During the 14th century the study of ancient literature was at a low ebb in Italy. The interest of the lay world was engrossed by political struggles, and the treasures of classical history and poetry were at the mercy of monks, too lazy or too ignorant to use, or even to preserve them. Boccaccio himself told that, on asking to see the library of the celebrated monastery of Monte Cassino, he was shown into a dusty room without a door to it. Many of the valuable manuscripts were mutilated; and his guide told him that the monks were in the habit of tearing leaves from the codices to turn them into psalters for children, or amulets for women at the price of four or five *soldi* apiece. Boccaccio did all in his power to remove by word and example this barbarous indifference. He bought or copied with his own hand numerous valuable manuscripts, and an old writer remarks that if Boccaccio had been a professional copyist, the amount of his work might astonish us. His zealous endeavours for the revival of the all but forgotten Greek language in western Europe are well known. The most celebrated Italian scholars about the beginning of the 15th century were unable to read the Greek characters. Boccaccio deplored the ignorance of his age. He took lessons from Leone Pilato, a learned adventurer of the period, who had lived a long time in Thessaly and, although born in Calabria, pretended to be a Greek. By Boccaccio's advice Leone Pilato was appointed professor of Greek language and literature in the university of Florence, a position which he held for several years, not without great and lasting benefit for the revival of classical learning. Boccaccio was justly proud of having been intimately connected with the foundation of the first chair of Greek in Italy. But he did not forget, in his admiration of classic literature, the great poets of his own country. He never tires in his praise of the sublime Dante, whose works he copied with his own hand. He conjures his friend Petrarch to study the great Florentine, and to defend himself against the charges of wilful ignorance and envy brought against him. A life of Dante, and the commentaries on the first sixteen cantos of the *Inferno*, bear witness to Boccaccio's learning and enthusiasm.

In the chronological enumeration of our author's writings we now come to his most important work, the *Decameron*, a collection of one hundred stories, published in their combined form in 1353, although mostly written at an earlier date. This work marks in a certain sense the rise of Italian prose. It is true that Dante's *Vita Nuova* was written before, but its involved sentences, founded essentially on Latin constructions, cannot be compared with the infinite suppleness and precision of Boccaccio's prose. The *Cento Novelle Antiche*, on the other hand, which also precedes the *Decameron* in date, can hardly be said to be written in artistic language according to definite rules of grammar and style. Boccaccio for the first time speaks a new idiom, flexible and tender, like the character of the nation, and capable of rendering all the shades of feeling, from the coarse laugh of cynicism to the sigh of hopeless love. It is by the name of "Father of Italian Prose" that Boccaccio ought to be chiefly remembered.

Like most progressive movements in art and literature, Boccaccio's remoulding of Italian prose may be described as a "return to nature." It is indeed the nature of the Italian people itself which has become articulate in the *Decameron*; here we find southern grace and elegance, together with that unveiled *naïveté* of impulse which is so striking and so amiable a quality of the Italian character. The undesirable complement of the last-mentioned feature, a coarseness and indecency of conception and expression hardly comprehensible to the northern mind, also appears in the *Decameron*, particularly where the life and conversation of the lower classes are the subject of the story. At the same time, these descriptions of low life are so admirable, and the character of popular parlance rendered with such humour, as often to make the frown of moral disgust give way to a smile.

It is not surprising that a style so concise and yet so pliable so typical and yet so individual, as that of Boccaccio was of enormous influence on the further progress of a prose in a manner created by it. This influence has indeed prevailed down to the present time, to an extent beneficial upon the whole, although frequently fatal to the development of individual writers. Novelists like Giovanni Fiorentino or Franco Sacchetti are completely under the sway of their great model; and Boccaccio's influence may be discerned equally in the plastic fulness of Machiavelli and in the pointed satire of Aretino. Without touching upon the individual merits of Lasca, Bandello and other novelists of the *cinque-cento*, it may be asserted that none of them created a style independent of their great predecessor. One cannot indeed but acquiesce in the authoritative utterance of the Accademia della Crusca, which holds up the *Decameron* as the standard and model of Italian prose. Even the Della Cruscan writers themselves have been unable to deprive the language wholly of the fresh

spontaneity of Boccaccio's manner, which in modern literature we again admire in Manzoni's *Promessi sposi*.

A detailed analysis of a work so well known as the *Decameron* would be unnecessary. The description of the plague of Florence preceding the stories is universally acknowledged to be a masterpiece of epic grandeur and vividness. It ranks with the paintings of similar calamities by Thucydides, Defoe and Manzoni. Like Defoe, Boccaccio had to draw largely on hearsay and his own imagination, it being almost certain that in 1348 he was at Naples, and therefore no eye-witness of the scenes he describes. The stories themselves, a hundred in number, range from the highest pathos to the coarsest licentiousness. A creation like the patient Griselda, which international literature owes to Boccaccio, ought to atone for much that is morally and artistically objectionable in the *Decameron*. It may be said on this head, that his age and his country were not only deeply immoral, but in addition exceedingly outspoken. Moreover, his sources were anything but pure. Most of his improper stories are either anecdotes from real life, or they are taken from the *fabliaux* of medieval French poets. On comparing the latter class of stories (about one-fifth of the whole *Decameron*) with their French originals, one finds that Boccaccio has never added to, but has sometimes toned down the revolting ingredients. Notwithstanding this, it cannot be denied that the artistic value of the *Decameron* is greatly impaired by descriptions and expressions, the intentional licentiousness of which is but imperfectly veiled by an attempt at humour.

Boccaccio has been accused of plagiarism, particularly by French critics, who correctly state that the subjects of many stories in the *Decameron* are borrowed from their literature. A similar objection might be raised against Chaucer, Shakespeare, Goethe (in *Faust*), and indeed most of the master minds of all nations. Power of invention is not the only nor even the chief criterion of a great poet. He takes his subjects indiscriminately from his own fancy, or from the consciousness of his and other nations. Stories float about in the air, known to all yet realized by few; the poet gathers their *disjecta membra* into an organic whole, and this he inspires and calls into life with the breath of his genius. It is in this sense that Boccaccio is the creator of those innumerable beautiful types and stories, which have since become household words amongst civilized nations. No author can equal him in these contributions to the store of international literature. There are indeed few great poets who have not in some way become indebted to the inexhaustible treasure of Boccaccio's creativeness. One of the greatest masterpieces of German literature, Lessing's *Nathan the Wise*, contains a story from Boccaccio (*Decameron*, Day 1st, tale iii.), and the list of English poets who have drawn from the same source comprises, among many others, the names of Chaucer, Lydgate, Dryden, Keats and Tennyson.

For ten years Boccaccio continued to reside in Florence, leaving the city only occasionally on diplomatic missions or on visits to his friends. His fame in the meantime began to spread far and wide, and his *Decameron*, in particular, was devoured by the fashionable ladies and gentlemen of the age. About 1360 he seems to have retired from the turbulent scenes of Florence to his native Certaldo, the secluded charms of which he describes with rapture. In the following year took place that strange turning-point in Boccaccio's career which is generally described as his conversion. It seems that a Carthusian monk came to him while at Certaldo charged with a posthumous message from another monk of the same order, to the effect that if Boccaccio did not at once abandon his godless ways in life and literature his death would ensue after a short time. It is also mentioned that the revelation to the friar on his deathbed of a secret known only to Boccaccio gave additional import to this alarming information. Boccaccio's impressionable nature was deeply moved. His life had been far from virtuous; in his writings he had frequently sinned against the rules of morality, and worse still, he had attacked with bitter satire the institutions and servants of holy mother church. Terrified by the approach of immediate death, he resolved to sell his library, abandon literature, and devote the remainder of his life to penance and religious exercise. To this effect he wrote to Petrarch. We possess the poet's answer; it is a masterpiece of writing, and what is more, a proof of tenderest friendship. The message of the monk Petrarch is evidently inclined to treat simply as pious fraud, without, however, actually committing himself to that opinion. "No monk is required to tell thee of the shortness and precariousness of human life. Of the advice received accept what is good; abandon worldly cares, conquer thy passions, and reform thy soul and life of degraded habits. But do not give up the studies which are the true food of a healthy mind." Boccaccio seems to have acted on this valuable advice. His later works, although written in Latin and scientific in character, are by no means of a religious kind. It seems, however, that his entering the church in 1362 is connected with the events just related.

In 1363 Boccaccio went on a visit to Naples to the seneschal Acciajuoli (the same

Florentine who had in 1344 persuaded the elder Boccaccio to permit his son's return to Naples), who commissioned him to write the story of his deeds of valour. On his arrival, however, the poet was treated with shameful neglect, and revenged himself by denying the possibility of relating any valorous deeds for want of their existence. This declaration, it must be confessed, came somewhat late, but it was provoked by a silly attack on the poet himself by one of the seneschal's indiscreet friends.

During the next ten years Boccaccio led an unsettled life, residing chiefly at Florence or Certaldo, but frequently leaving his home on visits to Petrarch and other friends, and on various diplomatic errands in the service of the Republic. He seems to have been poor, having spent large sums in the purchase of books, but his independent spirit rejected the numerous splendid offers of hospitality made to him by friends and admirers. During this period he wrote four important Latin works—*De Genealogia Deorum libri XV.*, a compendium of mythological knowledge full of deep learning; *De Montium, Silvarum, Lacuum, et Marium nominibus liber*, a treatise on ancient geography; and two historical books—*De Casibus Virorum et Feminarum Illustrium libri IX.*, interesting to the English reader as the original of John Lydgate's *Fall of Princes*; and *De Claris Mulieribus*. To the list of his works ought to be added *Il Ninfale Fiesolano*, a beautiful love-story in verse, and *Il Corbaccio ossia Il Laberinto d'Amore*, a coarse satire on a Florentine widow who had jilted the poet, written about 1355, not to mention many eclogues in Latin and miscellaneous *Rime* in Italian (the latter collected by his biographer Count Baldelli in 1802).

In 1373 we find Boccaccio again settled at Certaldo. Here he was attacked by a terrible disease which brought him to the verge of death, and from the consequences of which he never quite recovered. But sickness could not subdue his intellectual vigour. When the Florentines established a chair for the explanation of the *Divina Commedia* in their university, and offered it to Boccaccio, the senescent poet at once undertook the arduous duty. He delivered his first lecture on the 23rd of October 1373. The commentary on part of the *Inferno*, already alluded to, bears witness of his unabated power of intellect. In 1374 the news of the loss of his dearest friend Petrarch reached Boccaccio, and from this blow he may be said to have never recovered. Almost his dying efforts were devoted to the memory of his friend; urgently he entreated Petrarch's son-in-law to arrange the publication of the deceased poet's Latin epic *Africa*, a work of which the author had been far more proud than of his immortal sonnets to Laura.

In his last will Boccaccio left his library to his father confessor, and after his decease to the convent of Santo Spirito in Florence. His small property he bequeathed to his brother Jacopo. His own natural children had died before him. He himself died on the 21st of December 1375 at Certaldo, and was buried in the church of SS. Jacopo e Filippo of that town. On his tombstone was engraved the epitaph composed by himself shortly before his death. It is calm and dignified, worthy indeed of a great life with a great purpose. These are the lines:—

"Hac sub mole jacent cineres ac ossa Joannis;
Mens sedet ante Deum, meritis ornata laborum
Mortalis vitae. Genitor Boccaccius illi;
Patria Certaldum; studium fuit alma poesis."

A complete edition of Boccaccio's Italian writings, in 17 vols., was published by Moutier (Florence, 1834). The life of Boccaccio has been written by Tiraboschi, Mazzuchelli, Count Baldelli (*Vita di Boccaccio*, Florence, 1806), and others. In English the best biography is Edward Hutton (1909.) The first printed edition of the *Decameron* is without date, place or printer's name; but it is believed to belong to the year 1469 or 1470, and to have been printed at Florence. Besides this, Baldelli mentions eleven editions during the 15th century. The entire number of editions by far exceeds a hundred. A curious expurgated edition, authorized by the pope, appeared at Florence, 1573. Here, however, the grossest indecencies remain, the chief alteration being the change of the improper personages from priests and monks into laymen. The best old edition is that of Florence, 1527. Of modern reprints, that by Forfoni (Florence, 1857) deserves mention. Manni has written a *Storia del Decamerone* (1742), and a German scholar, M. Landau, who published (Vienna, 1869) a valuable investigation of the sources of the *Decameron*, subsequently brought out in 1877 a general study of Boccaccio's life and works. An interesting English translation of the *Decameron* appeared in 1624, under the title *The Model of Mirth, Wit, Eloquence and Conversation*.

(F. H.)

BOCCALINI, TRAJANO (1556-1613), Italian satirist, was born at Loretto in 1556. The son of an architect, he himself adopted that profession, and it appears that he commenced late in life to apply to literary pursuits. Pursuing his studies at Rome, he had the honour of teaching Bentivoglio, and acquired the friendship of the cardinals Gaetano and Borghesi, as well as of other distinguished personages. By their influence he obtained various posts, and was even appointed by Gregory XIII. governor of Benevento in the states of the church. Here, however, he seems to have acted imprudently, and he was soon recalled to Rome, where he shortly afterwards composed his most important work, the *Ragguagli di Parnaso*, in which Apollo is represented as receiving the complaints of all who present themselves, and distributing justice according to the merits of each particular case. The book is full of light and fantastic satire on the actions and writings of his eminent contemporaries, and some of its happier hits are among the hackneyed felicities of literature. To escape, it is said, from the hostility of those whom his shafts had wounded, he returned to Venice, and there, according to the register in the parochial church of Sta Maria Formosa, died of colic, accompanied with fever, on the 16th of November 1613. It was asserted, indeed, by contemporary writers that he had been beaten to death with sand-bags by a band of Spanish bravadoes, but the story seems without foundation. At the same time, it is evident from the *Pietra del Paragone*, which appeared after his death in 1615, that whatever the feelings of the Spaniards towards him, he cherished against them feelings of the bitterest hostility. The only government, indeed, which is exempt from his attacks is that of Venice, a city for which he seems to have had a special affection.

The *Ragguagli*, first printed in 1612, has frequently been republished. The *Pietra* has been translated into French, German, English and Latin; the English translator was Henry, earl of Monmouth, his version being entitled *The Politicke Touchstone* (London, 1674). Another posthumous publication of Boccalini was his *Commentarii sopra Cornelia Tacito* (Geneva, 1669). Many of his manuscripts are preserved still unprinted.

BOCCHERINI, LUIGI (1743-1805), Italian composer, son of an Italian bass-player, was born at Lucca, and studied at Rome, where he became a fine ’cellist, and soon began to compose. He returned to Lucca, where for some years he was prominent as a player, and there he produced two oratorios and an opera. He toured in Europe, and in 1768 was received in Paris by Gossec and his circle with great enthusiasm, his instrumental pieces being highly applauded; and from 1769 to 1785 he held the post of “composer and virtuoso” to the king of Spain’s brother, the infante Luis, at Madrid. He afterwards became “chamber-composer” to King Frederick William II. of Prussia, till 1797, when he returned to Spain. He died at Madrid on the 28th of May 1805.

As an admirer of Haydn, and a voluminous writer of instrumental music, chiefly for the violoncello, Boccherini represents the effect of the rapid progress of a new art on a mind too refined to be led into crudeness, too inventive and receptive to neglect any of the new artistic resources within its cognizance, and too superficial to grasp their real meaning. His mastery of the violoncello, and his advanced sense of beauty in instrumental tone-colour, must have made even his earlier works seem to contemporaries at least as novel and mature as any of those experiments at which Haydn, with eight years more of age and experience, was labouring in the development of the true new forms. Most of Boccherini’s technical resources proved useless to Haydn, and resemblances occur only in Haydn’s earliest works (*e.g.* most of the slow movements of the quartets in *op*. 3 and in some as late as *op*. 17); whichever derived the characteristics of such movements from the other, the advantage is decidedly with Boccherini. But the progress of music did not lie in the production of novel beauties of instrumental tone in a style in which polyphonic organization was either deliberately abandoned or replaced by a pleasing illusion, while the form in its larger aspects was a mere inorganic amplification of the old suite-forms, which presupposed a genuine polyphonic organization as the vitalizing principle of their otherwise purely decorative nature. The true tendency of the new sonata forms was to make instrumental music dramatic in its variety and contrasts, instead of merely decorative. Haydn from the outset buried himself with the handling of new rhythmic proportions; and if it is hardly an exaggeration to say that the surprising beauty of colour in such a specimen of Boccherini’s 125 string-quintets as that in E major (containing the popular minuet) is perhaps more modern and certainly safer in performance than any special effect Haydn ever achieved, it is

nevertheless true that even this beauty fails to justify the length and monotony of the work. Where Haydn uses any fraction of the resources of such a style, the ultimate effect is in proportion to a purpose of which Boccherini, with all his genuine admiration of his elder brother in art, could form no conception. Boccherini's works are, however, still indispensable for violoncellists, both in their education and their concert repertories; and his position in musical history is assured as that of the most original and, next to Tartini, perhaps the greatest writer of music for stringed instruments in the late Italian amplifications of the older quasi-polyphonic sonata or suite-form that survived into the beginning of the 19th century in the works of Nardini. Boccherini may safely be regarded as its last real master. He was wittily characterized by the contemporary violinist Puppo as "the wife of Haydn"; which is very true, if man and woman are two different species; but not as true as *e.g.* the equally common saying that "Schubert is the wife of Beethoven," and still less true than that "Vittoria is the wife of Palestrina."

His life, with a *Catalogue raisonné*, was published by L. Picquot (1851).

(D. F. T.)

BOCCHUS, king of Mauretania (about 110 B.C.), and father-in-law of Jugurtha. In 108 he vacillated between Jugurtha and the Romans, and joined Jugurtha only on his promising him the third part of his kingdom. The two kings were twice defeated. Bocchus again made overtures to the Romans, and after an interview with Sulla, who was Marius's quaestor at that time, sent ambassadors to Rome. At Rome the hope of an alliance was encouraged, but on condition that Bocchus showed himself deserving of it. After further negotiations with Sulla, he finally agreed to send a message to Jugurtha requesting his presence. Jugurtha fell into the trap and was given up to Sulla. Bocchus concluded a treaty with the Romans, and a portion of Numidia was added to his kingdom. Further to conciliate the Romans and especially Sulla, he sent to the Capitol a group of Victories guarding a device in gold showing Bocchus handing over Jugurtha to Sulla.

See JUGURTHA; also Sallust, *Jugurtha*, 80-120; Plutarch, *Marius*, 8-32, *Sulla*, 3; A.H.J. Greenidge, *History of Rome* (London, 1904).

His son, BOCCHUS, was king of Mauretania, jointly with a younger brother Bogud. As enemies of the senatorial party, their title was recognized by Caesar (49 B.C.). During the African war they invaded Numidia and conquered Cirta, the capital of the kingdom of Juba, who was thus obliged to abandon the idea of joining Metellus Scipio against Caesar. At the end of the war, Caesar bestowed upon Bocchus part of the territory of Massinissa, Juba's ally, which was recovered after Caesar's murder by Massinissa's son Arabion. Dio Cassius says that Bocchus sent his sons to support Sextus Pompeius in Spain, while Bogud fought on the side of Caesar, and there is no doubt that after Caesar's death Bocchus supported Octavian, and Bogud Antony. During Bogud's absence in Spain, his brother seized the whole of Numidia, and was confirmed sole ruler by Octavian. After his death in 33, Numidia was made a Roman province.

Bell. Afric. 25; Dio Cassius xli. 42, xliii. 36, xlviii. 45; Appian, *Bell. Civ.* ii. 96, iv. 54.

BOCHART, SAMUEL (1599-1667), French scholar, was born at Rouen on the 30th of May 1599. He was for many years a pastor of a Protestant church at Caen, and became tutor to Wentworth Dillon, earl of Roscommon. In 1646 he published his *Phaleg* and *Chanaan* (Caen, 1646 and 1651), the two parts of his *Geographia Sacra*. His *Hierozoicon*, which treats of the animals of Scripture, was printed in London (2 vols., 1663). In 1652 Christina of Sweden invited him to Stockholm, where he studied the Arabian manuscripts in the queen's possession. He was accompanied by Pierre Daniel Huet, afterwards bishop of Avranches. On his return to Caen he was received into the academy of that city. Bochart was a man of profound erudition; he possessed a thorough knowledge of the principal Oriental languages, including Hebrew, Syriac, Chaldaic and Arabic; and at an advanced age he wished to learn

Ethiopic. He was so absorbed in his favourite study, that he saw Phoenician and nothing but Phoenician in everything, even in Celtic words, and hence the number of chimerical etymologies which swarm in his works. He died at Caen on the 16th of May 1667.

A complete edition of his works was published at Leiden, under the title of *Sam. Bochart Opera Omnia* (1675, 2 vols. folio; 4th ed., 3 vols., 1712). An *Essay on the Life and Writings of Samuel Bochart*, by W.R. Whittingham, appeared in 1829.

BOCHOLT, a town of Germany, in the Prussian province of Westphalia, near the frontier of Holland, 12 m. by rail north of Wesel. It is a seat of the cotton industry. Pop. (1900) 21,278.

BOCHUM, a town of Germany, in the Prussian province of Westphalia, 11 m. by rail west from Dortmund. Pop. (1905) 118,000. It is a centre of the iron and steel industries, producing principally cast steel, cast iron, iron pipes, wire and wire ropes, and lamps, with tin and zinc works, coal-mining, factories for carpets, calcium carbide and paper-roofing, brickworks and breweries. The Bochumer Verein für Bergbau (mining) und Gusstahl Fabrication (steel manufacture) is one of the principal trusts in this industry, founded in 1854. There are a mining and a metallurgical school.

BÖCKH, PHILIPP AUGUST (1785-1867), German classical scholar and antiquarian, was born in Karlsruhe on the 24th of November 1785. He was sent to the gymnasium of his native place, and remained there until he left for the university of Halle (1803), where he devoted himself to the study of theology. F.A. Wolf was then creating there an enthusiasm for classical studies; Böckh fell under the spell, passed from theology to philology, and became the greatest of all Wolf's scholars. In 1807 he established himself as privat-docent in the university of Heidelberg and was shortly afterwards appointed a professor extraordinarius, becoming professor two years later. In 1811 he removed to the new Berlin University, having been appointed professor of eloquence and classical literature. He remained there till his death on the 3rd of August 1867. He was elected a member of the Academy of Sciences of Berlin in 1814, and for a long time acted as its secretary. Many of the speeches contained in his *Kleine Schriften* were delivered in this latter capacity.

Böckh worked out the ideas of Wolf in regard to philology, and illustrated them by his practice. Discarding the old notion that philology consisted in a minute acquaintance with words and the exercise of the critical art, he regarded it as the entire knowledge of antiquity, historical and philosophical. He divides philology into five parts: first, an inquiry into public acts, with a knowledge of times and places, into civil institutions, and also into law; second, an inquiry into private affairs; third, an exhibition of the religions and arts of the ancient nations; fourth, a history of all their moral and physical speculations and beliefs, and of their literatures; and fifth, a complete explanation of the language. These ideas in regard to philology Böckh set forth in a Latin oration delivered in 1822 (*Gesammelte kleine Schriften*, i.). In his speech at the opening of the congress of German philologists in 1850, he defined philology as the historical construction of the entire life—therefore, of all forms of culture and all the productions of a people in its practical and spiritual tendencies. He allows that such a work is too great for any one man; but the very infinity of subjects is the stimulus to the pursuit of truth, and men strive because they have not attained (*ib*. ii.). An account of Böckh's division of philology will be found in Freund's *Wie studirt man Philologie?*

From 1806 till his death Böckh's literary activity was unceasing. His principal works were

the following:—(1) An edition of Pindar, the first volume of which (1811) contains the text of the Epinician odes; a treatise, *De Metris Pindari*, in three books; and *Notae Criticae*: the second (1819) contains the *Scholia*; and part ii. of volume ii. (1821) contains a Latin translation, a commentary, the fragments and indices. It is still the most complete edition of Pindar that we have. But it was especially the treatise on the metres which placed Böckh in the first rank of scholars. This treatise forms an epoch in the treatment of the subject. In it the author threw aside all attempts to determine the Greek metres by mere subjective standards, pointing out at the same time the close connexion between the music and the poetry of the Greeks. He investigated minutely the nature of Greek music as far as it can be ascertained, as well as all the details regarding Greek musical instruments; and he explained the statements of the ancient Greek writers on rhythm. In this manner he laid the foundation for a scientific treatment of Greek metres. (2) *Die Staatshaushaltung der Athener*, 1817 (2nd ed. 1851, with a supplementary volume *Urkunden über das Seewesen des attischen Staats*; 3rd ed. by Fränkel, 1886), translated into English by Sir George Cornewall Lewis (1828) under the title of *The Public Economy of Athens*. In it he investigated a subject of peculiar difficulty with profound learning. He amassed information from the whole range of Greek literature, carefully appraised the value of the information given, and shows throughout every portion of it rare critical ability and insight. A work of a similar kind was his *Metrologische Untersuchungen über Gewichte, Münzfüsse, und Masse des Alterthums* (1838). (3) Böckh's third great work arose out of his second. In regard to the taxes and revenue of the Athenian state he derived a great deal of his most trustworthy information from inscriptions, many of which are given in his book. It was natural, therefore, that when the Berlin Academy of Sciences projected the plan of a *Corpus Inscriptionum Graecarum*, Böckh should be chosen as the principal editor. This great work (1828-1877) is in four volumes, the third and fourth volumes being edited by J. Franz, E. Curtius, A. Kirchhoff and H. Röhl.

Böckh's activity was continually digressing into widely different fields. He gained for himself a foremost position amongst the investigators of ancient chronology, and his name occupies a place by the side of those of Ideler and Mommsen. His principal works on this subject were: *Zur Geschichte der Mondcyclen der Hellenen* (1855); *Epigraphisch-chronologische Studien* (1856); *Über die vierjährigen Sonnenkreise der Alten* (1863), and several papers which he published in the *Transactions of the Berlin Academy*. Böckh also occupied himself with philosophy. One of his earliest papers was on the Platonic doctrine of the world, *De Platonica corporis mundani fabrica* (1809), followed by *De Platonico Systemate Caelestium globorum et de vera Indole Astronomiae Philolaice* (1810), to which may be added *Manetho und die Hundsternperiode* (1845). In opposition to Otto Gruppe (1804-1876), he denied that Plato affirmed the diurnal rotation of the earth (*Untersuchungen über das kosmische System des Platon*, 1852), and when in opposition to him Grote published his opinions on the subject (Plato and the Rotation of the Earth) Böckh was ready with his reply. Another of his earlier papers, and one frequently referred to, was *Commentatio Academica de simultate quae Platoni cum Xenophonte intercessisse fertur* (1811). Other philosophical writings were *Commentatio in Platonis qui vulgo fertur Minoem* (1806), and *Philolaos' des Pythagoreers Lehren nebst den Bruchstücken* (1819), in which he endeavoured to show the genuineness of the fragments.

Besides his edition of Pindar, Böckh published an edition of the Antigone of Sophocles (1843) with a poetical translation and essays. An early and important work on the Greek tragedians is his *Graecae Tragoediae Principum ... num ea quae supersunt et genuina omnia sint et forma primitiva servata* (1808).

The smaller writings of Böckh began to be collected in his lifetime. Three of the volumes were published before his death, and four after (*Gesammelte kleine Schriften*, 1858-1874). The first two consist of orations delivered in the university or academy of Berlin, or on public occasions. The third, fourth, fifth and sixth contain his contributions to the *Transactions of the Berlin Academy*, and the seventh contains his critiques. Böckh's lectures, delivered from 1809-1865, were published by Bratuschek under the title of *Encyclopädie und Methodologie der philologischen Wissenschaften* (2nd ed, Klussmann, 1886). His philological and scientific theories are set forth in Elze, *Über Philologie als System* (1845), and Reichhardt, *Die Gliederung der Philologie entwickelt* (1846). His correspondence with Ottfried Müller appeared at Leipzig in 1883. See Sachse, *Erinnerungen an August Böckh* (1868); Stark, in the *Verhandlungen der Würzburger Philologensammlung* (1868); Max Hoffmann, *August Böckh* (1901); and S. Reiter, in *Neue Jahrbucher für das klassische Altertum* (1902), p. 436.

BÖCKLIN, ARNOLD (1827-1901), Swiss painter, was born at Basel on the 16th of October 1827. His father, Christian Frederick Böcklin (b. 1802), was descended from an old family of Schaffhausen, and engaged in the silk trade. His mother, Ursula Lippe, was a native of the same city. In 1846 he began his studies at the Düsseldorf academy under Schirmer, who recognized in him a student of exceptional promise, and sent him to Antwerp and Brussels, where he copied the works of Flemish and Dutch masters. Böcklin then went to Paris, worked at the Louvre, and painted several landscapes; his “Landscape and Ruin” reveals at the same time a strong feeling for nature and a dramatic conception of scenery. After serving his time in the army he set out for Rome in March 1850, and the sight of the Eternal City was a fresh stimulus to his mind. So, too, was the influence of Italian nature and that of the dead pagan world. At Rome he married (June 20, 1853) Angela Rosa Lorenza Pascucci. In 1856 he returned to Munich, and remained there four years. He then exhibited the “Great Park,” one of his earliest works, in which he treated ancient mythology with the stamp of individuality, which was the basis of his reputation. Of this period, too, are his “Nymph and Satyr,” “Heroic Landscape” (Diana Hunting), both of 1858, and “Sappho” (1859). These works, which were much discussed, together with Lenbach’s recommendation, gained him his appointment as professor at the Weimar academy. He held the office for two years, painting the “Venus and Love,” a “Portrait of Lenbach,” and a “Saint Catherine.” He was again at Rome from 1862 to 1866, and there gave his fancy and his taste for violent colour free play in his “Portrait of Mme Böcklin,” now in the Basel gallery, in “An Anchorite in the Wilderness” (1863); a “Roman Tavern,” and “Villa on the Sea-shore” (1864); this last, one of his best pictures. He returned to Basel in 1866 to finish his frescoes in the gallery, and to paint, besides several portraits, “The Magdalene with Christ” (1868); “Anacreon’s Muse” (1869); and “A Castle and Warriors” (1871). His “Portrait of Myself,” with Death playing a violin (1873), was painted after his return again to Munich, where he exhibited his famous “Battle of the Centaurs” (in the Basel gallery); “Landscape with Moorish Horsemen” (in the Lucerne gallery); and “A Farm” (1875). From 1876 to 1885 Böcklin was working at Florence, and painted a “Pietà,” “Ulysses and Calypso,” “Prometheus,” and the “Sacred Grove.” From 1886 to 1892 he settled at Zürich. Of this period are the “Naiads at Play,” “A Sea Idyll,” and “War.” After 1892 Böcklin resided at San Domenico, near Florence. An exhibition of his collected works was held at Basel from the 20th of September to the 24th of October 1897. He died on the 16th of January 1901.

His life has been written by Henri Mendelssohn. See also F. Hermann, *Gazette des Beaux Arts* (Paris, 1893); Max Lehrs, *Arnold Böcklin, Ein Leitfaden zum Verständniss seiner Kunst* (Munich, 1897); W. Ritter, *Arnold Böcklin* (Gand, 1895); *Katalog der Böcklin Jubiläums Ausstellung* (Basel, 1897).

(H. Fr.)

BOCLAND, Bockland or Bookland (from A.S. *boc*, book), an original mode of tenure of land, also called charter-land or deed-land. Bocland was folk-land granted to individuals in private ownership by a document (charter or book) in writing, with the signatures of the king and witenagemot; at first it was rarely, if ever, held by laymen, except for religious purposes. Bocland to a certain extent resembled full ownership in the modern sense, in that the owner could grant it in his lifetime, in the same manner as he had received it, by *boc* or book, and also dispose of it by will. (See also Folkland.)

BOCSKAY, STEPHEN [István] (1557-1606), prince of Transylvania, the most eminent member of the ancient Bocskay family, son of György Bocskay and Krisztina Sulyok, was born at Kolozsvár, Hungary. As the chief councillor of Prince Zsigmond Báthory, he advised his sovereign to contract an alliance with the emperor instead of holding to the Turk, and rendered important diplomatic services on frequent missions to Prague and Vienna. The enmity towards him of the later Báthory princes of Transylvania, who confiscated his estates, drove him to seek protection at the imperial court (1599); but the attempts of the emperor Rudolph II. to deprive Hungary of her constitution and the Protestants of their

religious liberties speedily alienated Bocskay, especially after the terrible outrages inflicted on the Transylvanians by the imperial generals Basta and Belgiojoso from 1602 to 1604. Bocskay, to save the independence of Transylvania, assisted the Turks; and in 1605, as a reward for his part in driving Basta out of Transylvania, the Hungarian diet, assembled at Modgyes, elected him prince (1605), on which occasion the Ottoman sultan sent a special embassy to congratulate him and a splendid jewelled crown made in Persia. Bocskay refused the royal dignity, but made skilful use of the Turkish alliance. To save the Austrian provinces of Hungary, the archduke Matthias, setting aside his semi-lunatic imperial brother Rudolph, thereupon entered into negotiations with Bocskay, and ultimately the peace of Vienna was concluded (June 23, 1606), which guaranteed all the constitutional and religious rights and privileges of the Hungarians both in Transylvania and imperial Hungary. Bocskay, at the same time, was acknowledged as prince of Transylvania by the Austrian court, and the right of the Transylvanians to elect their own independent princes in future was officially recognized. The fortress of Tokaj and the counties of Bereg, Szatmár and Ugocsa were at the same time ceded to Bocskay, with reversion to Austria if he should die childless. Simultaneously, at Zsitvatorok, a peace, confirmatory of the peace of Vienna, was concluded with the Turks. Bocskay survived this signal and unprecedented triumph only a few months. He is said to have been poisoned (December 29, 1606) by his chancellor, Mihály Kátay, who was hacked to bits by Bocskay's adherents in the market-place of Kassa.

See *Political Correspondence of Stephen Bocskay* (Hung.), edited by Károly Szábo (Budapest, 1882); Jenö Thury, *Stephen Bocskay's Rebellion* (Hung.), Budapest, 1899.

(R. N. B.)

BODE, JOHANN ELERT (1747-1826), German astronomer, was born at Hamburg on the 19th of January 1747. Devoted to astronomy from his earliest years, he eagerly observed the heavens at a garret window with a telescope made by himself, and at nineteen began his career with the publication of a short work on the solar eclipse of the 5th of August 1766. This was followed by an elementary treatise on astronomy entitled *Anleitung zur Kenntniss des gestirnten Himmels* (1768, 10th ed. 1844), the success of which led to his being summoned to Berlin in 1772 for the purpose of computing ephemerides on an improved plan. There resulted the foundation by him, in 1774, of the well-known *Astronomisches Jahrbuch*, 51 yearly volumes of which he compiled and issued. He became director of the Berlin observatory in 1786, withdrew from official life in 1825, and died at Berlin on the 23rd of November 1826. His works were highly effective in diffusing throughout Germany a taste for astronomy. Besides those already mentioned he wrote:— *Sammlung astronomischer Tafeln* (3 vols., 1776); *Erläuterung der Sternkunde* (1776, 3rd ed. 1808); *Uranographia* (1801), a collection of 20 star-maps accompanied by a catalogue of 17,240 stars and nebulae. In one of his numerous incidental essays he propounded, in 1776, a theory of the solar constitution similar to that developed in 1795 by Sir William Herschel. He gave currency, moreover, to the empirical rule known as "Bode's Law," which was actually announced by Johann Daniel Titius of Wittenberg in 1772. It is expressed by the statement that the proportionate distances of the several planets from the sun may be represented by adding 4 to each term of the series; 0, 3, 6, 12, 24, &c. The irregularity will be noticed of the first term, which should be 1½ instead of 0. (See Solar System.)

See J.F. Encke, *Berlin Abhandlungen* (1827), p. xi.; H.C. Schumacher. *Astr. Nach.* v. 255, 367 (1827); Poggendorff, *Biog. literarisches Handwörterbuch; Allgemeine deutsche Biographie*, iii. 1.

BODEL, JEHAN (died *c.* 1210), French *trouvère*, was born at Arras in the second half of the 12th century. Very little is known of his life, but in 1205 he was about to start for the crusade when he was attacked by leprosy. In a touching poem called *Le Congé* (pr. by Méon in *Recueil de fabliaux et contes*, vol. i.), he bade farewell to his friends and patrons, and begged for a nomination to a leper hospital. He wrote *Le Jeu de Saint Nicolas*, one of the earliest miracle plays preserved in French (printed in Monmerqué and Michel's *Théâtre*

français du moyen âge, 1839, and for the *Soc. des bibliophiles français*, 1831); the *Chanson des Saisnes* (ed. F. Michel 1839), four *pastourelles* (printed in K. Bartsch's *Altfranz. Romanzen und Pastourellen*, Leipzig, 1870); and probably, the eight *fabliaux* attributed to an unknown Jean Bedel. The legend of Saint Nicholas had already formed the subject of the Latin *Ludus Sancti Nicholai* of Hilarius. Bodel placed the scene partly on a field of battle in Africa, where the crusaders perish in a hopeless struggle, and partly in a tavern. The piece, loosely connected by the miracle of Saint Nicholas narrated in the prologue, ends with a wholesale conversion of the African king and his subjects. The dialogue in the tavern scenes is written in thieves' slang, and is very obscure. The *Chanson des Saisnes*, Bodel's authorship of which has been called in question, is a *chanson de geste* belonging to the period of decadence, and is really a *roman d'aventures* based on earlier legends belonging to the Charlemagne cycle. It relates the wars of Charlemagne against the Saxons under Guiteclin de Sassoigne (Witikind or Widukind), with the second revolt of the Saxons and their final submission and conversion. Jehan Bodel makes no allusion to Ogier the Dane and many other personages of the Charlemagne cycle, but he mentions the defeat of Roland at Roncevaux. The romance is based on historical fact, but is overlaid with romantic detail. It really embraces three distinct legends—those of the wars against the Saxons, of Charlemagne's rebellious barons, and of Baudouim and Sebille. The earlier French poems on the subject are lost, but the substance of them is preserved in the Scandinavian versions of the Charlemagne cycle (supposed to have been derived from English sources) known as the *Karlamagnussaga* (ed. Unger, Christiania, 1860) and *Keiser Karl Magnus Krönike* (Romantisk Digtnung, ed. C.J. Brandt, Copenhagen, 1877).

> See also the article on Jehan Bodel by Paulin Paris in *Hist. litt, de la France*, xx. pp. 605-638; Gaston Paris, *Histoire poétique de Charlemagne* (1865); Léon Gautier, *Les Épopées françaises* (revised edition, vol. iii. pp. 650-684), where there is a full analysis of the *Chanson des Saisnes* and a bibliography; H. Meyer, in *Ausgaben und Abhandlungen aus ... der romanischen Philologie* (Marburg, 1883), pp. 1-76, where its relation to the rest of the Charlemagne cycle is discussed.

BODENBACH (Czech *Podmokly*), a town of Bohemia, Austria, 83 m. N.N.E. of Prague by rail. Pop. (1900) 10,782, almost exclusively German. It is situated on the left bank of the Elbe opposite Tetschen, and is an important railway junction, containing also an Austrian and a Saxon custom-house. Bodenbach, which in the middle of the 19th century had only a few hundred inhabitants, has become a very important industrial centre. Its principal manufactures include cotton and woollen goods, earthenware and crockery, chemicals, chicory, chocolate, sweetmeats and preserves, and beer. It has also a very active transit trade.

BODENSTEDT, FRIEDRICH MARTIN VON (1819-1892), German author, was born at Peine, in Hanover, on the 22nd of April 1819. He studied in Göttingen, Munich and Berlin. His career was determined by his engagement in 1841 as tutor in the family of Prince Gallitzin at Moscow, where he gained a thorough knowledge of Russian. This led to his appointment in 1844 as the head of a public school at Tiflis, in Transcaucasia. He took the opportunity of his proximity to Persia to study Persian literature, and in 1851 published a volume of original poetry in oriental guise under the fanciful title, *Die Lieder des Mirza Schaffy* (English trans. by E. d'Esterre, 1880). The success of this work can only be compared with that of Edward FitzGerald's *Omar Khayyam*, produced in somewhat similar circumstances, but differed from it in being immediate. It has gone through 160 editions in Germany, and has been translated into almost all literary languages. Nor is this celebrity undeserved, for although Bodenstedt does not attain the poetical elevation of FitzGerald, his view of life is wider, more cheerful and more sane, while the execution is a model of grace. On his return from the East, Bodenstedt engaged for a while in journalism, married the daughter of a Hessian officer (Matilde, the *Edlitam* of his poems), and was in 1854 appointed professor of Slavonic at Munich. The rich stores of knowledge which Bodenstedt brought

back from the East were turned to account in two important books, *Die Völker des Kaukasus und ihre Freiheits-Kämpfe gegen die Russen* (1848), and *Tausend und ein Tag im Orient* (1850). For some time Bodenstedt continued to devote himself to Slavonic subjects, producing translations of Pushkin, Lermontov, Turgweniev, and of the poets of the Ukraines, and writing a tragedy on the false Demetrius, and an epic, *Ada die Lesghierin*, on a Circassian theme. Finding, probably, this vein exhausted, he exchanged his professorship in 1858 for one of Early English literature, and published (1858-1860) a valuable work on the English dramatists contemporary with Shakespeare, with copious translations. In 1862 he produced a standard translation of Shakespeare's sonnets, and between 1866 and 1872 published a complete version of the plays, with the help of many coadjutors. In 1867 he undertook the direction of the court theatre at Meiningen, and was ennobled by the duke. After 1873 he lived successively at Altona, Berlin and Wiesbaden, where he died on the 19th of April 1892. His later works consist of an autobiography (1888), successful translations from Hafiz and Omar Khayyam, and lyrics and dramas which added little to his reputation.

An edition of his collected works in 12 vols. was published at Berlin (1866-1869), and his *Erzahlungen und Romane* at Jena (1871-1872). For further biographical details, see Bodenstedt's *Erinnerungen aus meinem Leben* (2 vols., Berlin, 1888-1890); and G. Schenck, *Friedrich von Bodenstedt. Ein Dichterleben in seinen Briefen* (Berlin, 1893).

BODHI VAMSA, a prose poem in elaborate Sanskritized Pali, composed by Upatissa in the reign of Mahinda IV. of Ceylon about A.D. 980. It is an adaptation of a previously existing work in Sinhalese on the same subject, and describes the bringing of a branch of the celebrated Bo or Bodhi tree (*i.e.* Wisdom Tree, under which the Buddha had attained wisdom) to Ceylon in the 3rd century B.C. The Bodhi Vamsa quotes verses from the Mahavamsa, but draws a great deal of its material from other sources; and it has occasionally preserved details of the older tradition not found in any other sources known to us.

Edition in Pali for the Pali Text Society by S. Arthur Strong (London, 1891).

BODICHON, BARBARA LEIGH SMITH (1827-1891), English educationalist, was born at Watlington, Norfolk, on the 8th of April 1827, the daughter of Benjamin Smith (1783-1860), long M.P. for Norwich. She early showed a force of character and catholicity of sympathy that later won her a prominent place among philanthropists and social workers. In 1857 she married an eminent French physician, Dr Eugene Bodichon, and, although wintering many years in Algiers, continued to lead the movements she had initiated in behalf of Englishwomen. In 1869 she published her *Brief Summary of the Laws of England concerning Women*, which had a useful effect in helping forward the passage of the Married Women's Property Act. In 1866, co-operating with Miss Emily Davies, she matured a scheme for the extension of university education to women, and the first small experiment at Hitchin developed into Girton College, to which Mme Bodichon gave liberally of her time and money. With all her public interests she found time for society and her favourite art of painting. She studied under William H. Hunt, and her water-colours, exhibited at the Salon, the Academy and elsewhere, showed great originality and talent, and were admired by Corot and Daubigny. Her London salon included many of the literary and artistic celebrities of her day; she was George Eliot's most intimate friend, and, according to her, the first to recognize the authorship of *Adam Bede*. Her personal appearance is said to be described in that of Romola. Mme Bodichon died at Robertsbridge, Sussex, on the 11th of June 1891.

BODIN, JEAN (1530-1596), French political philosopher, was born at Angers in 1530. Having studied law at Toulouse and lectured there on jurisprudence, he settled in Paris as an advocate, but soon applied himself to literature. In 1555 he published his first work, a translation of Oppian's *Cynegeticon* into Latin verse, with a commentary. The celebrated scholar, Turnebus, complained that some of his emendations had been appropriated without acknowledgment. In 1588, in refutation of the views of the seigneur de Malestroit, comptroller of the mint, who maintained that there had been no rise of prices in France during the three preceding centuries, he published his *Responsio ad Paradoxa Malestretti* (*Réponse aux paradoxes de M. Malestroit*), which the first time explained in a nearly satisfactory manner the revolution of prices which took place in the 16th century. Bodin showed a more rational appreciation than many of his contemporaries of the causes of this revolution, and the relation of the variations in money to the market values of wares in general as well as to the wages of labour. He saw that the amount of money in circulation did not constitute the wealth of the community, and that the prohibition of the export of the precious metals was rendered inoperative by the necessities of trade. This tract, the *Discours sur les causes de l'extèrme cherté qui èst aujourdhuy en France* (1574), and the disquisition on public revenues in the sixth book of the *République*, entitle Bodin to a distinguished position among the earlier economists.

His learning, genial disposition, and conversational powers won him the favor of Henry III. and of his brother, the duc d'Alençon; and he was appointed king's attorney at Laon in 1576. In this year he married, performed his most brilliant service to his country, and completed his greatest literary work. Elected by the *tiers état* of Vermandois to represent it in the states-general of Blois, he contended with skill and boldness in extremely difficult circumstances for freedom of conscience, justice and peace. The nobility and clergy favoured the League, and urged the king to force his subjects to profess the Catholic religion. When Bodin found he could not prevent this resolution being carried, he contrived to get inserted in the petition drawn up by the states the clause "without war," which practically rendered nugatory all its other clauses. While he thus resisted the clergy and nobility he successfully opposed the demand of the king to be allowed to alienate the public lands and royal demesnes, although the chief deputies had been won over to assent. This lost him the favour of the king, who wanted money on any terms. In 1581 he acted as secretary to the duc d'Alençon when that prince came over to England to seek the hand of Queen Elizabeth. Here he had the pleasure of finding that the *République* was studied at London and Cambridge, although in a barbarous Latin translation. This determined him to translate his work into Latin himself (1586). The latter part of Bodin's life was spent at Laon, which he is said to have persuaded to declare for the League in 1589, and for Henry IV. five years afterwards. He died of the plague in 1596, and was buried in the church of the Carmelites.

With all his breadth and liberality of mind Bodin was a credulous believer in witchcraft, the virtues of numbers and the power of the stars, and in 1580 he published the *Démonomanie des sorciers*, a work which shows that he was not exempt from the prejudices of the age. Himself regarded by most of his contemporaries as a sceptic, and by some as an atheist, he denounced all who dared to disbelieve in sorcery, and urged the burning of witches and wizards. It might, perhaps, have gone hard with him if his counsel had been strictly followed, as he confessed to have had from his thirty-seventh year a friendly demon, who, if properly invoked, touched his right ear when he purposed doing what was wrong, and his left when he meditated doing good.

His chief work, the *Six livres de la République* (Paris, 1576), which passed through several editions in his lifetime, that of 1583 having as an appendix *L'Apologie de René Herpin* (Bodin himself), was the first modern attempt to construct an elaborate system of political science. It is perhaps the most important work of its kind between Aristotle and modern writers. Though he was much indebted to Aristotle he used the material to advantage, adding much from his own experience and historical knowledge. In harmony with the conditions of his age, he approved of absolute governments, though at the same time they must, he thought, be controlled by constitutional laws. He entered into an elaborate defence of individual property against Plato and More, rather perhaps because the scheme of his work required the treatment of that theme than because it was practically urgent in his day, when the excesses of the Anabaptists had produced a strong feeling against communistic doctrines. He was under the general influence of the mercantilist views, and approved of energetic governmental interference in industrial matters, of high taxes on foreign manufactures and low duties on raw materials and articles of food, and attached great importance to a dense population. But he was not a blind follower of the system; he wished for unlimited freedom of trade in many cases; and he was in advance of his more eminent

contemporary Montaigne in perceiving that the gain of one nation is not necessarily the loss of another. To the public finances, which he called “the sinews of the state,” he devoted much attention, and insisted on the duties of the government in respect to the right adjustment of taxation. In general he deserves the praise of steadily keeping in view the higher aims and interests of society in connexion with the regulation and development of its material life.

Among his other works are *Oratio de instituenda in republica juventate* (1559); *Methodus ad facilem historiarum cognitionem* (1566); *Universale Naturae Theatrum* (1596, French trans. by Fougerolles, 1597), and the *Colloquium Heptaplomeres de abditis rerum sublimium arcanis*, written in 1588, published first by Guhrauer (1841), and in a complete form by L. Noack (1857). The last is a philosophy of naturalism in the form of a conversation between seven learned men—a Jew, a Mahommedan, a Lutheran, a Zwinglian, a Roman Catholic, an Epicurean and a Theist. The conclusion to which they are represented as coming is that they will live together in charity and toleration, and cease from further disputation as to religion. It is curious that Leibnitz, who originally regarded the *Colloquium* as the work of a professed enemy of Christianity, subsequently described it as a most valuable production (cf. M. Carrière, *Weltanschauung*, p. 317).

See H. Baudrillart, *J. Bodin et son temps* (Paris, 1853); Ad. Franck, *Réformateurs et publicistes de l’Europe* (Paris, 1864); N. Planchenault, *Études sur Jean Bodin* (Angers, 1858); E. de Barthélemy, *Étude sur J. Bodin* (Paris, 1876); for the political philosophy of Bodin, see P. Janet, *Hist. de la science polit.* (3rd ed., Paris, 1887); Hancke, *B. Studien über d. Begriff d. Souveränität* (Breslau, 1894), A. Bardoux. *Les Légistes et leur influence sur la soc. française*; Fournol, *Bodin prédécesseur de Montesquieu* (Paris, 1896); for his political economy, J.K. Ingram, *Hist. of Pol. Econ.* (London, 1888); for his ethical teaching, A. Desjardins, *Les Moralistes français du seizième siècle*, ch. v.; and for his historical views, R. Flint’s *Philosophy of History in Europe* (ed. 1893), pp. 190 foll.

BODKIN (Early Eng. *boydekin*, a dagger, a word of unknown origin, possibly connected with the Gaelic *biodag*, a short sword), a small, needle-like instrument of steel or bone with a flattened knob at one end, used in needlework. It has one or more slits or eyes, through which cord, tape or ribbon can be passed, for threading through a hem or series of loops. The word is also used of a small piercing instrument for making holes in cloth, &c.

BODLE or Boddle (said to be from Bothwell, the name of a mint-master), a Scottish copper coin worth about one-sixth of an English penny, first issued under Charles II. It survives in the phrase “not to care a bodle.”

BODLEY, GEORGE FREDERICK (1827-1907), English architect, was the youngest son of a physician at Brighton, his elder brother, the Rev. W.H. Bodley, becoming a well-known Roman Catholic preacher and a professor at Oscott. He was articled to the famous architect Sir Gilbert Scott, under whose influence he became imbued with the spirit of the Gothic revival, and he gradually became known as the chief exponent of 14th-century English Gothic, and the leading ecclesiastical architect in England. One of his first churches was St Michael and All Angels, Brighton (1855), and among his principal erections may be mentioned All Saints, Cambridge; Eton Mission church, Hackney Wick; Clumber church; Eccleston church; Hoar Cross church; St Augustine’s, Pendlebury; Holy Trinity, Kensington; Chapel Allerton, Leeds; St Faith’s, Brentford; Queen’s College chapel, Cambridge; Marlborough College chapel; and Burton church. His domestic work included the London

School Board offices, the new buildings at Magdalen, Oxford, and Hewell Grange (for Lord Windsor). From 1872 he had for twenty years the partnership of Mr T. Garner, who worked with him. He also designed (with his pupil James Vaughan) the cathedral at Washington, D.C., U.S.A., and cathedrals at San Francisco and in Tasmania; and when Mr Gilbert Scott's design for his new Liverpool cathedral was successful in the competition he collaborated with the young architect in preparing for its erection. Bodley began contributing to the Royal Academy in 1854, and in 1881 was elected A.R.A., becoming R.A. in 1902. In addition to being a most learned master of architecture, he was a beautiful draughtsman, and a connoisseur in art; he published a volume of poems in 1899; and he was a designer of wall-papers and chintzes for Watts & Co., of Baker Street, London; in early life he had been in close alliance with the Pre-Raphaelites, and he did a great deal, like William Morris, to improve public taste in domestic decoration and furniture. He died on the 21st of October 1907, at Water Eaton, Oxford.

BODLEY, SIR THOMAS (1545-1613), English diplomatist and scholar, founder of the Bodleian library, Oxford, was born at Exeter on the 2nd of March 1545. During the reign of Queen Mary, his father, John Bodley, being obliged to leave the kingdom on account of his Protestant principles, went to live at Geneva. In that university, in which Calvin and Beza were then teaching divinity, young Bodley studied for a short time. On the accession of Queen Elizabeth he returned with his father to England, and soon after entered Magdalen College, Oxford. In 1563 he took his B.A. degree, and was admitted a fellow of Merton College. In 1565 he read a Greek lecture in hall, took his M.A. degree the year after, and read natural philosophy in the public schools. In 1569 he was proctor, and for some time after was deputy public orator. Quitting Oxford in 1576, he made the tour of Europe; shortly after his return he became gentleman-usher to Queen Elizabeth; and in 1587, apparently, he married Ann Ball, a widow lady of considerable fortune, the daughter of a Mr Carew of Bristol. In 1584 he entered parliament as member for Portsmouth, and represented St German's in 1586. In 1585 Bodley was entrusted with a mission to form a league between Frederick II. of Denmark and certain German princes to assist Henry of Navarre. He was next despatched on a secret mission to France; and in 1588 he was sent to the Hague as minister, a post which demanded great diplomatic skill, for it was in the Netherlands that the power of Spain had to be fought. The essential difficulties of his mission were complicated by the intrigues of the queen's ministers at home, and Bodley repeatedly begged that he might be recalled. He was finally permitted to return to England in 1596, but finding his preferment obstructed by the jarring interests of Burleigh and Essex, he retired from public life. He was knighted on the 18th of April 1604. He is, however, remembered specially as the founder of the Bodleian at Oxford, practically the earliest public library in Europe (see Libraries). He determined, he said, "to take his farewell of state employments and to set up his staff at the library door in Oxford." In 1598 his offer to restore the old library was accepted by the university. Bodley not only used his private fortune in his undertaking, but induced many of his friends to make valuable gifts of books. In 1611 he began its permanent endowment, and at his death in London on the 28th of January 1613, the greater part of his fortune was left to it. He was buried in the choir of Merton College chapel where a monument of black and white marble was erected to him.

Sir Thomas wrote his own life to the year 1609, which, with the first draft of the statutes drawn up for the library, and his letters to the librarian, Thomas James, was published by Thomas Hearne, under the title of *Reliquiae Bodleianae, or Authentic Remains of Sir Thomas Bodley* (London, 1703, 8vo).

BODMER, JOHANN JAKOB (1698-1783), Swiss-German author, was born at Greifensee, near Zürich, on the 19th of July 1698. After first studying theology and then trying a commercial career, he finally found his vocation in letters. In 1725 he was appointed professor of Helvetian history in Zürich, a chair which he held for half a century, and in 1735 became a member of the "Grosser Rat." He published (1721-1723), in conjunction with

J.J. Breitinger (1701-1774) and several others, *Die Discourse der Mahlern*, a weekly journal after the model of the Spectator. Through his prose translation of Milton's Paradise Lost (1732) and his successful endeavours to make a knowledge of English literature accessible to Germany, he aroused the hostile criticism of Gottsched (*q.v.*) and his school, a struggle which ended in the complete discomfiture of the latter. His most important writings are the treatises *Von dem Wunderbaren in der Poesie* (1740) and *Kritische Betrachtungen über die poetischen Gemälde der Dichter* (1741), in which he pleaded for the freedom of the imagination from the restriction imposed upon it by French pseudo-classicism. Bodmer's epics *Die Sündfluth* (1751) and *Noah* (1751) are weak imitations of Klopstock's *Messias*, and his plays are entirely deficient in dramatic qualities. He did valuable service to German literature by his editions of the Minnesingers and part of the *Nibelungenlied*. He died at Zürich on the 2nd of January 1783.

See T.W. Danzel, *Gottsched und seine Zeit* (Leipzig, 1848); J. Crüger, *J.C. Gottsched, Bodmer und Breitinger* (Stuttgart, 1884); F. Braitmaier, *Geschichte der poetischen Theorie und Kritik von den Diskursen der Maler bis auf Lessing* (Leipzig, 1888); *Denkschrift zu Bodmers 200. Geburtstag* (Zürich, 1900).

BODMIN, a market town and municipal borough in the Bodmin parliamentary division of Cornwall, England, the county town, 30½ m. W.N.W. of Plymouth, on branches of the Great Western and London & South-Western railways. Pop. (1901) 5353. It lies between two hills in a short valley opening westward upon that of the Camel, at the southern extremity of the high open Bodmin Moor. The large church of St Petrock, mainly Perpendicular, has earlier portions, and a late Norman font. East of it there is a ruined Decorated chapel of St Thomas of Canterbury, with a crypt. A tower of Tudor date, in the cemetery, marks the site of a chapel of the gild of the Holy Rood. Part of the buildings of a Franciscan friary, founded *c.* 1240, are incorporated in the market-house, and the gateway remains in an altered form. At Bodmin are a prison, with civil and naval departments, the county gaol and asylum, the headquarters of the constabulary, and those of the duke of Cornwall's Light Infantry. Cattle, sheep and horse fairs are held, and there is a considerable agricultural trade. The borough is under a mayor, four aldermen and twelve councillors. Area, 2797 acres.

Traces of Roman occupation have been found in the western part of the parish, belonging to the first century A.D. Possibly tin-mining was carried on here at that period. The grant of a charter by King Edred to the prior and canons of Bodmin (Bomine, Bodman, Bodmyn) in respect of lands in Devonshire appears in an *inspeximus* of 1252. To its ecclesiastical associations it owed its importance at the time of the Domesday survey, when St Petrock held the manor of Bodmin, wherein were sixty-eight houses and one market. To successive priors, as mesne lords, it also owed its earliest municipal privileges. King John's charter to the prior and convent, dated the 17th of July 1199, contained a clause (subsequently cancelled by Richard II.) by which burgesses were exempt from being impleaded, touching any tenements in their demesne, except before the king and his chief justice. Richard of Cornwall, king of the Romans, confirmed to the burgesses their gild merchant, Edward I. the pesage of tin, and Edward II. a market for tin and wool. Queen Elizabeth in 1563 constituted the town a free borough and the burgesses a body corporate, granting at the same time two fairs and a Saturday market. There are still held also three other fairs whose origin is uncertain. An amended charter granted in 1594 remained in force until 1789, when the corporation became extinct owing to the diminution of the burgesses. By virtue of a new charter of incorporation granted in 1798 and remodelled by the act of 1835, the corporation now consists of a mayor, four aldermen and twelve councillors. The first members for Bodmin were summoned in 1295. Retaining both its members in 1832, losing one in 1868 and the other in 1885, it has now become merged in the south-eastern division of the county. From 1715 to 1837 the assizes were generally held alternately at Launceston and Bodmin; since 1837 they have been held at Bodmin only. A court of probate has also been held at Bodmin since 1773. A festival known as "Bodmin Riding" was formerly celebrated here on the Sunday and Monday following St Thomas's day (July 7). It is thought by some to have been instituted in 1177 to celebrate the recovery of the bones of St Petrock.

See *Victoria County History, Cornwall*; John Maclean, *Parochial and Family History of the Deanery of Trigg Minor, Cornwall* (3 vols., 1873-1879).

BODÖ, a seaport on the north-western coast of Norway, in Nordland *amt* (county), lat. 67° 17′ N. Pop. (1900) 4827. The rock-bound harbour admits large vessels, and there is a brisk trade in fish and eider-down. The neighbouring country has many scenic attractions. Sixty miles inland (E.) rises the great massif of Sulitelma on the Swedish frontier, with its copper mines, broad snow-fields and glaciers. The fjords of the district include the imposing Beierenfjord, the Saltenfjord, and the Skjerstadfjord, at the narrow mouths of which, between islands, a remarkable cataract (Saltström) is formed at the turn of the tide. On this fjord is Skjerstad, a large scattered village.

BODONI, GIAMBATTISTA (1740-1813), Italian printer, was born in 1740 at Saluzzo in Piedmont, where his father owned a printing establishment. While yet a boy he began to engrave on wood. He at length went to Rome, and there became a compositor for the press of the Propaganda. He made himself acquainted with the Oriental languages, and thus was enabled to render essential service to the Propaganda press, by restoring and accurately distributing the types of several Oriental alphabets which had fallen into disorder. The infante Don Ferdinand, afterwards duke of Parma, having established, about 1760, a printing-house on the model of those in Paris, Madrid and Turin, Bodoni was placed at the head of this establishment, which he soon rendered the first of the kind in Europe. The beauty of his typography, &c., leaves nothing further to be desired; but the intrinsic value of his editions is seldom equal to their outward splendour. His Homer, however, is a truly magnificent work; and, indeed, his Greek letters are faultless imitations of the best Greek manuscript. His editions of the Greek, Latin, Italian and French classics are all highly prized for their typographical elegance, and some of them are not less remarkable for their accuracy. Bodoni died at Padua in 1813. In 1818 a magnificent work appeared in two volumes quarto, entitled *Manuale Tipografico*, containing specimens of the vast collection of types which had belonged to him.

See De Lama, *Vita del Cavaliere Giambattista Bodoni* (1816).

BODY-SNATCHING, the secret disinterring of dead bodies in churchyards in order to sell them for the purpose of dissection. Those who practised body-snatching were frequently called resurrectionists or resurrection-men. Previous to the passing of the Anatomy Act 1832 (see ANATOMY: *History*), no licence was required in Great Britain for opening an anatomical school, and there was no provision for supplying subjects to students for anatomical purposes. Therefore, though body-snatching was a misdemeanour at common law, punishable with fine and imprisonment, it was a sufficiently lucrative business to run the risk of detection. Body-snatching became so prevalent that it was not unusual for the relatives and friends of a deceased person to watch the grave for some time after burial, lest it should be violated. Iron coffins, too, were frequently used for burial, or the graves were protected by a framework of iron bars called *mortsafes*, well-preserved examples of which may still be seen in Greyfriars' churchyard, Edinburgh.

For a detailed history of body-snatching, see *The Diary of a Resurrectionist*, edited by J.B. Bailey (London, 1896), which also contains a full bibliography and the regulations in force in foreign countries for the supply of bodies for anatomical purposes.

BOECE (or BOYCE), **HECTOR** (c. 1465-c. 1536), Scottish historian, was born at Dundee about the year 1465, being descended of a family which for several generations had possessed the barony of Panbride in Forfarshire. He received his early education at Dundee, and completed his course of study in the university of Paris, where he took the degree of B.D. He was appointed regent, or professor, of philosophy in the college of Montaigu; and there he was a contemporary of Erasmus, who in two epistles has spoken of him in the highest terms. When William Elphinstone, bishop of Aberdeen, was laying his plans for the foundation of the university of Aberdeen (King's College) he made Boece his chief adviser; and the latter was persuaded, after receipt of the papal bull erecting the university (1494), to be the first principal. He was in Aberdeen about 1500 when lectures began in the new buildings, and he appears to have been well received by the canons of the cathedral, several of whom he has commemorated as men of learning. It was a part of his duty as principal to read lectures on divinity.

The emoluments of his office were poor, but he also enjoyed the income of a canonry at Aberdeen and of the vicarage of Tullynessle. Under the date of 14th July 1527, we find a "grant to Maister Hector" of an annual pension of £50, to be paid by the sheriff of Aberdeen out of the king's casualties; and on the 26th of July 1529 was issued a "precept for a lettre to Mr Hector Boys, professor of theology, of a pension of £50 Scots yearly, until the king promote him to a benefice of 100 marks Scots of yearly value; the said pension to be paid him by the custumars of Aberdeen." In 1533 and 1534, one-half of his pension was, however, paid by the king's treasurer, and the other half by the comptroller; and as no payment subsequent to that of Whitsuntide 1534 has been traced in the treasurer's accounts, he is supposed to have obtained the benefice soon after that period. This benefice was the rectorship of Tyrie.

In 1528, soon after the publication of his history, Boece received the degree of D.D. at Aberdeen; and on this occasion the magistrates voted him a present of a tun of wine when the new wines should arrive, or, according to his option, the sum of £20 to purchase bonnets. He appears to have survived till the year 1536; for on the 22nd of November in that year, the king presented John Garden to the rectory of Tyrie, vacant by the death of "Mr Hector Boiss." He died at Aberdeen, and was buried before the high altar at King's College, beside the tomb of his patron Bishop Elphinstone.

His earliest publication, *Episcoporum Murthlacensium et Aberdonensium per Hectorem Boetium Vitae*, was printed at the press of Jodocus Badius (Paris, 1522). The notices of the early prelates are of little value, but the portion of the book in which he speaks of Bishop Elphinstone is of enduring merit. Here we likewise find an account of the foundation and constitution of the college, together with some notices of its earliest members. His fame rests chiefly on his *History of Scotland*, published in 1527 under the title *Scotorum Historiae a prima gentis origine cum aliarum et rerum et gentium illustratione non vulgari*. This edition contains seventeen books. Another edition, containing the eighteenth book and a fragment of the nineteenth, was published by Ferrerius, who has added an appendix of thirty-five pages (Paris, 1574).

The composition of the history displays much ability; but Boece's imagination was, however, stronger than his judgment: of the extent of the historian's credulity, his narrative exhibits many unequivocal proofs; and of deliberate invention or distortion of facts not a few, though the latter are less flagrant and intentional than early 19th-century criticism has assumed. He professed to have obtained from the monastery of Icolmkill, through the good offices of the earl of Argyll, and his brother, John Campbell of Lundy, the treasurer, certain original historians of Scotland, and among the rest Veremundus, of whose writings not a single vestige is now to be found. In his dedication to the king he is pleased to state that Veremundus, a Spaniard by birth, was archdeacon of St Andrews, and that he wrote in Latin a history of Scotland from the origin of the nation to the reign of Malcolm III., to whom he inscribed his work. His propensity to the marvellous was at an early period exposed in the following verses by Leland:—

"Hectoris historici tot quot mendacia scripsit
Si vis ut numerem, lector amice, tibi,
Me jubeas etiam fluctus numerare marinos
Et liquidi Stellas connumerare poli."

Boece's *History of Scotland* was translated into Scottish prose by John Bellenden, and into verse by William Stewart. *The Lives of the Bishops* was reprinted for the Bannatyne Club, Edin., 1825, in a limited edition of sixty copies. A commonplace verse-rendering of the *Life of*

Bishop Elphinstone, which was written by Alexander Gardyne in 1619, remains in MS. There is no modern edition of the history, though the versions of Bellenden and Stewart have been edited.

BOEHM, SIR JOSEPH EDGAR, Bart. (1834-1890), British sculptor, was born of Hungarian parentage on the 4th of July 1834 at Vienna, where his father was director of the imperial mint. After studying the plastic art in Italy and at Paris, he worked for a few years as a medallist in his native city. After a further period of study in England, he was so successful as an exhibitor at the Exhibition of 1862 that he determined to abandon the execution of coins and medals, and to give his mind to portrait busts and statuettes, chiefly equestrian. The colossal statue of Queen Victoria, executed in marble (1869) for Windsor Castle, and the monument of the duke of Kent in St George's chapel, were his earliest great works, and so entirely to the taste of his royal patrons that he rose rapidly in favour with the court. He was made A.R.A. in 1878, and produced soon afterwards the statue of Carlyle on the Thames embankment at Chelsea. In 1881 he was appointed sculptor in ordinary to the queen, and in the ensuing year became full Academician. On the death of Dean Stanley, Boehm was commissioned to execute his sarcophagus in Westminster Abbey, and his achievement, a recumbent statue, has been pronounced to be one of the best portraits in modern sculpture. Less successful was his monument to General Gordon in St Paul's cathedral. He executed the equestrian statue of the duke of Wellington at Hyde Park Corner, and designed the coinage for the Jubilee of Queen Victoria in 1887. Among his ideal subjects should be noted the "Herdsman and Bull." He died suddenly in his studio at South Kensington on the 12th of December 1890.

BOEHM VON BAWERK, EUGEN (1851-), Austrian economist and statesman, was born at Brünn on the 12th of February 1851. Entering the Austrian department of finance in 1872, he held various posts until 1880, when he became qualified as a teacher of political economy in the university of Vienna. The following year, however, he transferred his services to the university of Innsbruck, where he became professor in 1884. In 1889 he became councillor in the ministry of finance, and represented the government in the Lower House on all questions of taxation. In 1895 and again in 1897-1898 he was minister of finance. In 1899 he was made a member of the Upper House, and in 1900 again became minister of finance. One of the leaders of the Austrian school of economists, he has made notable criticisms on the theory of value in relation to cost as laid down by the "classical school." His more important works are *Kapital und Kapitalzins* (Innsbruck, 1884-1889), in two parts, translated by W. Smart, viz. *Capital and Interest* (part i., 1890), and *The Positive Theory of Capital* (part ii., 1891); *Karl Marx and the Close of his System* (trans. A.M. Macdonald, 1898); *Recent Literature on Interest* (trans. W.A. Scott and S. Feilbogen, 1903).

BOEHME (or Behmen), **JAKOB** (1575-1624), German mystical writer, whose surname (of which Fechner gives eight German varieties) appears in English literature as Beem, Behmont, &c., and notably Behmen, was born at Altseidenberg, in Upper Lusatia, a straggling hamlet among the hills, some 10 m. S.E. of Görlitz. His father was a well-to-do peasant, and his first employment was that of herd boy on the Landskrone, a hill in the neighbourhood of Görlitz; the only education he received was at the town-school of Seidenberg, a mile from his home. Seidenberg, to this day, is filled with shoemakers, and to a shoemaker Jakob was apprenticed in his fourteenth year (1589), being judged not robust enough for husbandry. Ten years later (1599) we find him settled at Görlitz as master-shoemaker, and married to Katharina, daughter of Hans Kuntzschmann, a thriving butcher

in the town. After industriously pursuing his vocation for ten years, he bought (1610) the substantial house, which still preserves his name, close by the bridge, in the Neiss-Vorstadt. Two or three years later he gave up business, and did not resume it as a shoemaker; but for some years before his death he made and sold woollen gloves, regularly visiting Prague fair for this purpose.

Boehme's authorship began in his 37th year (1612) with a treatise, *Aurora, oder die Morgenröte im Aufgang*, which though unfinished was surreptitiously copied, and eagerly circulated in MS. by Karl von Ender. This raised him at once out of his homely sphere, and made him the centre of a local circle of liberal thinkers, considerably above him in station and culture. The charge of heresy was, however, soon directed against him by Gregorius Richter, then pastor primarius of Görlitz. Feeling ran so high after Richter's pulpit denunciations, that, in July 1613, the municipal council, fearing a disturbance of the peace, made a show of examining Boehme, took possession of his fragmentary quarto, and dismissed the writer with an admonition to meddle no more with such matters. For five years he obeyed this injunction. But in 1618 began a second period of authorship; he poured forth, but did not publish, treatise after treatise, expository and polemical, in the next and the two following years. In 1622 he composed nothing but a few short pieces on true repentance, resignation, &c., which, however, devotionally speaking, are the most precious of all his writings. They were the only pieces offered to the public in his lifetime and with his permission, a fact which is evidence of the essentially religious and practical character of his mind. Their publication at Görlitz, on New Year's day 1624, under the title of *Der Weg zu Christo*, was the signal for renewed clerical hostility. Boehme had by this time entered on the third and most prolific though the shortest period (1623-1624) of his speculation. His labours at the desk were interrupted in May 1624 by a summons to Dresden, where his famous "colloquy" with the Upper Consistorial court was made the occasion of a flattering but transient ovation on the part of a new circle of admirers. Richter died in August 1624, and Boehme did not long survive his pertinacious foe. Seized with a fever when away from home, he was with difficulty conveyed to Görlitz. His wife was at Dresden on business; and during the first week of his malady he was nursed by a literary friend. He died, after receiving the rites of the church, grudgingly administered by the authorities, on Sunday, the 17th of November.

Boehme always professed that a direct inward opening or illumination was the only source of his speculative power. He pretended to no other revelation. Ecstatic raptures we should not expect, for he was essentially a Protestant mystic. No "thus saith the Lord" was claimed as his warrant, after the manner of Antoinette Bourignon, or Ludowick Muggleton; no spirits or angels held converse with him as with Swedenborg. It is needless to dwell, in the way either of acceptance or rejection, on the very few occasions in which his outward life seemed to him to come into contact with the invisible world. The apparition of the pail of gold to the herd boy on the Landskrone, the visit of the mysterious stranger to the young apprentice, the fascination of the luminous sheen, reflected from a common pewter dish, which first, in 1600, gave an intuitive turn to his meditations, the heavenly music which filled his ears as he lay dying—none of these matters is connected organically with the secret of his special power. The mysteries of which he discoursed were not reported to him: he "beheld" them. He saw the root of all mysteries, the *Ungrund* or *Urgrund*, whence issue all contrasts and discordant principles, hardness and softness, severity and mildness, sweet and bitter, love and sorrow, heaven and hell. These he "saw" in their origin; these he attempted to describe in their issue, and to reconcile in their eternal result. He saw into the being of God; whence the birth or going forth of the divine manifestation. Nature lay unveiled to him, he was at home in the heart of things. "His own book, which he himself was," the microcosm of man, with his threefold life, was patent to his vision. Such was his own account of his qualification. If he failed it was in expression; he confessed himself a poor mouthpiece, though he saw with a sure spiritual eye.

It must not be supposed that the form in which Boehme's pneumatic realism worked itself out in detail was shaped entirely from within. In his writings we trace the influence of Theophr. Bombast von Hohenheim, known as Paracelsus (1493-1541), of Kaspar Schwenkfeld (1490-1561), the first Protestant mystic, and of Valentin Weigel (1533-1588). From the school of Paracelsus came much of his puzzling phraseology,—his *Turba* and *Tinctur* and so forth,—a phraseology embarrassing to himself as well as to his readers. His friends plied him with foreign terms, which he was delighted to receive, interpreting them by an instinct, and using them often in a corrupted form and always in a sense of his own. Thus the word *Idea* called up before him the image of "a very fair, heavenly, and chaste virgin." The title *Aurora*, by which his earliest treatise is best known, was furnished by Dr Balthasar Walther. These, however, were false helps, which only serve to obscure a difficult

study, like the *Flagrat* and *Lubet*, with which his English translator veiled Boehme's own honest *Schreck* and *Lust*. There is danger lest his crude science and his crude philosophical vocabulary conceal the fertility of Boehme's ideas and the transcendent greatness of his religious insight. Few will take the pains to follow him through the interminable account of his seven *Quellgeister*, which remind us of Gnosticism; or even of his three first properties of eternal nature, in which his disciples find Newton's formulae anticipated, and which certainly bear a marvellous resemblance to the three ἀρχαί of Schelling's *Theogonische Natur*. Boehme is always greatest when he breaks away from his fancies and his trammels, and allows speech to the voice of his heart. Then he is artless, clear and strong; and no man can help listening to him, whether he dive deep down with the conviction "ohne Gift und Grimm kein Leben," or rise with the belief that "the being of all beings is a wrestling power," or soar with the persuasion that Love "in its height is as high as God." The mystical poet of Silesia, Angelus Silesius, discerned where Boehme's truest power lay when he sang —

> "Im Wasser lebt der Fisch, die Pflanze in der Erden,
> Der Vogel in der Luft, die Sonn' am Firmament,
> Der Salamander muss im Feu'r erhalten werden,
> Und Gottes Herz ist Jakob Böhme's Element."

The three periods of Boehme's authorship constitute three distinct stages in the development of his philosophy. He himself marks a threefold division of his subject-matter:— 1. Philosophia, *i.e.* the pursuit of the divine *Sophia*, a study of God in himself; this was attempted in the *Aurora*. 2. Astrologia, *i.e.*, in the largest sense, cosmology, the manifestation of the divine in the structure of the world and of man; hereto belong, with others, *Die drei Principien göttlichen Wesens; Vom dreifachen Leben der Menschen; Von der Menschwerdung Christi;, Von der Geburt und Bezeichnung alter Wesen* (known as *Signatura Rerum*). 3. Theologia, *i.e.*, in Scougall's phrase, "the life of God in the soul of man." Of the speculative writings under this head the most important are *Von der Gnadenwahl; Mysterium Magnum* (a spiritual commentary on Genesis); *Von Christi Testamenten* (the Sacraments).

Although Boehme's philosophy is essentially theological, and his theology essentially philosophical, one would hardly describe him as a philosophical theologian; and, indeed, his position is not one in which either the philosopher or the theologian finds it easy to make himself completely at home. The philosopher finds no trace in Boehme of a conception of God which rests its own validity on an accord with the highest canons of reason or of morals; it is in the actual not in the ideal that Boehme seeks God, whom he discovers as the spring of natural powers and forces, rather than as the goal of advancing thought. The theologian is staggered by a language which breaks the fixed association of theological phrases, and strangely reversing the usual point of view, characteristically pictures God as underneath rather than above. Nature rises out of Him; we sink into Him. The *Ungrund* of the unmanifested Godhead is boldly represented in the English translations of Boehme by the word *Abyss*, in a sense altogether unexplained by its Biblical use. In the *Theologia Germanica* this tendency to regard God as the *substantia*, the underlying ground of all things, is accepted as a foundation for piety; the same view, when offered in the colder logic of Spinoza, is sometimes set aside as atheistical. The procession of spiritual forces and natural phenomena out of the *Ungrund* is described by Boehme in terms of a threefold manifestation, commended no doubt by the constitution of the Christian Trinity, but exhibited in a form derived from the school of Paracelsus. From Weigel he learned a purely idealistic explanation of the universe, according to which it is not the resultant of material forces, but the expression of spiritual principles. These two explanations were fused in his mind till they issued forth as equivalent forms of one and the same thought. Further, Schwenkfeld supplied him with the germs of a transcendental exegesis, whereby the Christian Scriptures and the dogmata of Lutheran orthodoxy were opened up in harmony with his new-found views. Thus equipped, Boehme's own genius did the rest. A primary effort of Boehme's philosophy is to show how material powers are substantially one with moral forces. This is the object with which he draws out the dogmatic scheme which dictates the arrangement of his seven *Quellgeister*. Translating Boehme's thought out of the uncouth dialect of material symbols (as to which one doubts sometimes whether he means them as concrete instances, or as pictorial illustrations, or as a mere *memoria technica*), we find that Boehme conceives of the correlation of two triads of forces. Each triad consists of a thesis, an antithesis and a synthesis; and the two are connected by an important link. In the hidden life of the Godhead, which is at once *Nichts* and *Alles*, exists the original triad, viz.

Attraction, Diffusion, and their resultant, the Agony of the unmanifested Godhead. The transition is made; by an act of will the divine Spirit comes to Light; and immediately the manifested life appears in the triad of Love, Expression, and their resultant, Visible Variety. As the action of contraries and their resultant are explained the relations of soul, body and spirit; of good, evil and free will; of the spheres of the angels, of Lucifer, and of this world. It is a more difficult problem to account on this philosophy for the introduction of evil. Boehme does not resort to dualism, nor has he the smallest sympathy with a pantheistic repudiation of the fact of sin. That the difficulty presses him is clear from the progressive changes in his attempted solution of the problem. In the *Aurora* nothing save good proceeds from the *Ungrund*, though there is good that abides and good that fall;—Christ and Lucifer. In the second stage of his writing the antithesis is directly generated as such; good and its contrary are coincidently given from the one creative source, as factors of life and movement; while in the third period evil is a direct outcome of the primary principle of divine manifestation—it is the wrath side of God. Corresponding to this change we trace a significant variation in the moral end contemplated by Boehme as the object of this world's life and history. In the first stage the world is created in remedy of a decline; in the second, for the adjustment of a balance of forces; in the third, to exhibit the eternal victory of good over evil, of love over wrath.

Editions of Boehme's works were published by H. Betke (Amsterdam, 1675); by J.G. Gichtel (Amsterdam, 1682-1683, 10 vols.); by K.W. Schiebler (Leipzig, 1831-1847, 7 vols.). Translations of sundry treatises have been made into Latin (by J.A. Werdenhagen, 1632), Dutch (complete, by W. v. Bayerland, 1634-1641), and French (by Jean Macle, *c*. 1640, and L.C. de Saint-Martin, 1800-1809). Between 1644 and 1662 all Boehme's works were translated by John Ellistone (d. 1652) and John Sparrow, assisted by Durand Hotham and Humphrey Blunden, who paid for the undertaking. At that time regular societies of *Behmenists*, embracing not only the cultivated but the vulgar, existed in England and in Holland. They merged into the Quaker movement, holding already in common with Friends that salvation is nothing short of the very presence and life of Christ in the believer, and only kept apart by an objective doctrine of the sacraments which exposed them to the polemic of Quakers (*e.g.* J. Anderdon). Muggleton led an anthropomorphic reaction against them, and between the two currents they were swept away. The Philadelphian Society at the beginning of the 18th century consisted of cultured mystics, Jane Lead, Pordage, Francis Lee, Bromley, &c., who fed upon Boehme. William Law (1686-1761) somewhat later recurred to the same spring, with the result, however, in those dry times of bringing his own good sense into question rather than of reviving the credit of his author. After Law's death the old English translation was in great part re-edited (4 vols., 1762-1784) as a tribute to his memory, by George Ward and Thomas Langcake, with plates from the designs of D.A. Freher (Brit. Mus. Add. MSS. 5767-5794). This forms what is commonly called Law's translation; to complete it a 5th vol. (12mo, Dublin, 1820) is needed.

See also J. Hambetger, *Die Lehre des deutschen Philosophen J. Boehmes* (1844); Alb. Peip, *J. Boehme der deutsche Philosoph* (1860); von Harless, *J. Boehme und die Alchimisten* (1870, 2nd ed. 1882). For Boehme's life see the *Memoirs* by Abraham von Frankenberg (d. 1652) and others, trans, by F. Okely (1870); La Motte Fouqué, *J. Boehm, ein biographischer Denkstein* (1831); H.A. Fechner, *J. Boehme, sein Leben und seine Schriften* (1857); H.L. Martensen, *J. Boehme, Theosophiske Studier* (Copenhagen, 1881; English trans. 1885); J. Claassen, *J. Boehme, sein Leben und seine theosophische Werke* (Güterslöh, 1885); P. Deussen, *J. Boehme, über sein Leben und seine Philosophie* (Kiel, 1897).

BOEOTIA, a district of central Greece, stretching from Phocis and Locris in the W. and N. to Attica and Megaris in the S. between the strait of Euboea and the Corinthian Gulf. This area, amounting in all to 1100 sq. m., naturally falls into two main divisions. In the north the basin of the Cephissus and Lake Copaïs lies between parallel mountain-walls continuing eastward the line of Parnassus in the extensive ridge of Helicon, the "Mountain of the Muses" (5470 ft.) and the east Locrian range in Mts. Ptoüm, Messapium and other smaller peaks. These ranges, which mostly lie close to the seaboard, form by their projecting spurs a narrow defile on the Phocian frontier, near the famous battlefield of Chaeroneia, and shut in Copaïs closely on the south between Coronea and Haliartus. The north-east barrier was pierced by underground passages (*katavothra*) which carried off the overflow from Copaïs. The southern portion of the land forms a plateau which slopes to Mt. Cithaeron, the frontier

range between Boeotia and Attica. Within this territory the low ridge of Teumessus separates the plain of Ismenus and Dirce, commanded by the citadel of Thebes, from the upland plain of the Asopus, the only Boeotian river that finds the eastern sea. Though the Boeotian climate suffered from the exhalations of Copaïs, which produced a heavy atmosphere with foggy winters and sultry summers, its rich soil was suited alike for crops, plantations and pasture; the Copaïs plain, though able to turn into marsh when the choking of the *katavothra* caused the lake to encroach, being among the most fertile in Greece. The central position of Boeotia between two seas, the strategic strength of its frontiers and the ease of communication within its extensive area were calculated to enhance its political importance. On the other hand the lack of good harbours hindered its maritime development; and the Boeotian nation, although it produced great men like Pindar, Epaminondas, Pelopidas and Plutarch, was proverbially as dull as its native air. But credit should be given to the people for their splendid military qualities: both their cavalry and heavy infantry achieved a glorious record.

In the mythical days Boeotia played a prominent part. Of the two great centres of legends, Thebes with its Cadmean population figures as a military stronghold, and Orchomenus, the home of the Minyae, as an enterprising commercial city. The latter's prosperity is still attested by its archaeological remains (notably the "Treasury of Minyas") and the traces of artificial conduits by which its engineers supplemented the natural outlets. The "Boeotian" population seems to have entered the land from the north at a date probably anterior to the Dorian invasion. With the exception of the Minyae, the original peoples were soon absorbed by these immigrants, and the Boeotians henceforth appear as a homogeneous nation. In historical times the leading city of Boeotia was Thebes, whose central position and military strength made it a suitable capital. It was the constant ambition of the Thebans to absorb the other townships into a single state, just as Athens had annexed the Attic communities. But the outlying cities successfully resisted this policy, and only allowed the formation of a loose federation which in early times seems to have possessed a merely religious character. While the Boeotians, unlike the Arcadians, generally acted as a united whole against foreign enemies, the constant struggle between the forces of centralization and disruption perhaps went further than any other cause to check their development into a really powerful nation. Boeotia hardly figures in history before the late 6th century. Previous to this its people is chiefly known as the producer of a type of geometric pottery similar to the Dipylon ware of Athens. About 519 the resistance of Plataea to the federating policy of Thebes led to the interference of Athens on behalf of the former; on this occasion, and again in 507, the Athenians defeated the Boeotian levy. During the Persian invasion of 480, while some of the cities fought whole-heartedly in the ranks of the patriots, Thebes assisted the invaders. For a time the presidency of the Boeotian League was taken away from Thebes, but in 457 the Spartans reinstated that city as a bulwark against Athenian aggression. Athens retaliated by a sudden advance upon Boeotia, and after the victory of Oenophyta brought under its power the whole country excepting the capital. For ten years the land remained under Athenian control, which was exercised through the newly installed democracies; but in 447 the oligarchic majority raised an insurrection, and after a victory at Coronea regained their freedom and restored the old constitutions. In the Peloponnesian War the Boeotians, embittered by the early conflicts round Plataea, fought zealously against Athens. Though slightly estranged from Sparta after the peace of Nicias, they never abated their enmity against their neighbours. They rendered good service at Syracuse and Arginusae; but their greatest achievement was the decisive victory at Delium over the flower of the Athenian army (424), in which both their heavy infantry and their cavalry displayed unusual efficiency.

About this time the Boeotian League comprised eleven groups of sovereign cities and associated townships, each of which elected one Boeotarch or minister of war and foreign affairs, contributed sixty delegates to the federal council at Thebes, and supplied a contingent of about a thousand foot and a hundred horse to the federal army. A safeguard against undue encroachment on the part of the central government was provided in the councils of the individual cities, to which all important questions of policy had to be submitted for ratification. These local councils, to which the propertied classes alone were eligible, were subdivided into four sections, resembling the *prytaneis* of the Athenian council, which took it in turns to take previous cognizance of all new measures.[1]

Boeotia took a prominent part in the war of the Corinthian League against Sparta, especially at Haliartus and Coronea (395-394). This change of policy seems due mainly to the national resentment against foreign interference. Yet disaffection against Thebes was now growing rife, and Sparta fostered this feeling by stipulating for the complete independence of all the cities in the peace of Antalcidas (387). In 374 Pelopidas restored the

Theban dominion. Boeotian contingents fought in all the campaigns of Epaminondas, and in the later wars against Phocis (356-346); while in the dealings with Philip of Macedon the federal cities appear merely as the tools of Thebes. The federal constitution was also brought into accord with the democratic governments now prevalent throughout the land. The sovereign power was vested in the popular assembly, which elected the Boeotarchs (between seven and twelve in number), and sanctioned all laws. After the battle of Chaeroneia, in which the Boeotian heavy infantry once again distinguished itself, the land never rose again to prosperity. The destruction of Thebes by Alexander (335) seems to have paralysed the political energy of the Boeotians, though it led to an improvement in the federal constitution, by which each city received an equal vote. Henceforth they never pursued an independent policy, but followed the lead of protecting powers. Though the old military training and organization continued, the people proved unable to defend the frontiers, and the land became more than ever the "dancing-ground of Ares." Though enrolled for a short time in the Aetolian League (about 245 B.C.) Boeotia was generally loyal to Macedonia, and supported its later kings against Rome. In return for the excesses of the democracies Rome dissolved the league, which, however, was allowed to revive under Augustus, and merged with the other central Greek federations in the Achaean synod. The death-blow to the country's prosperity was given by the devastations during the first Mithradatic War.

Save for a short period of prosperity under the Frankish rulers of Athens (1205-1310), who repaired the *katavothra* and fostered agriculture, Boeotia long continued in a state of decay, aggravated by occasional barbarian incursions. The first step towards the country's recovery was not until 1895, when the outlets of Copaïs were again put into working order. Since then the northern plain has been largely reclaimed for agriculture, and the natural riches of the whole land are likely to develop under the influence of the railway to Athens. Boeotia is at present a Nomos with Livadia (the old Turkish capital) for its centre; the other surviving townships are quite unimportant. The population (65,816 in 1907) is largely Albanian.

AUTHORITIES.—Thuc. iv. 76-101; Xenophon, *Hellenica*, iii.-vii.; Strabo, pp. 400-412; Pausanias ix.; Theopompus (or Cratippus) in the *Oxyrhynchus Papyri*, vol. v. (London, 1908), No. 842, col. 12; W.M. Leake, *Travels in Northern Greece*, chs. xi.-xix. (London, 1835); H.F. Tozer, *Geography of Greece* (London, 1873), pp. 233-238; W. Rhys Roberts, *The Ancient Boeotians* (Cambridge, 1895); E.A. Freeman. *Federal Government* (ed. 1893, London), ch. iv. § 2; B.V. Head, *Historia Numorum*, pp. 291 sqq. (Oxford, 1887); W. Larfeld, *Sylloge Inscriptionum Boeoticarum* (Berlin, 1883). (See also THEBES.)

1 Thucydides (v. 38), in speaking of the "four councils of the Boeotians," is referring to the plenary bodies in the various states.

BOER, the Dutch form of the Eng. "boor," in its original signification of husbandman (Ger. *Bauer*), a name given to the Dutch farmers of South Africa, and especially to the Dutch population of the Transvaal and Orange River States. (See SOUTH AFRICA and TRANSVAAL.)

BOERHAAVE, HERMANN (1668-1738), Dutch physician and man of science, was born at Voorhout near Leiden on the 31st of December 1668. Entering the university of Leiden he took his degree in philosophy in 1689, with a dissertation *De distinctione mentis a corpore*, in which he attacked the doctrines of Epicurus, Hobbes and Spinoza. He then turned to the study of medicine, in which he graduated in 1693 at Harderwyck in Guelderland. In 1701 he was appointed lecturer on the institutes of medicine at Leiden; in his inaugural discourse, *De commendando Hippocratis studio*, he recommended to his pupils that great physician as their model. In 1709 he became professor of botany and medicine, and in that capacity he did good service, not only to his own university, but also to botanical science, by his improvements and additions to the botanic garden of Leiden, and by the publication of numerous works descriptive of new species of plants. In 1714, when he was appointed

rector of the university, he succeeded Govert Bidloo (1649-1713) in the chair of practical medicine, and in this capacity he had the merit of introducing the modern system of clinical instruction. Four years later he was appointed also to the chair of chemistry. In 1728 he was elected into the French Academy of Sciences, and two years later into the Royal Society of London. In 1729 declining health obliged him to resign the chairs of chemistry and botany; and he died, after a lingering and painful illness, on the 23rd of September 1738 at Leiden. His genius so raised the fame of the university of Leiden, especially as a school of medicine, that it became a resort of strangers from every part of Europe. All the princes of Europe sent him disciples, who found in this skilful professor not only an indefatigable teacher, but an affectionate guardian. When Peter the Great went to Holland in 1715, to instruct himself in maritime affairs, he also took lessons from Boerhaave. His reputation was not confined to Europe; a Chinese mandarin wrote him a letter directed “To the illustrious Boerhaave, physician in Europe,” and it reached him in due course.

His principal works are—*Institutiones medicae* (Leiden, 1708); *Aphorismi de cognoscendis et curandis morbis* (Leiden, 1709), on which his pupil and assistant, Gerard van Swieten (1700-1772) published a commentary in 5 vols.; and *Elementa chemiae* (Paris, 1724).

BOETHUS, a sculptor of the Hellenistic age, a native of Carthage (or possibly Chalcedon). His date cannot be accurately fixed, but was probably the 2nd century B.C. He was noted for his representations of children, in dealing with whom earlier Greek art had not been very successful; and especially for a group representing a boy struggling with a goose, of which several copies survive in museums.

BOETIUS (or BOETHIUS), **ANICIUS MANLIUS SEVERINUS** (*c.* A.D. 480-524), Roman philosopher and statesman, described by Gibbon as “the last of the Romans whom Cato or Tully could have acknowledged for their countryman.” The historians of the day give us but imperfect records or make unsatisfactory allusions. Later chroniclers indulged in the fictitious and the marvellous, and it is almost exclusively from his own books that trustworthy information can be obtained. There is considerable diversity among authorities as to his name. One editor of his *De Consolatione*, Bertius, thinks that he bore the praenomen of Flavius, but there is no authority for this supposition. His father was Flavius Manlius Boetius, and it is probable that the Flavius Boetius, the praetorian prefect who was put to death in A.D. 455 by order of Valentinian III., was his grandfather, but these facts do not prove that he also had the praenomen of Flavius. Many of the earlier editions inserted the name of Torquatus, but it is not found in any of the best manuscripts. The last name is commonly written Boethius, from the idea that it is connected with the Greek βοηθος; but the best manuscripts agree in reading Boetius.

His boyhood was spent in Rome during the reign of Odoacer. We know nothing of his early years. A passage in a treatise falsely ascribed to him (*De Disciplina Scholarium*) and a misinterpretation of a passage in Cassiodorus led early scholars to suppose that he spent some eighteen years in Athens pursuing his studies, but there is no foundation for this opinion. His father, consul in 487, seems to have died soon after; for Boetius states that, when he was bereaved of his parent, men of the highest rank took him under their charge (*De Con*. lib. ii. c. 3), especially the senator Q. Aur. Memmius Symmachus, whose daughter Rusticiana he married. By her he had two sons, Anicius Manlius Severinus Boetius and Q. Aurelius Memmius Symmachus. He became a favourite with Theodoric, the Ostrogoth, who ruled in Rome from 500, and was one of his intimate friends. Boetius was consul in 510, and his sons, while still young, held the same honour together (522). Boetius regarded it as the height of his good fortune when he witnessed his two sons, consuls at the same time, convoyed from their home to the senate-house amid the enthusiasm of the masses. On that day, he tells us, while his sons occupied the curule chairs in the senate-house, he himself had the honour of pronouncing a panegyric on the monarch. But his good fortune did not last, and he attributes the calamities that came upon him to the ill-will which his bold

maintenance of justice had caused, and to his opposition to every oppressive measure. Of this he mentions particular cases. A famine had begun to rage. The prefect of the praetorium was determined to satisfy the soldiers, regardless altogether of the feelings of the provincials. He accordingly issued an edict for a *coemptio*, that is, an order compelling the provincials to sell their corn to the government, whether they would or not. This edict would have utterly ruined Campania. Boetius interfered. The case was brought before the king, and Boetius succeeded in averting the *coemptio* from the Campanians. And he gives as a crowning instance that he exposed himself to the hatred of the informer Cyprianus by preventing the punishment of Albinus, a man of consular rank. He mentions in another place that when at Verona the king was anxious to transfer the accusation of treason brought against Albinus to the whole senate, he defended the senate at great risk. In consequence of the ill-will that Boetius had thus roused, he was accused of treason towards the end of the reign of Theodoric. The charges were that he had conspired against the king, that he was anxious to maintain the integrity of the senate, and to restore Rome to liberty, and that for this purpose he had written to the emperor Justin. Justin had, no doubt, special reasons for wishing to see an end to the reign of Theodoric. Justin was orthodox, Theodoric was an Arian. The orthodox subjects of Theodoric were suspicious of their ruler; and many would gladly have joined in a plot to displace him. The knowledge of this fact may have rendered Theodoric suspicious. But Boetius denied the accusation in unequivocal terms. He did indeed wish the integrity of the senate. He would fain have desired liberty, but all hope of it was gone. The letters addressed by him to Justin were forgeries, and he had not been guilty of any conspiracy. Notwithstanding his innocence he was condemned and sent to Ticinum (Pavia) where he was thrown into prison. It was during his confinement in this prison that he wrote his famous work *De Consolatione Philosophiae*. His goods were confiscated, and after an imprisonment of considerable duration he was put to death in 524. Procopius relates that Theodoric soon repented of his cruel deed, and that his death, which took place soon after, was hastened by remorse for the crime he had committed against his great counsellor.

Two or three centuries after the death of Boetius writers began to view his death as a martyrdom. Several Christian books were ascribed to him, and there was one especially on the Trinity (see below) which was regarded as proof that he had taken an active part against the heresy of Theodoric. It was therefore for his orthodoxy that Boetius was put to death. And these writers delight to paint with minuteness the horrible tortures to which he was exposed and the marvellous actions which the saint performed at his death. He was locally regarded as a saint, but he was not canonized. The brick tower in Pavia in which he was confined was, and still is, an object of reverence to the country people. Finally, in the year 996, Otho III. ordered the bones of Boetius to be taken out of the place in which they had lain hid, and to be placed in the church of S. Pietro in Ciel d’Oro within a splendid tomb, for which Gerbert, afterwards Pope Silvester II., wrote an inscription. Thence they were subsequently removed to a tomb beneath the high altar of the cathedral. It should be mentioned also that some have given him a decidedly Christian wife, of the name of Elpis, who wrote hymns, two of which are still extant (Daniel, *Thes. Hymn.* i. p. 156). This is a pure supposition inconsistent with chronology, and based only on a misinterpretation of a passage in the *De Consolatione*.

The contemporaries of Boetius regarded him as a man of profound learning. Priscian the grammarian speaks of him as having attained the summit of honesty and of all sciences. Cassiodorus, *magister officiorum* under Theodoric and the intimate acquaintance of the philosopher, employs language equally strong, and Ennodius, the bishop of Pavia, knows no bounds for his admiration. Theodoric had a profound respect for his scientific abilities. He employed him in setting right the coinage. When he visited Rome with Gunibald, king of the Burgundians, he took him to Boetius, who showed them, amongst other mechanical contrivances, a sun-dial and a water-clock. The foreign monarch was astonished, and, at the request of Theodoric, Boetius had to prepare others of a similar nature, which were sent as presents to Gunibald.

The fame of Boetius increased after his death, and his influence during the middle ages was exceedingly powerful. His circumstances peculiarly favoured this influence. He appeared at a time when contempt for intellectual pursuits had begun to pervade society. In his early years he was seized with a passionate enthusiasm for Greek literature, and this continued through life. Even amidst the cares of the consulship he found time for commenting on the *Categories* of Aristotle. The idea laid hold of him of reviving the spirit of his countrymen by imbuing them with the thoughts of the great Greek writers. He formed the resolution to translate all the works of Aristotle and all the dialogues of Plato, and to reconcile the philosophy of Plato with that of Aristotle. He did not succeed in all that he designed; but he did a great part of his work. He translated into Latin Aristotle’s *Analytica*

Priora et Posteriora, the *Topica*, and *Elenchi Sophistici*; and he wrote commentaries on Aristotle's *Categories*, on his book περὶ ἑρμηνείας, also a commentary on the *Isagoge* of Porphyrius. These works formed to a large extent the source from which the middle ages derived their knowledge of Aristotle. (See Stahr, *Aristoteles bei den Römern*, pp. 196-234.) Boetius wrote also a commentary on the *Topica* of Cicero; and he was also the author of independent works on logic:—*Introductio ad Categoricos Syllogismos*, in one book; *De Syllogismis Categoricis*, in two books; *De Syllogismis Hypotheticis*, in two books; *De Divisione*, in one book; *De Definitione*, in one book; *De Differentiis Topicis*, in four books.

We see from a statement of Cassiodorus that he furnished manuals for the quadrivium of the schools of the middle ages (the "quattuor matheseos disciplinae," as Boetius calls them) on arithmetic, music, geometry and astronomy. The statement of Cassiodorus that he translated Nicomachus is rhetorical. Boetius himself tells us in his preface addressed to his father-in-law Symmachus that he had taken liberties with the text of Nicomachus, that he had abridged the work when necessary, and that he had introduced formulae and diagrams of his own where he thought them useful for bringing out the meaning. His work on music also is not a translation from Pythagoras, who left no writing behind him. But Boetius belonged to the school of musical writers who based their science on the method of Pythagoras. They thought that it was not sufficient to trust to the ear alone, to determine the principles of music, as did practical musicians like Aristoxenus, but that along with the ear, physical experiments should be employed. The work of Boetius is in five books and is a very complete exposition of the subject. It long remained a text-book of music in the universities of Oxford and Cambridge. It is still very valuable as a help in ascertaining the principles of ancient music, and gives us the opinions of some of the best ancient writers on the art. The manuscripts of the geometry of Boetius differ widely from each other. One editor, Godofredus Friedlein, thinks that there are only two manuscripts which can at all lay claim to contain the work of Boetius. He published the *Ars Geometriae*, in two books, as given in these manuscripts; but critics are generally inclined to doubt the genuineness even of these. Professor Rand, Georgius Ernst and A.P. McKinlay regard the *Ars* as certainly inauthentic, while they accept the *Interpretatio Euclidis* (see works quoted in bibliography).

By far the most important and most famous of the works of Boetius is his book *De Consolatione Philosophiae*. Gibbon justly describes it as "a golden volume, not unworthy of the leisure of Plato or Tully, but which claims incomparable merit from the barbarism of the times and the situation of the author." The high reputation it had in medieval times is attested by the numerous translations, commentaries and imitations of it which then appeared. Among others Asser, the instructor of Alfred the Great, and Robert Grosseteste, bishop of Lincoln, commented on it. Alfred translated it into Anglo-Saxon. Versions of it appeared in German, French, Italian, Spanish and Greek before the end of the 15th century. Chaucer translated it into English prose before the year 1382; and this translation was published by Caxton at Westminster, 1480. Lydgate followed in the wake of Chaucer. It is said that, after the invention of printing, amongst others Queen Elizabeth translated it, and that the work was well known to Shakespeare. It was the basis of the earliest specimen of Provençal literature.

> This famous work consists of five books. Its form is peculiar, and is an imitation of a similar work by Marcianus Capella, *De Nuptiis Philologiae et Mercurii*. It is alternately in prose and verse. The verse shows great facility of metrical composition, but a considerable portion of it is transferred from the tragedies of Seneca. The first book opens with a few verses, in which Boetius describes how his sorrows had brought him to a premature old age. As he is thus lamenting, a woman appears to him of dignified mien, whom he recognizes as his guardian, Philosophy. She, resolving to apply the remedy for his grief, questions him for that purpose. She finds that he believes that God rules the world, but does not know what he himself is; and this absence of self-knowledge is the cause of his weakness. In the second book Philosophy presents to Boetius Fortune, who is made to state to him the blessings he has enjoyed, and after that proceeds to discuss with him the kind of blessings that fortune can bestow, which are shown to be unsatisfactory and uncertain. In the third book Philosophy promises to lead him to true happiness, which is to be found in God alone, for since God is the highest good, and the highest good is true happiness, God is true happiness. Nor can real evil exist, for since God is all-powerful, and since he does not wish evil, evil must be non-existent. In the fourth book Boetius raises the question, Why, if the governor of the universe is good, do evils exist, and why is virtue often punished and vice rewarded? Philosophy proceeds to show that in fact vice is never unpunished nor virtue unrewarded. From this Philosophy passes into a discussion in regard to the nature of providence and fate, and shows that every fortune is good. The fifth and last book takes up the question of man's free will and God's foreknowledge, and, by an exposition of the nature of God, attempts to show that these doctrines are not subversive of each other; and the conclusion is drawn that God

remains a foreknowing spectator of all events, and the ever-present eternity of his vision agrees with the future quality of our actions, dispensing rewards to the good and punishments to the wicked.

Several theological works have been ascribed to Boetius, as has been already mentioned. The *Consolatio* affords conclusive proof that the author was not a practical believer in Christianity. The book contains expressions such as *daemones*, *angelica virtus*, and *purgatoria dementia*, which have been thought to be derived from the Christian faith; but they are used in a heathen sense, and are explained sufficiently by the circumstance that Boetius was on intimate terms with Christians. The writer nowhere finds consolation in any Christian belief, and Christ is never named in the work. It is not impossible, however, that Boetius may have been brought up a Christian, and that in his early years he may have written some Christian books. Peiper thinks that the first three treatises are the productions of the early years of Boetius. The first, *De Sancta Trinitate*, is addressed to Symmachus (Domino Patri Symmacho), and the result of the short discussion, which is of an abstract nature, and deals partly with the ten categories, is that unity is predicated absolutely, or, in regard to the substance of the Deity, trinity is predicated relatively. The second treatise is addressed to John the deacon ("Ad Joannem Diaconum"), and its subject is "Utrum Pater et Filius et Spiritus Sanctus de divinitate substantialiter praedicentur." This treatise is shorter than the first, occupying only two or three pages, and the conclusion of the argument is the same. The third treatise bears the title, *Quomodo substantiae in eo quod sint bonae sint cum non sint substantialia bona*. It contains nothing distinctly Christian, and it contains nothing of great value; therefore its authorship is a matter of little consequence. Peiper thinks that, as the best MSS. uniformly assign these treatises to Boetius, they are to be regarded as his; that it is probable that Symmachus and John (who afterwards became Pope) were the men of highest distinction who took charge of him when he lost his father; and that these treatises are the first-fruits of his studies, which he dedicates to his guardians and benefactors. He thinks that the variations in the inscriptions of the fifth treatise which is not found in the best manuscript, are so great that the name of Boetius could not have originally been in the title. The fourth book is also not found in the best manuscript, and two manuscripts have no inscription. He infers, from these facts, that there is no sure evidence for the authorship of the fourth and fifth treatises. The fifth treatise is *Contra Eutychen et Nestorium*. Both Eutyches and Nestorius are spoken of as living. A council is mentioned, in which a letter was read, expounding the opinion of the Eutychians for the first time. The novelty of the opinion is also alluded to. All these circumstances point to the council of Chalcedon (451). The treatise was therefore written before the birth of Boetius, if it be not a forgery; but there is no reason to suppose that the treatise was not a genuine production of the time to which it professes to belong. The fourth treatise, *De Fide Catholica*, does not contain any distinct chronological data; but the tone and opinions of the treatise produce the impression that it probably belonged to the same period as the treatise against Eutyches and Nestorius. Several inscriptions ascribe both these treatises to Boetius. It will be seen from this statement that Peiper bases his conclusions on grounds far too narrow; and on the whole it is perhaps more probable that Boetius wrote none of the four Christian treatises, particularly as they are not ascribed to him by any of his contemporaries. Three of them express in the strongest language the orthodox faith of the church in opposition to the Arian heresy, and these three put in unmistakable language the procession of the Holy Spirit from both Father and Son. The fourth argues for the orthodox belief of the two natures and one person of Christ. When the desire arose that it should be believed that Boetius perished from his opposition to the heresy of Theodoric, it was natural to ascribe to him works which were in harmony with this supposed fact. The works may really have been written by one Boetius, a bishop of Africa, as Jourdain supposes, or by some Saint Severinus, as Nitzsch conjectures, and the similarity of name may have aided the transference of them to the heathen or neutral Boetius.

Important and, if genuine, decisive evidence upon this point is afforded by a passage in the *Anecdoton Holderi*, a fragment contained in a 10th-century MS. (ed. H. Usener, Leipzig, 1877). The fragment gives an extract from a previously unknown letter of Cassiodorus, the important words being "Scripsit (*i.e.* Boetius) librum de sancta trinitate, et capita quaedam dogmatica, et librum contra Nestorium." Nitzsch, however, held that this was a copyist's gloss, harmonizing with the received Boetius legend, which had been transferred to the text, and did not consider that it outweighed the opposing internal evidence from *De Cons. Phil.*

EDITIONS.—The first collected edition of the works of Boetius was published at Venice in 1492 (Basel, 1570); the last in J.P. Migne's *Patrologia*, lxiii., lxiv. (Paris, 1847). Of the numerous editions of the *De Consolatione* the best are those of Theodorus Obbarius (Jena, 1843) and R. Peiper (Leipzig, 1871). The first contains prolegomena on the life and writings of Boetius, on his religion and philosophy, and on the manuscripts and editions, a critical apparatus, and notes. The text of the second was based on the fullest collation of MSS. up to that time, though a considerable number of MSS. still remained to be collated. In addition to

an account of the MSS. used, it gives the Book of Lupus, “De Metris Boetii,” the “Vita Boetii” contained in some MSS., “Elogia Boetii,” and a short list of the commentators, translators and imitators of the *Consolatio*. It contains also an account of the metres used by Boetius in the *Consolatio*, and a list of the passages which he has borrowed from the tragedies of Seneca. The work also includes the five treatises, four of them Christian, of which mention has been made above. King Alfred’s Anglo-Saxon version of the *De Consolatione*, with literal English translation, notes and glossary, was published by S. Fox (1835) and again by W.J. Sedgefield (1900); that of G. Colville (Colvile, Coldewel, 1556) was republished by E.B. Bax (1897); translation (mixed prose and verse) by H.R. James (1897). Queen Elizabeth’s “Englishings” was reprinted in 1899; on the style, see A. Engelbrecht in *Sitzungsber. der Wiener Akad. der Wissenschaften* (1902), pp. 15-36. The *De Institutione Arithmetica, De Institutione Musica*, and the doubtful *Geometria* (for which see G. Ernst, *De Geometricis illis quae sub Boethii nomine nobis tradita sunt quaestiones*, 1903; A.P. McKinlay in *Harvard Classical Studies*, 1907; M. Cantor, *Geschichte der Mathematik*, i., Leipzig, 1894; G. Friedlein, *Gerbert, die Geometric des Boethius, und die indischen Ziffern*, Erlangen, 1861, are edited by G. Friedlein (Leipzig, 1867); German translation of the *De Musica*, with explanatory notes, by O. Paul (Leipzig, 1872), and on the sources W. Miekley, *De Boethii libri de musica primi fontibus* (Jena, 1899). Commentary on Aristotle’s *De Interpretatione* περι ἑρμηνείας), ed. C. Meiser (Leipzig, 1877), and on Porphyry’s *Isagoge*, ed. S. Brandt (Vienna, 1906).

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BOG (from Ir. and Gael, *bogach, bog*, soft), a tract of soft, spongy, water-logged ground, composed of vegetation, chiefly mosses, in various stages of decomposition. This vegetable matter when partially decomposed forms the substance known as “peat” (*q.v.*). When the accumulation of water is rapidly increased by excessive rainfall, there is a danger of a “bog-slide,” or “bog-burst,” which may obliterate the neighbouring cultivated land with a deposit of the contents of the bog. Destructive bog-slides have occurred in Ireland, such as that of the Knocknageeha Bog, Rathmore, Kerry, in 1896, at Castlerea, Roscommon, 1901, and at Kilmore, Galway, 1909.

There is a French game of cards called “bog,” said to be of Italian origin, played with a piquet pack on a table with six divisions, one of which is known by the name of the game and forms the pool. It was fashionable during the Second Empire.

BOGATZKY, KARL HEINRICH VON (1690-1774), German hymn-writer, was born at Jankowe in Lower Silesia on the 7th of September 1690. At first a page at the ducal court of Saxe-Weissenfels, he next studied law and theology at Jena and Halle; but ill-health preventing his preferment he settled at Glancha in Silesia, where he founded an orphanage. After living for a time at Köstritz, and from 1740 to 1745 at the court of Christian Ernst, duke of Saxe-Coburg, at Saalfeld, he made his home at the Waisenhaus (orphanage) at Halle, where he engaged in spiritual work and in composing hymns and sacred songs, until his death on the 15th of June 1774. Bogatzky’s chief works are *Güldenes Schatzkästlein der*

Kinder Gottes (1718), which has reached more than sixty editions; and *Übung der Gottseligkeit in allerlei geistlichen Liedern* (1750).

See Bogatzky's autobiography—*Lebenslauf von ihm selbst geschrieben* (Halle, 1801; new ed., Berlin, 1872); and Ledderhose, *Das Leben Bogatzky's* (Heidelberg, 1846); also Kelly, *C.H. von Bogatzky's Life and Work* (London, 1889).

BOGHAZ KEUI, a small village in Asia Minor, north-west of Yuzgat in the Angora vilayet, remarkable for the ruins and rock-sculptures in its vicinity. The ruins are those of a ruling city of the oriental type which flourished in the pre-Greek period; and they are generally identified with Pteria (*q.v.*), a place taken by Croesus after he had crossed the Halys (Herodotus i. 76).

BOGIE, a northern English dialect word of unknown origin, applied to a kind of low truck or "trolly." In railway engineering it is applied to an under-truck, most frequently with four wheels, which is often provided at one end of a locomotive or both ends of a carriage. It is pivoted or swivelled on the main frames, so that it can turn relatively to the body of the vehicle or engine, and thus it enables the wheels readily to follow the curves of the line. It has no connexion with the series of words, such as "bogey" or "bogy," "bogle," "boggle," "bogart" (in Shakespeare "bug," "bugs and goblins"), which are probably connected with the Welsh *bwg*, a spectre; hence the verb to "boggle," properly applied to a horse which shies at supposed spectres, and so meaning to hesitate, bungle.

BOGNOR, a seaside resort in the Chichester parliamentary division of Sussex, England, 66 m. S.S.W. from London by the London, Brighton & South Coast railway. Pop. of urban district (1901) 6180. Besides the parish church there is a Roman Catholic priory and church. The town possesses a pier and promenade, a theatre, assembly rooms, and numerous convalescent homes, including an establishment belonging to the Merchant Taylors' Company. The church of the mother parish of South Bersted is Norman and Early English, and retains a fresco of the 16th century.

BOGÓ, a town of the province of Cebú, island of Cebú, Philippine Islands, on Bogó Bay at the mouth of the Bulac river, in the north-east part of the island. Pop. (1903) 14,915. The climate is hot but healthy. The surrounding country is fertile, producing sugar, Indian corn, and maguay in abundance; rice, cacao and fruits are also produced. Hats, baskets, cloths and rope are woven and are exported to a limited extent; small quantities of copra are also exported. The fisheries are of considerable local importance. The language is Cebú-Visayan.

BOGODUKHOV, a town of Russia, in the government of Kharkov, 45 m. by rail N.W. of

the city of that name, in 49° 58′ N. lat. and 36° 9′ E. long., was formerly fortified. Pop. (1860) 10,522; (1897) 11,928. There seems to have been a settlement on this site as early as 1571. In 1709, at the time of the Russo-Swedish War, Bogodukhov was taken by Menshikov and the emperor Alexius. It contains a cathedral, built in 1793. Boots, caps and furred gowns are manufactured, and gardening and tanning are carried on. The trade is principally in grain, cattle and fish.

BOGOMILS, the name of an ancient religious community which had its origin in Bulgaria. It is difficult to ascertain whether the name was taken from the reputed founder of that sect, a certain pope Bogumil or Bogomil, or whether he assumed that name after it had been given to the whole sect. The word is a direct translation into Slavonic of *Massaliani*, the Syrian name of the sect corresponding to the Greek Euchites. The Bogomils are identified with the Massaliani in Slavonic documents of the 13th century. They are also known as *Pavlikeni*, *i.e.* Paulicians. It is a complicated task to determine the true character and the tenets of any ancient sect, considering that almost all the information that has reached us has come from the opponents. The heretical literature has to a great extent either perished or been completely changed; but much has also survived in a modified written form or through oral tradition. Concerning the Bogomils something can be gathered from the information collected by Euthymius Zygadenus in the 12th century, and from the polemic *Against the Heretics* written in Slavonic by St Kozma during the 10th century. The old Slavonic lists of forbidden books of the 15th and 16th centuries also give us a clue to the discovery of this heretical literature and of the means the Bogomils employed to carry on their propaganda. Much may also be learnt from the doctrines of the numerous heretical sects which arose in Russia after the 11th century.

The Bogomils were without doubt the connecting link between the so-called heretical sects of the East and those of the West. They were, moreover, the most active agents in disseminating such teachings in Russia and among all the nations of Europe. They may have found in some places a soil already prepared by more ancient tenets which had been preserved in spite of the persecution of the official Church, and handed down from the period of primitive Christianity. In the 12th and 13th centuries the Bogomils were already known in the West as “Bulgari.” In 1207 the *Bulgarornm heresis* is mentioned. In 1223 the Albigenses are declared to be the local *Bougres*, and at the same period mention is made of the “Pope of the Albigenses who resided within the confines of Bulgaria.” The Cathars and Patarenes, the Waldenses, the Anabaptists, and in Russia the Strigolniki, Molokani and Dukhobortsi, have all at different times been either identified with the Bogomils or closely connected with them.

Doctrine.—From the imperfect and conflicting data which are alone available one positive result can be gathered, viz. that the Bogomils were both Adoptionists and Manichaeans. They had accepted the teaching of Paul of Samosata, though at a later period the name of Paul was believed to be that of the Apostle; and they were not quite free from the Dualistic principle of the Gnostics, at a later period too much identified with the teaching of Mani. They rejected the pneumatic Christianity of the orthodox churches and did not accept the docetic teaching of some of the other sects. Taking as our starting-point the teaching of the heretical sects in Russia, notably those of the 14th century, which are a direct continuation of the doctrines held by the Bogomils, we find that they denied the divine birth of Christ, the personal coexistence of the Son with the Father and Holy Ghost, and the validity of sacraments and ceremonies. The miracles performed by Jesus were interpreted in a spiritual sense, not as real material occurrences; the Church was the interior spiritual church in which all held equal share. Baptism was only to be practised on grown men and women. The Bogomils repudiated infant baptism, and considered the baptismal rite to be of a spiritual character neither by water nor by oil but by self-abnegation, prayers and chanting of hymns. Carp Strigolnik, who in the 14th century preached this doctrine in Novgorod, explained that St Paul had taught that simple-minded men should instruct one another; therefore they elected their “teachers” from among themselves to be their spiritual guides, and had no special priests. Prayers were to be said in private houses, not in separate buildings such as churches. Ordination was conferred by the congregation and not by any specially appointed minister. The congregation were the “elect,” and each member could obtain the perfection of Christ and become a Christ or “Chlist.” Marriage was not a sacrament. The Bogomils

refused to fast on Mondays and Fridays. They rejected monachism. They declared Christ to be the Son of God only through grace like other prophets, and that the bread and wine of the eucharist were not transformed into flesh and blood; that the last judgment would be executed by God and not by Jesus; that the images and the cross were idols and the worship of saints and relics idolatry.

These Paulician doctrines have survived in the great Russian sects, and can be traced back to the teachings and practice of the Bogomils. But in addition to these doctrines of an adoptionist origin, they held the Manichaean dualistic conception of the origin of the world. This has been partly preserved in some of their literary remains, and has taken deep root in the beliefs and traditions of the Bulgarians and other nations with whom they had come into close contact. The chief literature of all the heretical sects throughout the ages has been that of apocryphal Biblical narratives, and the popes Jeremiah or Bogumil are directly mentioned as authors of such forbidden books "which no orthodox dare read." Though these writings are mostly the same in origin as are known from the older lists of apocryphal books, they underwent in this case a certain modification at the hands of their Bogomil editors, so as to be used for the propagation of their own specific doctrines. In its most simple and attractive form—one at the same time invested with the authority of the reputed holy author—their account of the creation of the world and of man; the origin of sin and redemption, the history of the Cross, and the disputes between body and soul, right and wrong, heaven and hell, were embodied either in "Historiated Bibles" (Paleya[1]) or in special dialogues held between Christ and his disciples, or between renowned Fathers of the Church who expounded these views in a simple manner adapted to the understanding of the people (Lucidaria). The Bogomils taught that God had two sons, the elder Satanail and the younger Michael. The elder son rebelled against the father and became the evil spirit. After his fall he created the lower heavens and the earth and tried in vain to create man; in the end he had to appeal to God for the Spirit. After creation Adam was allowed to till the ground on condition that he sold himself and his posterity to the owner of the earth. Then Michael was sent in the form of a man; he became identified with Jesus, and was "elected" by God after the baptism in the Jordan. When the Holy Ghost (Michael) appeared in the shape of the dove, Jesus received power to break the covenant in the form of a clay tablet (*hierographon*) held by Satanail from Adam. He had now become the angel Michael in a human form; as such he vanquished Satanail, and deprived him of the termination *-il* = God, in which his power resided. Satanail was thus transformed into Satan. Through his machinations the crucifixion took place, and Satan was the originator of the whole Orthodox community with its churches, vestments, ceremonies, sacraments and fasts, with its monks and priests. This world being the work of Satan, the perfect must eschew any and every excess of its pleasure. But the Bogomils did not go as far as to recommend asceticism. They held the "Lord's Prayer" in high respect as the most potent weapon against Satan, and had a number of conjurations against "evil spirits." Each community had its own twelve "apostles," and women could be raised to the rank of "elect." The Bogomils wore garments like mendicant friars and were known as keen missionaries, travelling far and wide to propagate their doctrines. Healing the sick and conjuring the evil spirit, they traversed different countries and spread their apocryphal literature along with some of the books of the Old Testament, deeply influencing the religious spirit of the nations, and preparing them for the Reformation. They sowed the seeds of a rich religious popular literature in the East as well as in the West. The Historiated Bible, the Letter from Heaven, the Wanderings through Heaven and Hell, the numerous Adam and Cross legends, the religious poems of the "Kalëki perehozhie" and other similar productions owe their dissemination to a large extent to the activity of the Bogomils of Bulgaria, and their successors in other lands.

History.—The Bogomil propaganda follows the mountain chains of central Europe, starting from the Balkans and continuing along the Carpathian Mountains, the Alps and the Pyrenees, with ramifications north and south (Germany, England and Spain). In the middle of the 8th century the emperor Constantine Copronymus settled a number of Armenian Paulicians in Thracia. These were noted heretics and were persecuted by the Greek Church with fire and sword. The empress Theodora killed, drowned or hanged no fewer than 100,000. In the 10th century the emperor John Zimisces, himself of Armenian origin, transplanted no less than 200,000 Armenian Paulicians to Europe and settled them in the neighbourhood of Philippopolis, which henceforth became the centre of a far-reaching propaganda. Settled along the Balkans as a kind of bulwark against the invading Bulgars, the Armenians on the contrary soon fraternized with the newcomers, whom they converted to their own views; even a prince of the Bulgarians adopted their teaching. According to Slavonic documents the founder of this sect was a certain priest Bogumil, who "imbibed the Manichaean teaching and flourished at the time of the Bulgarian emperor Peter" (927-968).

According to another source the founder was called Jeremiah (or there was another priest associated with him by the name of Jeremiah). The Slavonic sources are unanimous on the point that his teaching was Manichaean. A Synodikon from the year 1210 adds the names of his pupils or "apostles," Mihail, Todur, Dobri, Stefan, Vasilie and Peter, all thoroughly Slavonic names. Zealous missionaries carried their doctrines far and wide. In 1004, scarcely 15 years after the introduction of Christianity into Russia, we hear of a priest Adrian teaching the same doctrines as the Bogomils. He was imprisoned by Leontie, bishop of Kiev. In 1125 the Church in the south of Russia had to combat another heresiarch named Dmitri. The Church in Bulgaria also tried to extirpate Bogomilism. The popes in Rome whilst leading the Crusade against the Albigenses did not forget their counterpart in the Balkans and recommended the annihilation of the heretics.

The Bogomils spread westwards, and settled first in Servia; but at the end of the 12th century Stephen Nemanya, king of Servia, persecuted them and expelled them from the country. Large numbers took refuge in Bosnia, where they were known under the name of Patarenes (*q.v.*) or Patareni. From Bosnia their influence extended into Italy (Piedmont). The Hungarians undertook many crusades against the heretics in Bosnia, but towards the close of the 15th century the conquest of that country by the Turks put an end to their persecution. It is alleged that a large number of the Bosnian Paterenes, and especially the nobles, embraced Islam (see BOSNIA AND HERZEGOVINA: *History*). Few or no remnants of Bogomilism have survived in Bosnia. The Ritual in Slavonic written by the Bosnian Radoslavov, and published in vol. xv. of the *Starine* of the South Slavonic Academy at Agram, shows great resemblance to the Cathar ritual published by Cunitz, 1853. See F. Racki, "Bogomili i Paternai" in *Rad*, vols. vii., viii. and x. (Agram, 1870); Döllinger, *Beiträge zur Ketzergeschichte d. Mittelalters*, 2 vols. (Munich, 1890).

Under Turkish rule the Bogomils lived unmolested as *Pavlikeni* in their ancient stronghold near Philippopolis, and farther northward. In 1650 the Roman Catholic Church gathered them into its fold. No less than fourteen villages near Nicopolis embraced Catholicism, and a colony of *Pavlikeni* in the village of Cioplea near Bucharest followed the example of their brethren across the Danube.

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(M. G.)

1 These betray their Gnostic (Marcianite) spirit by the anti-Jewish tone of the oldest MSS. extant, though this prejudice tends to decrease in later MSS.

BOGORODSK, a town of central Russia, in the government of Moscow, and 38 m. by rail E.N.E. of the city of Moscow, on the Klyazma. It has woollen, cotton and silk mills, chemical factories and dye-works, and is famous for its gold brocade. Pop. (1897) 11,210.

BOGOS (BILENS), a pastoral race of mixed Hamitic descent, occupying the highlands immediately north of Abyssinia, now part of the Italian colony of Eritrea. They were formerly a self-governing community, though subject to Abyssinia. The community is divided into two classes, the *Shumaglieh* or "elders" and *Tigré* or "clients." The latter are serfs of the former,

who, however, cannot sell them. The Tigré goes with the land, and his master must protect him. In blood-money he is worth another Tigré or ninety-three cows, while an elder's life is valued at one hundred and fifty-eight cattle or one of his own caste. The eldest son of a Shumaglieh inherits his father's two-edged sword, white cows, lands and slaves, but the house goes to the youngest son. Female chastity is much valued, but women have no rights, inherit nothing, and are classed with the hyaena, the most despised animal throughout Abyssinia. The Bogo husband never sees the face or pronounces the name of his mother-in-law, while it is a crime for a wife to utter her husband's or father-in-law's name.

BOGOTÁ, or Santa Fé de Bogotá, the capital of the republic of Colombia, and of the interior department of Cundinamarca, in 4° 6′ N. lat. and 78° 30′ W. long. Pop. about 125,000. The city is on the eastern margin of a large elevated plateau 8563 ft. above sea-level. The plateau may be described as a great bench or shelf on the western slope of the oriental Cordilleras, about 70 m. long and 30 m. wide, with a low rim on its western margin and backed by a high ridge on the east. The plain forming the plateau is well watered with numerous small lakes and streams. These several small streams, one of which, the San Francisco, passes through the city, unite near the south-western extremity of the plateau and form the Rio Funza, or Bogotá, which finally plunges over the edge at Tequendama in a beautiful, perpendicular fall of about 475 ft. The city is built upon a sloping plain at the base of two high mountains La Gaudalupe and Monserrate, upon whose crests stand two imposing churches. From a broad avenue on the upper side downward to the west slope the streets, through which run streams of cool, fresh water from the mountains above. The north and south streets cross these at right angles, and the blocks thus formed are like great terraces. A number of handsomely-laid-out plazas, or squares, ornamented with gardens and statuary, have been preserved; on these face the principal public buildings and churches. In Plaza Bolivar is a statue of Bolivar by Pietro Tenerani (1789-1869), a pupil of Canova, and in Plaza Santandér is one of General Francisco de Paula Santandér (1792-1840). Facing on Plaza de la Constitución are the capitol and cathedral. The streets are narrow and straight, but as a rule they are clean and well paved. Owing to the prevalence of earthquakes, private houses are usually of one storey only, and are built of sun-dried bricks, white-washed. But few of the public buildings are imposing in appearance, though good taste in style and decoration are often shown.

The city occupies an area of about 2½ × 1½ m. It has street cars, electric light and telephones. Short lines of railway connect it with Facatativa (24 m.) on the road to Honda, and with Zipaquira, where extensive salt mines are worked. A line of railway was also under construction in 1906 to Jirardot, at the head of navigation on the upper Magdalena. Bogotá is an archiepiscopal see, founded in 1561, and is one of the strongholds of medieval clericalism in South America. It has a cathedral, rebuilt in 1814, and some 30 other churches, together with many old conventual buildings now used for secular purposes, their religious communities having been dissolved by Mosquera and their revenues devoted in great measure to education. The capitol, which is occupied by the executive and legislative departments, is an elegant and spacious building, erected since 1875. The interest which Bogotá has always taken in education, and because of which she has been called the "Athens of South America," is shown in the number and character of her institutions of learning—a university, three endowed colleges, a school of chemistry and mineralogy, a national academy, a military school, a public library with some 50,000 volumes, a national observatory, a natural history museum and a botanic garden. The city also possesses a well-equipped mint, little used in recent years. The plain surrounding the city is very fertile, and pastures cattle and produces cereals, vegetables and fruit in abundance. It was the centre of Chibcha civilization before the Spanish conquest and sustained a large population. The climate is mild and temperate, the average annual temperature being about 58° and the rainfall about 43½ in. The geographical location of the city is unfavourable to any great development in commerce and manufactures beyond local needs.

Bogotá was founded in 1538 by Gonzalo Jiménez de Quesada and was named Santa Fé de Bogotá after his birthplace Santa Fé, and after the southern capital of the Chibchas, Bacatá (or Funza). It was made the capital of the viceroyalty of Nueva Granada, and soon became one of the centres of Spanish colonial power and civilization on the South American continent. In 1811 its citizens revolted against Spanish rule and set up a government of their

own, but in 1816 the city was occupied by Pablo Morillo (1777-1838), the Spanish general, who subjected it to a ruthless military government until 1819, when Bolivar's victory at Boyacá compelled its evacuation. On the creation of the republic of Colombia, Bogotá became its capital, and when that republic was dissolved into its three constituent parts it remained the capital of Nueva Granada. It has been the scene of many important events in the chequered history of Colombia.

(A. J. L.)

BOGRA, or Bagura, a town and district of British India, in the Rajshahi division of eastern Bengal and Assam. The town is situated on the right bank of the river Karatoya. Pop. (1901) 7094. The District of Bogra, which was first formed in 1821, lies west of the main channel of the Brahmaputra. It contains an area of 1359 sq. m. In 1901 the population (on a reduced area) was 854,533, showing an increase of 11% in the decade. The district stretches out in a level plain, intersected by numerous streams and dotted with patches of jungle. The Karatoya river flows from north to south, dividing it into two portions, possessing very distinct characteristics. The eastern tract consists of rich alluvial soil, well watered, and subject to fertilizing inundations, yielding heavy crops of coarse rice, oil-seeds and jute. The western portion of the district is high-lying and produces the finer qualities of rice. The principal rivers are formed by the different channels of the Brahmaputra, which river here bears the local names of the Konai, the Daokoba and the Jamuna, the last forming a portion of the eastern boundary of the district. Its bed is studded with alluvial islands. The Brahmaputra and its channels, together with three minor streams, the Bangali, Karatoya and Atrai, afford admirable facilities for commerce, and render every part of the district accessible to native cargo boats of large burden. The rivers swarm with fish. The former production of indigo is extinct, and the industry of silk-spinning is decaying. There is no town with as many as 10,000 inhabitants, trade being conducted at riverside marts. Nor are there any metalled roads. Several lines of railway (the Eastern Bengal, &c.), however, serve the district.

BOGUE, DAVID (1750-1825), British nonconformist divine, was born in the parish of Coldingham, Berwickshire. After a course of study in Edinburgh, he was licensed to preach by the Church of Scotland, but made his way to London (1721), where he taught in schools at Edmonton, Hampstead and Camberwell. He then settled as minister of the Congregational church at Gosport in Hampshire (1777), and to his pastoral duties added the charge of an institution for preparing men for the ministry. It was the age of the new-born missionary enterprise, and Bogue's academy was in a very large measure the seed from which the London Missionary Society took its growth. Bogue himself would have gone to India in 1796 but for the opposition of the East India Company. He also had much to do with founding the British and Foreign Bible Society and the Religious Tract Society, and in conjunction with James Bennet, minister at Romsey, wrote a well-known *History of Dissenters* (3 vols., 1809). Another of his writings was an *Essay on the Divine Authority of the New Testament*. He died at Brighton on the 25th of October 1825.

BOGUS (of uncertain origin, possibly connected with the Fr. *bagasse*, sugar-cane refuse), a slang word, originally used in America of the apparatus employed in counterfeiting coins, and now generally of any sham or spurious transaction.

BOHEA (a word derived from the Wu-i hills in the Fuhkien province of China, *b* being substituted for *W* or *V*), a kind of black tea (*q.v.*), or, in the 18th and early 19th centuries, tea generally, as in Pope's line, "So past her time 'twixt reading and bohea." Later the name "bohea" has been applied to an inferior quality of tea grown late in the season.

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