by far the largest share of adoration, and it is in special accounts of the *Saiva*, *Vaishnava*, and *Sākta* sects rather than in an exposition of the Brāhmanical belief, that the religious history of India from about the beginning of our era can be dealt with satisfactorily. At that time the worship of Vishnu in his most popular avatār, in the person of *Krishna*, appears to have received much countenance at the hands of the priests, with a view of counteracting the growing influence of Buddhism. The sectarian spirit gave gradually rise to a special class of works, the modern *Purānas* composed for the express purpose of promoting the worship of some particular deity. In the 8th or 9th century *Sankara-āchārya*, a Malabar Brāhman of the Saiva sect and Vedānta school of philosophy, made an attempt, by engaging in controversy with the leaders of various sects, to restore the Brāhmanical system of belief to its former imposing position. His example and teachings seem to have inspired the Brāhmanical community with a good deal of religious zeal, and even fanaticism, and thus to have greatly contributed to the final overthrow of the Buddhists. In the 7th century the authority of *Śākya-muni's* doctrine was already on the wane, as is evident from Hiouen Thsang's complaints of the number of ruined temples and deserted monasteries, and the great proportion of heretics. At the time of Sankara its decline must have been still more advanced, and a few more centuries probably sufficed to make the last living remains of the Buddhist faith disappear from the continent of India; except, indeed, in Nepal, where it prevails to this day. There also still exists in India a very important sect which seems to have early branched off from the Buddhist doctrine, viz., the *Jains*. Although, in the long run, Buddhism has been unable to maintain the ground it had won from the Brahmans, the humanizing spirit of its doctrines has left a deep impress on the Hindū mind. One of the practical and least salutary effects it has produced is the adoption of monastic institutions by most of the Brāhmanical sects. The *maths* or convents, in which a considerable portion of the clergy of the various religious bodies reside together, are presided over by *mahānts* or superiors, and are scattered all over India. Sankara founded several establishments of this kind in various parts, especially one still existing at Sringeri, on the Western Ghats. In spite of its levelling tendencies, Buddhism seems never to have succeeded in checking the further development of the caste system. At the time of Sankara seventy-two mixed classes, or eighteen subdivisions of each of the four original castes, are said to have existed, and ever since they have become more and more numerous. Indeed, there can be no doubt that Hindūs do not feel, and perhaps never felt, their class restrictions as being in any way burdensome, or still less a disgrace to them, and that even the lowest man looks upon his caste as a privilege as high as that of the Brāhman. In the opinion of the Brāhmans only one original caste is now extant, viz., their own, all the others having resulted from successive intermixtures.

Mr Sherring, in his *Hindu Tribes and Castes*, makes the following remarks on the Brāhmanical caste at the present day:—"The Brahman occupies the highest rank among Hindus for at least three reasons. The first is his assumed sanctity. By the people generally he is regarded as a pure, stainless, twice-born being, divine as well as human, worthy of unbounded admiration and worship. He is the priest of the Hindu religion, directing the ceremonies performed at the temples, sacred wells, sacred tanks, sacred rivers, and at all hallowed places throughout the land. He is present to sanction, and give effect to, the great social festivals of his countrymen held at marriages, at births of sons, and at deaths. He casts the horoscope, tells the lucky days, gives spiritual counsel, whispers *mantras* or mysterious words, executes magical incantations and charms, and is at once household god, family priest, and general preceptor and guide in behalf of the many millions of Hindus residing in the vast country lying between the Himalayas and Cape Comorin. The second reason of the Brahman's superiority is that, for many ages, perhaps from the outset of his career, when with other Aryans he first entered the plains of India, he has been intellectually in advance of the rest of the Hindu race. . . . The third reason is a consequent of the second. The Brahman is not only a thinking, but also a reading man. He possesses and, perhaps, reads the holy canon—Vedas, Shastras, and Purānas. He has been the author of Hindu literature. . . . Light of complexion, his forehead ample, his countenance of striking significance, his lips thin, and mouth expressive, his eyes quick and sharp, his fingers long, his carriage noble and almost sublime, the true Brahman, uncontaminated by European influence and manners, with his intense self-consciousness, with the proud conviction of superiority depicted in every muscle of his face, and manifest in every movement of his body, is a wonderful specimen of humanity walking on God's earth. Yet the Brāhman has lived his day. His prestige is rapidly on the decline, and is only maintained at its ancient pitch in remote villages and in the fastnesses of superstition in great cities. Here, as of old, it envelopes him like a glory. But the further he moves from such places, the more dim becomes the glory until it fades away altogether. Education and other influences are treating the Brahman roughly. Yet the fault is his own. He has had a better start by reason of his great natural endowments than any Hindu of the other castes below him; but he has neglected his opportunities. I fear he has been too proud, too self-satisfied to avail himself of them."

On the modern observance of religious duties Professor Wilson remarks:—"Now it is true that in the present constitution of Indian society the distribution of the periods of life, beyond that of the student, is never regarded except by a few, who prefer a life of lazy mendicity, or by some half-crazed enthusiast, who thinks it possible to realize the letter of the law. The great body of the people, Brahmans included, pursue their worldly avocations as long as their faculties permit, spend the decline of life in the bosom of their families, and die peaceably and decently at home. But although the practice is discontinued, the doctrine remains and influences opinion; and devotional ceremonies, pilgrimage, penance, and abstract contemplation have an undue preponderance in the estimation of the people, even the best informed among them, over active duties and the precepts of morality. As to the common people they have a still lower scale, and they find a ready substitute for the inconveniences of all moral restraint in the fervour of that faith which they place in Vishnu, and the unwearied perseverance with which they train a parrot or a starling to repeat his names, to articulate Krishna-Rādhā, or Sītā-Rām."

The study of the ancient literature of the Hindūs has taught us that some practices which have hitherto, or until recently, prevailed in India, and which have contributed so much to bringing Hindū morals into disrepute, are but comparatively modern innovations. Thus, the rite of *suttee* (properly *satī*, *i.e.*, "the faithful wife"), or voluntary immolation of widows, which was abolished some thirty years ago with considerable difficulty, seems to have sprung up originally as a local habit among the Kshatriyas, and, on becoming more and more prevalent, to have at length received Brāhmanical sanction. The alleged conformity of the rite to the Hindū scriptures has been shown to have rested chiefly on a misquotation, if not an intentional garbling, of a certain passage of the *Rigveda*, which, so far from authorizing the concremation of the widow, bids her return from the funeral pile to her home and resume her worldly duties.

Cases of infanticide are still, unfortunately, too common in many parts of India, especially among the Rājputs. To the honour of the priests be it said, however, that they have never sanctioned this abominable practice. Its origin has, it appears, to be sought in the enormous extravagance of wedding feasts, and a mistaken notion of parents being disgraced by their daughters remaining husbandless. Hence also the practice of early marriages, which is the more mischievous, as Hindū law does not allow widows to re-marry.

The cow has been held in high honour in India from early times. This religious feeling was not, however, carried formerly to the extreme to which it is carried now-a-days, when the slaughtering and eating the flesh of kine is considered as one of the most heinous crimes. It has, on the contrary, been shown conclusively by a Hindū scholar, that beef formed in former times a staple article of food in India, and that in showing hospitality to an honoured guest it played as prominent a part "as did the killing of the fatted calf among the Jews."

See H. H. Wilson, *Essays on the Religion of the Hindus*; J. Muir, *Original Sanskrit Texts*; M. Müller, *History of Ancient Sanskrit Literature*; C. Lassen, *Indische Alterthumskunde*; Elphinstone, *History of India*, ed. by E. B. Cowell. (J. E.)

BRAHMAPUTRA, one of the largest rivers of India, with a total length of 1800 miles, rises near the lake Mānsarowar in the plateau of Thibet, where it is known by the name of Sánpu, flows eastward for about 1000 miles, and skirting round the eastern passes of the Himalayas not far from the Yang-tse-kiang and the great river of Cambodia, enters the plain of British India on the north-eastern frontier of Assam. It then runs westward, dividing the province of Assam into two unequal portions, turns southward into Eastern Bengal, and joins the Ganges opposite Goálanda, the terminus of the Eastern Bengal Railway. The united stream then flows south-west, joins the Meghná, and after another southern stretch of about 100 miles, empties itself into the Bay of Bengal. The body of water formed by the union of these three noble rivers, the Brahmaputra, Ganges, and Meghná, expands during the latter part of its course into a vast estuary, studded with large islands. The Brahmaputra proper in Assam is formed by the union of three streams, in 27° 45′ N. lat. and 95° 30′ E. long.,—the Sánpu or Dihang, the Dibang, and another stream, which, although the least of the three, the Hindus have taken as the main branch, honouring it with the name of Brahmaputra, and sanctifying it in their mythology. This branch, which many European writers have accepted as the main Brahmaputra, takes its rise in a valley called the Brahmakunda, on the side of the eastern extremity of the Himalaya Mountains beneath the snowy range.

The upper part of the Brahmaputra is entirely in Thibet, and divides the broad plateau drained by the very elevated Thibetian lakes from the narrow plateau which divides the northern and southern Himalayan ranges, where the affluents of the Ganges spring from perennial snow. At the western extremity of the Brahmaputra basin the main river is 14,000 feet above the sea, and after a course of 600 miles it is still 11,000 feet high. Nothing is known of its passage across the Himalaya Mountains. The features of the passage are probably similar to those exhibited by the gorge of the Sutlej; but it is a reproach to the science and enterprise of the 19th century to allow such a problem to remain unsolved. Eastward the basin of the Brahmaputra is bounded by that of the Yang-tse-Kiang, which here flows through tremendous gorges on its way to the plains of China and the Yellow Sea. Some contend that the basins of the Irawadi, Salwin, and Cambodia rivers, are interposed between the Brahmaputra and the Yang-tse-Kiang, although they approach each other within 150 miles. On the south, the Patkai Mountains, terminating in the Manipur and Chittagong hills, separate the Brahmaputra from the Irawadi and the basins of the Arākan coast. The principal tributaries of the Brahmaputra are the Dibru, Buri Dihing, Disang, Subansiri, Manās, Bāghmi, Dharlá, and Tista. The Brahmaputra forms many islands during its course; among which that of Májulí, enclosed by the Brahmaputra and its branch the Lohit, contains an area of 282,165 acres, and is well inhabited and cultivated. In Assam the Brahmaputra also bears the name of the Hiranya, and above its junction with the Ganges it is called the Jamuná. The principal towns on its banks in Assam are Dibrugarh, Tezpur, Gauhátí, Goálpára, and in Bengal Sirajganj. Its volume of water has been computed at Goálpára during its lowest ebb at 146,188 cubic feet per second. During the rains, when the river attains a height of 30 to 40 feet above its common level, its body of water may fairly be computed at four times the above quantity. The Brahmaputra is navigable as far as Dibrugarh, but in the dry season only for steamers of light draught. In the rains it overflows its banks and spreads over the country for hundreds of square miles. At Goálanda, where it joins the Ganges, the current is so strong during the rains, and the eddies and whirlpools formed by the meeting of the waters so numerous, that large and powerful river steamers are often unable to make headway, and have to lie for days until the river subsides. The main branch of the Brahmaputra formerly flowed through the eastern district of Maimansinh, but the greater part of its water now finds its way through the Jamuná. The total length, as above stated, is 1800 miles; but if its source be taken at the Brahmakunda, the length of the river only amounts to 930 miles. Until 1765 the Brahmaputra River was unknown in Europe as a first-class river, and Major Rennel, on exploring it, was surprised to find it larger than the Ganges. The *bore*, or upward wave caused by the sudden influence of the tide, occurs in all the passages between the islands of the estuary formed by the united streams of the Brahmaputra, Ganges, and Meghná. (W. W. H.)

BRAIN. See ANATOMY, PHYSIOLOGY, PSYCHOLOGY, and MENTAL DISEASES.

BRAINERD, DAVID, one of the most zealous and successful of modern Christian missionaries, was born at Haddam, in the state of Connecticut, in 1718, and died October 9, 1747, in the house of his friend President Edwards. His heroic and self-denying labours among the American Indians wore out in the course of a few years a naturally feeble constitution, but left behind them important fruits. The narrative of his mission is contained in his journal published in 1746. His life, compiled chiefly from his own diary, was written by President Edwards, and has gone through many editions. Brainerd was a man of strong mental powers, extensive knowledge, and great sagacity; and as a preacher he was forcible and pathetic.

BRAINTREE, the Raines of *Domesday Book*, a market-town of Essex, eleven miles N. by E. of Chelmsford. It is one of the polling-places for North Essex, and is the seat of the Braintree Poor Law Union. The parish church, St Michael's, is a fine Gothic edifice of early date. A corn exchange and a mechanics' institute may also be mentioned. The bishops of London had at one time a palace in the town, but there are no remains of the building. The manufactures of silk and crape, which employ about 1000 persons, have quite superseded that of woollen cloth, which was introduced by the Flemings who fled to England to escape the persecution of the duke of Alva. Straw-plaiting is also carried on. There is a free school in the town, besides several charities. Two annual fairs of three days each are held here, commencing May 7 and October 2. Population of the parish in 1871, 4790.

BRAKE, a town in the Grand Duchy of Oldenburg, on the left bank of the Weser, about half-way between Bremen and the mouth of the river. It was for centuries the port of Bremen; and though, since the founding of Bremerhaven, it no longer possesses a monopoly of the river traffic as before, it still continues to flourish. Large docks have been recently constructed, and a railway has been opened from the town to Bremen. Shipbuilding and the weaving of woollen cloths are carried on to some extent. Population in 1871, 3800.

BRAKE is an instrument by means of which mechanical energy may be expended in overcoming friction. It is used for several entirely different purposes, the principal of these being (*a*) to limit or decrease the velocity of, or in some cases to bring completely to rest, the body or system

of bodies imparting the energy; (*b*) to measure directly the amount of frictional resistance between two bodies; or (*c*) to measure, indirectly, the amount of energy given out by the body or system of bodies producing it.

The first case is the familiar one occurring in the brakes of locomotives, railway carriages, and wheeled vehicles generally, and in those applied to such machines as cranes, winches, &c. Here some system of bodies,—or for simplicity's sake we may say some body,—originally at rest has been set in motion, and has received acceleration up to a certain velocity, the work which has been done in that acceleration being stored up as "actual energy" in the body itself. Before it can be brought to rest it must part with this energy, expending it in overcoming some external resistance. Very frequently the actual energy is very large in proportion to the usual resistance opposing the motion of the body, so that that motion would continue for a long time, or through a great distance, before the whole energy had been expended and the body brought to rest. For the sake of convenience, and in certain cases for the sake of safety, it is often necessary that this time or distance should be greatly shortened. This may be done by artificially increasing the resistance for the time being, and the most convenient method of doing this is the use of a brake.

The construction of railway brakes falls to be treated in detail in the article RAILWAYS. In other vehicles the brake belongs generally to one of two classes—it is either a block which can be pressed against a wheel by a suitable arrangement of levers under the control of the driver, or a slipper or "skid" which can be placed under a wheel, and which is attached by a chain or otherwise to the body of the vehicle. The increased resistance is due in the one case to the friction between the block and the wheel, and in the other to that between the skid and the road.

In the case of hoisting-machines the brake is used very frequently as a means of controlling the velocity of the descent of the load. In the process of "lowering by a brake," its frictional resistance is alone opposed to the load, and suitable mechanical means are provided for varying that resistance so that the velocity of the descending weight may be kept within the desired limits. The brake used in these machines very frequently consists of a cylindrical pulley or narrow drum encircled by a flexible belt of iron or steel. One end of this belt is fastened to the framing, and it is so formed that in ordinary work the drum revolves in it without touching it. When necessary, however, the position of the movable end can be so altered as to bring a larger or smaller area into contact, the surfaces being held together with a pressure which can be varied to suit the requirements of each case. This is effected either by a simple lever (in small machines worked by the foot), or for heavier work by the aid of a screw and hand-wheel.

In what are known as "differential" brakes the brake-band is not fixed to the frame of the machine, but both its ends are attached to points in a movable lever in such a way that motion of the lever-affects them unequally, tightening one more than it loosens the other, or loosening one more than it tightens the other. The principle of such an arrangement is shown in fig. 1. Here A is the pulley, B the brakeband, and C the working lever; B being attached to the latter at points *a* and *b* unequally distant from the fulcrum D. It is obvious that for any motion of C the angular motions of the arms D*a* and D*b* are equal, but the instantaneous linear motions of the points *a* and *b* in the directions of the band are unequal, varying directly as D*a*, D*b*, the ratio of the normals from D upon those directions. Thus any motion of C to the right tends to tighten the lower part of the belt and to slacken the upper part, but the slackening takes place through a larger distance than the tightening, and the belt is therefore released from the drum. By moving the lever to the left, on the other hand, the opposite action occurs, and the belt is correspondingly tightened.

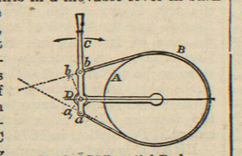

FIG. 1.—Differential Brake.

Instead of using the friction between two solid bodies, in some special cases the frictional resistance of a fluid is employed, as in what Professor Rankine called fan brakes and pump brakes. In the one case the motion of revolving blades (commonly) is opposed by the resistance of the atmospheric or liquid medium surrounding them, and in the other the motion of a liquid is opposed by the resistance due to a narrow passage or orifice.

The measurement of the frictional resistance between two bodies of known material or form is often of great importance, and it is still more often of importance to measure, by means of the frictional resistance which it can balance, the amount of energy given out by some engine or machine. Both these measurements can be and are frequently made by means of brakes. For this purpose the apparatus must be so made that the actual resistance can be accurately measured,—that this resistance can be kept sensibly constant for any length of time, but can be altered at will,—and also that the brake can be kept continuously at work for any desired period. The brake used for this purpose commonly takes the form of a revolving drum of iron, encircled by a ring of hard wood blocks connected together by thin iron bands. To this ring is attached a weight of known magnitude, at a known distance from the centre of the pulley. The wheel being set in motion the blocks can be gradually pressed upon it by a screw until the friction occurring is just sufficient to lift the weight and keep it off the ground or its support. So long as these conditions can be maintained the frictional resistance is exactly known, for its magnitude must be to that of the weight inversely as their distances from the centre of the wheel, and the energy expended in any given time will be equal to this resistance multiplied by the space passed through in the time by any point in the periphery of the drum.

Figs. 2 and 3 show the construction of a brake of this kind, copied from drawings kindly furnished by Mr W. H. Maw, the designer. The

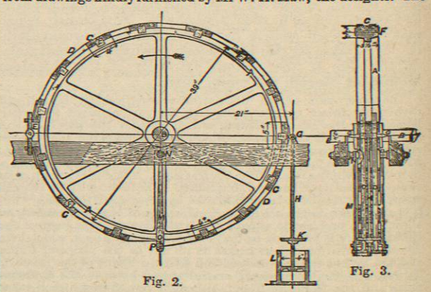
Fig. 2.

Fig. 3.

FIGS. 2 and 3.—12 H.P. Friction Brake (designed by W. H. Maw).

drum A has a turned cylindrical surface 39 inches in diameter and 3¾ inches wide; it is fixed upon the shaft B with which it revolves. The brake-ring consists of fourteen wooden blocks CC, connected

by the straps DD of hoop-iron, and so arranged that they can be tightened up by the screw E. To the ring there is attached at G a pin with pointed ends, from the centre of which hangs the rod H carrying, by means of the plate at K, the weights. The blocks are made to exert such a pressure upon the wheel that the pin G, from which the weights are suspended, remains always in the position shown, its pointed ends coinciding with the top of gauges upon the fixed wooden beams beside the brake. This apparatus is made to a certain extent self-adjusting by means of two compensating levers. The upper end of one of these, M, moves freely through an eye N some distance below the centre of the shaft; the hoop-iron rings are attached to its lower end at O and P, the latter further from N than the former. If N coincided with the centre of the shaft the lever would cause no impediment to the motion of the ring along with the drum; as it is actually placed, however, if any motion occur the point O must move through a relatively smaller distance than in the other case, because the ratio $\frac{ON}{PN}$ is less than $\frac{OB}{PB}$. The consequence of this is, that if through any cause the drum carry the ring round with it through any small distance, O tends to tighten the belt, and P to slacken it, but the relatively larger movement of the latter causes the final result to be a slackening, so that the weight drops back into its proper place. If, on the other hand, the ring begins to slide back on the drum, a similar, but reversed, action at OP increases the pressure on the blocks, and the drum again gripping them, brings the weight back into its original position. The dash-pot L contains a piston very nearly fitting it, below which is water or oil, its object being to prevent too sudden a fall of the weight. It is really a little brake in itself, in which the energy given out by the descending weight is expended in overcoming the frictional resistance encountered by the water in passing upwards through the narrow space round the piston.

In order that a machine of this kind may be run continuously at a high velocity it requires careful and abundant lubrication. If the surface be too small, water will have to be used, but with a well-designed and not over-worked brake, tallow is the best lubricant.

With regard to the proper proportioning of surface, numerous experiments with brakes of different sizes run at different speeds seem to show that the surface required varies as the energy transmitted, and (approximately) inversely as the peripheral velocity of the drum. The conclusions drawn from them, put in the most general form, are (for a brake having a cast-iron drum and wooden blocks) as follows:—Let E be the energy (in foot lbs) to be absorbed per minute (that is, the work done per minute by the machine driving the brake), T the number of revolutions of the drum per minute, R its radius (in feet), and *a* the area (square inches), and *b* the breadth (inches) of the drum; then in order that the latter may not heat, *a* should not have a smaller value than $\cdot 286\,\frac{E}{T}$, while it is frequently and very properly made as much as $\cdot 357\,\frac{E}{T}$. Expressing the same relation in other terms, we have $b =$ from $\cdot 0038\,\frac{E}{RT}$ to $\cdot 0048\,\frac{E}{RT}$, or from $\cdot 024\,\frac{E}{V}$ to $\cdot 03\,\frac{E}{V}$, V being the peripheral velocity of the drum in feet per minute. If the work be expressed in horses' power (P) the equation is very nearly equivalent to $b =$ from $\frac{800P}{V}$ to $\frac{1000P}{V}$.

A brake may have automatic apparatus attached to it for showing or registering its speed or performance. (A. B. W. K.)

BRAMAH, JOSEPH, a practical engineer and machinist, was born at Stainborough, in Yorkshire, on the 13th of April 1749. He exhibited at a very early age an unusual talent for the mechanical arts, and having been incapacitated, when he was about sixteen, by an accidental lameness in his ankle, for the pursuit of agricultural labour, he was apprenticed to a carpenter and joiner. When the term of his engagement had expired he obtained employment for some time in the workshop of a cabinetmaker in London, and soon after established himself as a principal in that business. His first patent for some improvements in the mechanism of water-closets was taken out in 1783. In the following year he took out a patent for the peculiar locks which have long been named after him. His fertile invention led him to devise new arrangements for pumps, fire-engines, steam-boilers, and paper machinery, for all of which he obtained patents. The invention which has proved of most practical service, the hydraulic press, was first brought forward in 1796. Its principle is that of the hydrostatic paradox, and it has been found of very great use in all operations requiring the application of immense mechanical force. In 1806 Bramah patented a very ingenious printing-machine, specially adapted for bank notes, which was adopted in the following year by the Bank of England. During the latter years of his life Bramah erected some large machines at the Thames bank for sawing stones and timber, began to devise some improvements in bridges and in locks for canals, and was at one time actually employed in the execution of some water-works belonging to the department of the civil engineer, which he completed with ability and success. His great and various exertions appear in some measure to have exhausted the strength of his constitution; and his last illness was immediately occasioned by a severe cold, taken in the prosecution of his experiments in Holt Forest on the tearing up of trees. He died in his sixty-sixth year, on the 9th December 1814. (See notice of his life and works by Dr Cullen Brown in *New Monthly Magazine*, 1815.)

BRAMANTE, or BRAMANTE LAZZARI, one of the most celebrated architects of Italy, famous also as a painter, was born at Casteldurante, in Urbino, in July 1444. He showed a great taste for drawing, and was at an early age placed under a painter of some distinction, Fra Bartolommeo, called Fra Carnavale. But though he afterwards gained some fame as a painter, his attention was soon absorbed by the sister art, architecture. He appears to have studied under Scirro Scirri, an architect in his native place, and perhaps under other masters. He then set out from Urbino, and proceeded through several of the towns of Lombardy, executing works of various magnitudes, and examining patiently all remains of ancient art. At last he reached Milan, drawn thither by the fame of the great Duomo, and remained there for several years. Information as to this part of his life is singularly scanty, but he seems to have left Milan for Rome about 1500. He painted some frescoes at Rome, and devoted himself to the study of the ancient buildings, both in the city and in all the district as far south as Naples. About this time the Cardinal Caraffa, hearing of his studies in architecture, commissioned him to rebuild the cloister of the Convent della Pace. The celerity and skill with which Bramante accomplished his task gained for him the good offices of the cardinal, who introduced him to Pope Alexander VI. He began to be consulted on nearly all the great architectural operations in Rome, and executed for the Pope the palace of the Cancelleria, or chancery, which was much admired. But under Alexander's successor, Julius II., Bramante's talents began to obtain an adequate sphere of exercise. His first large work was to unite the straggling buildings of the palace and the Belvedere. This he accomplished by means of two long galleries or corridors enclosing a court. The design was only in part completed before the death of Julius and of the architect. So impatient was the Pope and so eager was Bramante, that the foundations were not sufficiently well attended to; great part of it had therefore soon to be rebuilt, and the whole is now so much altered that it is hardly possible to decipher the original design.

Besides executing numerous smaller works at Rome and Bologna, among which is specially mentioned by older writers a round temple in the cloister of San Pietro-a-Montorio, Bramante was called upon by Pope Julius to take the first part in one of the greatest architectural enterprises ever attempted, the rebuilding of St Peter's. Bramante's designs were complete, and he pushed on the work so fast, that before his death he had erected the four great piers and their arches, and completed the cornice and the vaulting in of this portion. He also vaulted in the principal chapel. After his death in 1514 his design was

much altered by the architects engaged to carry on the work, and in particular by Michel Angelo. Competent judges are strongly of opinion that Bramante's designs, if carried out, would have had a much greater effect than those which were finally adopted.

Bramante had a great influence in Italy. By his careful study of the ancient forms of art he became the real introducer of the so-called classical style. His own genius was bold and inventive, delighting in mass and breadth, but occasionally failing in the perfection of detail.

BRAMANTINO. See SUARDI.

BRAMBÁNAN, a village in Java, notable for extensive and remarkable ruins of Hindu character. The place lies directly south of the great volcanic cone of Mir-Api (8640 feet) in the territory of the sultan of Yugya-karta (written by the Dutch Djokjo-karta), and 10 miles east of the capital, just on the border of the other native state called Surakarta or Solo.

The remains embrace six groups of temples, besides two buildings intended for residence, perhaps monastic. The most remarkable of the former is that called *Chandi Sewu*, or "The Thousand Pagodas." The centre of the group is a large temple of cruciform plan, standing on a terraced basement, and surrounded by four (originally, perhaps, by five) concentric squares, formed by rows of small detached cells or temples, the whole area forming a square of upwards of 500 feet to the side. Statements differ as to the exact number of these cells, but a plan given by Raffles shows 238 as now standing. They are sculptured externally with mythological reliefs, each is crowned with a small *dagoba* of the usual Buddhistic pattern (*i.e.*, very like the minor domes over the west portico of St Paul's), and probably all originally contained images of Buddha in the usual cross-legged attitude (of which a few still remain), whilst the central shrine contained, no doubt, a great image or images of Buddha also. Mr Fergusson thinks the group to be Jaina rather than Buddhist; and this a closer examination of the images and their symbols alone can decide. But similar series of shrines, clustered round a central pagoda, are found in Buddhist Pegu. There is a professed restoration of the central temple of Chandi Sewu in Raffles's *History;* but the details of this plate (pl. 40) are not to be relied on.

Another Buddhist edifice, single but more perfect, is known by the name of Chandi Kali Baneng. This also is cruciform; it stands on a boldly moulded basement, and the external decoration exhibits pilasters richly carved in scroll-work, and massive double cornices. Small Buddhas in niches remain, but the great figure which must have occupied the interior has disappeared.

A third group of temples, once, probably, the most important, is known as *Lara Jongran*. These are so ruined that at a short distance they present the aspect of vast and shapeless cairns of stone. One of them contains in three upper cells fine figures of purely Hindu and Brahmanical character. To the north is Durga (here in the character of a strong but beneficent power) slaying the demon Mahishâsura,—precisely the same subject that is to be found in Moor's *Hindu Pantheon*, pl. 35. This is the *Lara* or Virgin, who gives the popular name to the group of temples. To the west is the elephant-headed Ganesha, and to the south a fine Jove-like Siva, bearded and trident-bearing. Offerings are sometimes made to these images by the peasantry, in spite of the universal Mahometan profession.

The name of the place is said by Friedrich to be properly *Parambánan*, and to mean probably "the Place of Teachers." The whole of the temples are alleged, in traditional rhymes, to have been erected between 1266 and 1296 A.D. But the chronology and history of the older Javanese remains is still very obscure, and probably the date of some of the Brambánan temples must be carried much farther back. The destruction of the last-described group must have been the work of earthquake, and we must suppose the date of the other buildings to be subsequent to the destruction. Some general points worthy of note in regard to these buildings are the following:—

(1.) They are all built of hewn stones without the use of any cement.

(2.) There are distinct traces showing that the exterior and interior of the buildings were once covered with a fine coat of stucco, not excepting the most elaborate sculpture in scroll-work, &c. We know that the sculptured cave-walls of Ellora, the great idols at Bamian, and the Doric order at Selinus were similarly coated; and probably in all these cases the stucco was intended to bear colour or gilding.

(3.) No real arch exists in these buildings. The vaults and doorways are covered by the corbelling, or stepped projection, of the horizontal courses. Mr Crawfurd makes a contrary statement, but that historian, usually so trustworthy, was certainly mistaken on this point.

(4.) Many of the peculiarities of this architecture, both in general plan and in ornamental details, indicate a close relation to the mediæval styles of Burmah and Camboja; and points almost necessarily to an original common type in India, a type which as yet we cannot trace satisfactorily. In this lies a problem of interest, which the accumulation of photographs will perhaps allow of being worked out. It is notable, however, that in the Burmese mediæval brick buildings of analogous character the true arch is used profusely.—(*Chiefly from the notes of a visit to Brambánan by the writer.*) (H. Y.)

BRANDE, WILLIAM THOMAS, chemist, was born at London in 1788. After leaving Westminster school he spent some time on the Continent, and acquired a knowledge of French and German. On his return he began the study of medicine, and in 1806 a communication of his to the Royal Society was printed in their *Transactions*. In 1809 he was made a fellow of the Royal Society, and became assistant to Sir Humphrey Davy at the Royal Institution. He succeeded Davy in the chair of chemistry in 1813, and in the same year received the Copley medal of the Royal Society. From 1816 to 1836 he was joint editor with Faraday of the *Quarterly Journal of Science and Art*. In 1825 he was made superintendent of the die department in the Mint, and in 1853 he received the honorary degree of D.C.L. of Oxford. He died on the 11th February 1866. Besides numerous papers, which marked him out as one of the most vigorous and able chemists of the day, Brande was the author of several important works. The *Manual of Chemistry*, 1819, and *Elements of Chemistry*, 1831, were the best works of the time, and soon became popular. He also published a *Dictionary of Materia Medica* in 1839, and a *Dictionary of Science, Literature, and Art* in 1842. The latter is an exceedingly able and valuable work of reference; a new edition of it has recently appeared under the editorship of Mr G. W. Cox, 1875. Brande was the author of the third of the Dissertations (that on the progress of Chemical philosophy) prefixed to the supplement of the fourth edition of the *Encyclopædia Britannica*.

BRANDENBURG, one of the largest provinces of Prussia, and the division from which that powerful monarchy originally sprung. It lies between 51° and 53° 34′ N. lat. and 11° 25′ and 16° 10′ E. long., and is bounded on the N. by Mecklenburg and the province of Pomerania, E. by Posen and Silesia, S. by Silesia and the kingdom and province of Saxony, and W. by Anhalt and the provinces of Saxony and Hanover. It has an area of 15,403 square miles, and is divided into the two governments of Potsdam and Frankfort, the capital, Berlin, forming a separate jurisdiction. The province is a sandy plain interspersed with numerous fertile districts and considerable stretches of woodland. Its barrenness was formerly much exaggerated, and it was popularly described as the sandbox of the Holy

Roman Empire. It is generally well-watered by tributaries of its two principal rivers, the Elbe and the Oder, and is besides remarkable for the number of its lakes, of which no fewer than 600 or 700 great or small are enumerated. The mineral products comprise coal, limestone, gypsum, alum, and potter's earth; barley and rye are the usual cereals; fruits and vegetables are abundant; and considerable quantities of hemp, flax, hops, and tobacco are raised. The breeding of sheep receives great attention, and the province furnishes a greater export of wool than any other in the kingdom. Bees are kept in considerable numbers, especially in the neighbourhood of Sorau. The climate is cold and raw in winter, excessively hot in summer, and there are frequently violent storms of wind. The manufacturing industry of the province is both varied and extensive, but is for the most part concentrated in the principal cities. The most important branches are the spinning and weaving of wool and cotton, the manufacture of paper, and the distillation of brandy. Educational institutions are very numerous, not only in the capital, but throughout the province. There are in all 135 towns in the province, the most important being—

Potsdam,	population	43,834
Frankfort	,,	43,214
Brandenburg	,,	25,822
Spandau	,,	19,690
Prenzlau	,,	14,442
Luckenwalde	,,	13,539
Ruppin	,,	11,590

In 1871 the population was 2,863,229, of whom 2,720,242 were Protestants, 86,047 Roman Catholics, and 47,484 Jews.

BRANDENBURG, a town of Prussia, capital of the circle of West Havelland, in the government of Potsdam, and province of Brandenburg. It is situated on the River Havel, and on the Magdeburg and Berlin Railway, 37 miles W.S.W. of Berlin. The town is enclosed by walls, and is divided into three parts by the river,—the old town on the right and the new town on the left bank, while on an island between them is the "cathedral town," also called, from its position, "Venice." Many of the houses are built on piles, through which the water of the river flows. The cathedral, an ancient structure of the 14th century, the old church of St Katharine, erected in 1410, and the council-house, deserve notice for their antiquity and as works of art. There are also a castle, a gymnasium, a riding academy, a public library, a theatre, and several hospitals. In the market-place stands a *Rolandssäule*, a colossal figure 18 feet in height, hewn out of a single block of stone; and a little to the N. of the town is the Marienberg, on which the heathen temple of Triglaff and afterwards the church of St Mary's were built. The town has a very considerable trade, with manufactures of woollens, silks, linens, hosiery, and paper, as well as breweries, tanneries, and boat-building. Population in 1871, 25,822.

Brandenburg, originally *Brennabonch*, was founded by some Slavonian tribes, from whom it was captured in 928 by the emperor Henry I., who surrounded it with strong fortifications. A bishopric was founded there in 949, subject to Mayence, and subsequently (968) to Magdeburg; but the heathen Wends succeeded in getting possession of the town, and were only expelled by Albert the Bear in 1161.

BRANDIS, CHRISTIAN AUGUST, a distinguished scholar and historian of Greek philosophy, was born on 13th February 1790 at Hildesheim. His father, a physician of some distinction, held for a time a professorship at the university of Kiel. His education was begun at the gymnasia of Holzminden and Kiel, and in 1806 he entered the university of the latter town. His attention was soon drawn from theology, in the study of which he was then engaged, to philosophy, particularly to Plato. In 1809 he accepted the post of private tutor in the family of Count Adam Moltke at Nütschau, and there became acquainted with Niebuhr, whose noble character made a deep impression on him. In 1812 he graduated at the university of Copenhagen, and presented as his thesis "Commentationes Eleaticæ," a careful collection of the fragments of Xenophanes, Parmenides, and Melissus. Two years later he attended the university of Göttingen, and in 1815 presented as his inaugural dissertation at Berlin an essay *On the Idea of the History of Philosophy* (*Von dem Begriff der Geschichte der Philosophie*). In 1816 he had the offer of an extraordinary professorship at Heidelberg, but preferred to accompany Niebuhr to Italy. Six years were spent in examination of the principal libraries, and Brandis began the labours on Aristotle which were to occupy many years of his life. In 1821 he was made professor of philosophy in the newly founded university of Bonn, and in 1823 appeared his edition of the *Metaphysics* of Aristotle (*Aristotelis et Theophrasti Metaphysica*). To this was added in 1837 a second part, *Scholia Græca in Aristotelis Metaphysica*. He became part editor, along with Boeckh and Niebuhr, of the new classical journal *Rheinisches Museum*, and contributed largely to it. His articles on Socrates (1827, 1829) are particularly deserving of notice. In 1835 appeared the first part of his great work, *Handbuch der Geschichte der Griechisch-röm. Phil.*, and in 1836 the *Scholia in Aristotelem*, forming the 4th volume of the Berlin edition of Aristotle. The following three years were spent in Greece, whither he had gone as instructor to the young king Otho. Some of his experiences in Greece were published in 1843 (*Mittheilungen über Griechenland*). The remainder of his life was devoted to his history of Greek philosophy, the last part of which was published in 1866, little more than a year before his death, which took place on the 24th July 1867.

Brandis's great work, that by which he will be best remembered, appeared at intervals from 1835 to 1866, and altogether fills six volumes. It is characterized generally by great extent of reading, sound judgment, and critical examination of authorities. But it is to some extent defective in speculative insight and in power of exposition. The history for the most part is moulded too rigidly on the work of the author under consideration, and the whole course of exposition follows the order of the author's thought. Thus in many cases it is apt to degenerate into what is little more than a running commentary or summary of the original text. This is particularly noticeable in the portions on Plato and Aristotle. There is no attempt made to bring together information from all quarters and to work the whole into an organic unity. A comparison of the work of Brandis with that of Zeller would bring out the contrast between the two methods. At the same time the *Handbuch* will always retain a high value, even by the side of Zeller's later work, and its best portion, that on Aristotle, is perhaps as complete and accurate an account as can be desired. That Brandis himself felt the defects of his own method of history is shown by the fact that he threw the whole matter of his larger treatise into a smaller and more systematic form, the very title of which, *History of the Developments of Greek Philosophy* (*Geschichte der Entwickelungen der Griechischen Philosophie*, 2 vols., in three parts, 1862, 1864, 1866), indicates the change made. This smaller work is decidedly one of the best and completest histories of Greek thought in existence.

A sketch of the life of Brandis, with full list of his works, will be found in the notice read by Trendelenburg to the Berlin Academy, 1868 ("Zur Erinnerung an C. A. Brandis," *Abh. der Kön. Akad. d. Wissen.*, 1868, pp. 1–24).

BRANDT, SEBASTIAN, German satirist, was born at Strasburg about 1458. He studied at Basel, took the degree of doctor, and seems to have held a professorship for some time. After his return to Strasburg he was made syndic and then chancellor of the town. He died in 1521. Among his writings are some Latin poems and treatises on law; but the work by which he is best known is the satirical poem *Das Narrenschyff*, published in 1494. The *Ship of Fools*, though without artistic beauty of structure, and though its satire is often coarse, took the popular taste