













INFINITE RICHES IN A LITTLE ROOM.

—Christopher Marlowe.

NEW AMERICANIZED

# ENCYCLOPÆDIA BRITANNICA

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A DICTIONARY OF ARTS, SCIENCES AND LITERATURE

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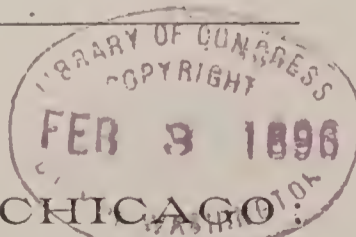


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VOL. IX.—PAR—SAN.

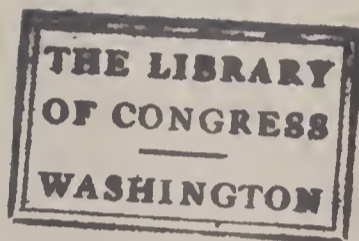


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# NEW AMERICANIZED ENCYCLOPÆDIA BRITANNICA.

## VOLUME IX.

### P A R

**PARAGUAY**, a South American republic, situated in the basin of the Parana-Paraguay system. It is conterminous with Brazil, Bolivia, and the Argentine Republic, and its boundaries were long under dispute. The whole area of the country is estimated at 91,890 square miles, of which 35,280 are in the Gran Chaco portion.

The year in Paraguay is divided into two seasons—"summer," lasting from October to March, and "winter," from April to September. December, January, and February are generally the hottest months, and May, June, July, and August coldest. The most temperate month is April. The mean temperature for the year seems to be about 75° or 76°; for summer 81°, for winter 71°. The rainfall amounting to fifty-eight inches at Asuncion, is distributed over eighty-four days—seventy-five days being cloudy, and 206 bright and clear. Goitre and leprosy are the only endemic diseases; but the natives, being underfed, are prone to diarrhoea and dyspepsia.

As to the mineral resources of Paraguay but little is known—possibly because there is little to know. The gold mines said to have been concealed by the Jesuits may have had no existence; and, though iron was worked by Lopez II. at Ibicuy (seventy miles southeast of Asuncion), and native copper, black oxide of manganese, marbles, lime, and salt have been found in greater or less abundance, the real wealth of the country consists rather in the variety and value of its vegetable productions. Its forests yield at least seventy kinds of timber fit for industrial purposes—some, such as the lapacho and quebrache, of rare excellence and durability, as is shown by the wonderful state of preservation in which the woodwork of early Jesuit churches still remains. Fifteen plants are known to furnish dyes, and eight are sources of fiber. Fruit-trees of many kinds flourish luxuriantly; the cocoa palm often forms regular groves and the orange-tree (reaching a height of fifty feet) is so common and bears so profusely that oranges, like bananas, have a mere nominal value. In the **MATÉ** (*q.v.*), or Paraguayan tea, Paraguay has a commercial plant of great importance, which may be

said to be peculiarly its own; and most of the primary crops of the tropics could be cultivated with ease if there were only men and means. Cattle-breeding was formerly a very important interest in several of the departments, but the stock was nearly all destroyed during the war, and is only being slowly recruited from the Argentine Republic. The total number of horned cattle is estimated at 500,000.

The inhabitants of Paraguay are mainly Guaranis or half-breeds with a strong proportion of Guarani blood. A peaceful, simple people, fond of flowers and fêtes, they displayed during the desolating war of 1865-70 (as so often before in the time of the Jesuits) indomitable courage in the face of overwhelming odds. Formerly, about 1857, divided into twenty-five departments, the country was in 1876 distributed into twenty-three electoral districts, each with a *gefefe politico*, a *juez de pas*, and a municipality. **ASUNCION** (*q.v.*), the capital, is also the largest city (25,000). Other places of present or historical importance are Villa Rica (11,000), often called Villa Pobre, the chief seat of the tobacco trade, and the easternmost of the larger towns; Villa Pilar or El Pilar (3,621), formerly Neembucu, opposite the mouth of the Bermejo, and the "strangers' farthest" under Doctor Francia's despotism; San Estanisló (7,000); San Pedro (9,706), near the Tejui, about three leagues from its junction with the Paraguay; Concepcion (10,697), the northernmost of the towns or villages, 200 miles above Asuncion, and the trading center for the northern maté plantations; Humaitá (4,205), 198 miles below the capital, the site of the great earthworks by which Lopez stopped the advance of the allies for more than a year; Paraguari (5,315), the present terminus of the railway; Jaguaron (3,413), two and one-half leagues from Paraguari, founded in 1536, and the seat of a manufacture of orange-flower essence; Ita (6,332), known for its earthenware; Itangua (6,948), with brick and tile work; Luque (8,878), the provisional capital in 1868; Villa Hayes (Villa Occidental, Nouvelle Bourdeaux), ten miles above Asuncion, founded in 1854 by Lopez with French settlers.

Paraguay is a constitutional republic. The presi-

dent and vice-president hold office for four years, and are again eligible after eight years. The legislative bodies are a chamber of deputies (one deputy for each 6,000 inhabitants) and a senate (one senator from each territorial division with 8,000 inhabitants, and beyond that from every 12,000 inhabitants). There are five government departments, and a supreme court of three salaried judges. The people are nominally Roman Catholics, but full religious liberty prevails. Crime is comparatively rare, and is rapidly diminishing. Marriage has fallen so completely out of fashion that only 3 per cent. of the births are legitimate.

The population consists of about 300,000 whites and 130,000 Indians, with foreigners to the number of about 9,000, who have settled in the country, principally Argentines, Italians, Brazilians, and Germans, and a sprinkling of English and French. In November, 1886, Gen. P. Escobar was elected to the presidency for four years, and on January 1st following the home debt had been reduced about \$179,435, that amount having been derived from the sales of public lands and the levying of an additional tax of 10 per cent. customs duties. The reports for 1886 indicate that the customs receipts during that year amounted to \$844,218, the same being \$75,218 greater than in 1885, the total income to have been \$1,531,892, and the expenditures \$1,378,756. During the summer of the same year the silver dollars of Chili, Bolivia, Peru, Mexico, and the Argentine Republic were admitted for circulation at a par value with the Paraguayan silver dollar, also the five-franc pieces of France, Belgium, and Italy.

There was an increase of imports and exports, and telegraph and postal facilities available were shown to be constantly extending and improving. In November of the same year, the Asuncion Villa Rica Railway was purchased from the government by William Stewart. The consideration was \$2,100,000 in gold, and the sale was conditioned upon the extension of the road by Stewart to Villa Encarnacion, the government engaging to guarantee 6 per cent. interest on the cost of construction, at the rate of \$30,000 per kilometer. The government was also empowered to build a line of railroad and telegraph from the right bank of the Paraguay river to a point of junction on the northwestern frontier of Bolivia and Paraguay. The bill as passed authorized the expropriation of all necessary land on the route, and extended the time for the submission of the plans two years from the date of its passage. In 1887 a commercial treaty was concluded between Germany and Paraguay, and immigration is now invited from all portions of Europe, Germany and France in particular, the government binding itself to furnish a house, seeds, tools and provisions for eight months. No interest will run on the money thus advanced, the colonists to be exempt from taxation, and only in the event of their property being assailed will they be called upon to aid in its defense.

In 1528 Sebastian Cabot, following in the footsteps of De Solis, reached Paraguay and built a fort called Santo Espiritu. Asuncion was founded on August 15, 1537, by Juan de Ayolas, and his successor, Martinez de Irala, determined to make it the capital of the Spanish possessions east of the Andes. From this center Spanish adventurers pushed east to La Guayra beyond the Parana, and west into the Gran Chaco; and before long vast numbers of the less warlike natives were reduced to serfdom. The name Paraguay was applied not only to the country between Rio Paraguay and Rio Parana, but to the whole Spanish territory, which now comprises parts of Brazil, the republic of Uruguay, and the Argentine provinces of Buenos Ayres, Entre Rios, Corrientes, Misiones, and part of Santa

Fé. It was not till 1620 that Paraguay proper and Rio de la Plata or Buenos Ayres were separated from each other as distinct governments, and they were both dependent on the vice-royalty of Peru till 1776, when Buenos Ayres was erected into a vice-royalty, and Paraguay placed under its jurisdiction. Though they succeeded in establishing a kind of *imperium in imperio*, and were allowed to drill the natives to the use of arms, the Jesuits never held rule in the government of Paraguay; indeed they had nearly as often to defend themselves from the hostility of the governor and bishop at Asuncion as from the actual invasions of the Paulistas or Portuguese settlers of São Paulo. It was only by the powerful assistance of Zabala, governor of Buenos Ayres, that the Anti-Jesuit and quasi-national party which had been formed under Antequera was crushed in 1735. In 1750 Ferdinand VI. of Spain ceded to the Portuguese, in exchange for the fortified village of Colonia del Sacramento (Uruguay), both the district of La Guayra and a territory of some 20,000 square miles to the east of the Uruguay. Seven of their reductions being included in this area, the Jesuits determined to resist the transference, and it was only after several engagements that they were defeated by the combined forces of Spain and Portugal. The treaty which they thus opposed was revoked by Spain in 1761, but the missions never recovered their prosperity, and the Jesuits were finally expelled the country in 1767. In 1811 Paraguay declared itself independent of Spain; by 1814 it was a despotism in the hands of DOCTOR FRANCIA, (*q.v.*) On Francia's death in 1840, the chief power passed to his nephew, Carlos Antonio LOPEZ (*q.v.*), and he was in 1862 succeeded by his son Francisco Solano Lopez, whose ambitious schemes of conquest resulted in the almost total extinction of Paraguayan nationality. The three allies, Uruguay, Brazil, and the Argentine Republic, which united against him, bound themselves by the treaty of 1865 to respect and guarantee for five years the independence, sovereignty, and territorial integrity of Paraguay, and at the close of the war in 1870 a new constitution was established, and a president, Jovellanos, appointed under their protection. Reduced to utter helplessness, the country owes its continued existence to the jealousy and balance of power existing between its neighbors. By a separate treaty with Brazil in 1872 it undertook to pay the cost of the war—\$200,000,000 to Brazil, \$35,000,000 to the Argentine Republic, and \$1,000,000 to Uruguay, or more than \$700 per head of the population. An attempt made in 1873 by Messrs. Robinson and Fleming to establish an English colony of so-called Lincolnshire farmers ended in disaster. Somewhat better success has as yet attended the German colony of San Bernardino, on Lake Ipacanay. The Brazilian army of occupation was withdrawn only in 1876.

PARAGUAY RIVER. See PLATE RIVER.

PARAHYBA, or PARAIBA, distinguished as Parahyba do Norte from Parahyba do Sul or S. João de Parahyba to the south of Rio de Janeiro, is a city of Brazil, on the right bank of the river of the same name, twelve miles from the sea, at the terminus of a railway running eighty-seven miles into the interior. The population, which was 40,000 about 1845, has decreased to between 12,000 and 14,000, and direct trade with Europe has been given up since 1840. Sugar, cotton, and india-rubber are still exported.

PARALLAX may be defined, generally, as the change produced in the apparent place of an object when it is viewed from a point other than that of reference. In astronomy, the places of the moon and planets are referred to the center of the earth, those of the fixed stars to the center of the sun. It is shown in

ASTRONOMY (*q. v.*) that the maximum of horizontal parallax of a celestial object being known, its parallax from any point of observation can be calculated. The sun's mean equatorial horizontal parallax (termed briefly the "solar parallax") is the angle which the equatorial radius of the earth would subtend to an observer at the sun when the earth is at mean distance from the sun. For its determination it would appear only necessary to observe the sun's apparent position simultaneously from two widely different points on the earth's surface; the difference of the apparent positions will be due to displacement by parallax, from which displacement the mean equatorial horizontal parallax can be readily obtained.

The requirements of modern astronomy demand that the solar parallax shall be determined with an accuracy of  $\frac{1}{1000}$  part of its amount—that is, within less than  $\frac{1}{100}$  part of a second of arc. But measures in the neighborhood of the sun cannot be made with any approach to this accuracy, not only on account of the effect of the sun's heat on the various parts of the instruments employed, but also of the atmospheric currents created by heat, which tend to destroy steady atmospheric definition and to render the solar image incapable of exact observation. It is thus hopeless to look for any solution of the problem by the most direct method. Two courses remain—either to seek some method which affords a larger angle to measure, or one which permits a mode of observation affording a higher precision. There are many relations to the solar parallax which are well established.

The parallax of the moon is known with very considerable precision by direct determination. The proportion of this parallax to that of the sun is an important term in the lunar theory, and the constant of this term (the *parallactic inequality*) is a known function of the solar parallax. Hence, if the constant of the parallactic inequality is independently determined, the solar parallax becomes known. The elements of the orbits of Venus and Mars undergo secular variations which increase from year to year, from century to century, and at last acquire very large values. These secular variations (on the assumption that all the terms of the theories of the planets are mathematically accurate) have also a well-determined relation to the solar parallax, and therefore afford a means of determining that parallax with an accuracy which increases by the continuation of observation.

It has been shown (see ASTRONOMY and MECHANICS), that the proportions of the interplanetary distances can be very accurately determined and tables be computed from observations of the apparent places of the planets, without any knowledge or assumption as to absolute distances (although an accurate knowledge of the solar parallax is required for giving final perfection to the lunar and planetary tables). In astronomical ephemerides, therefore, the distances of planets from the earth are accurately expressed in terms of the earth's mean distance from the sun, the latter being reckoned unity. Hence, to determine the solar parallax, it is only necessary to measure, at some favorable opportunity, the parallax of any planet, and to multiply the parallax so found by the number which expresses the relation of the distance of the planet from the earth to the earth's mean distance from the sun.

When Jupiter is in opposition he is nearer the earth by the diameter of the earth's orbit than when in conjunction; hence, since light occupies a very sensible time to travel, eclipses of Jupiter's satellites will seem to occur too soon in the first case and too late in the latter, the difference between the extremes of acceleration and retardation being the time occupied by light in

crossing the earth's orbit. This time is about sixteen and one-third minutes for the mean diameter of the earth's orbit; hence, if the velocity of light can be independently determined, the diameter of the earth's orbit becomes known. The determination, by employing the velocity of light, is also arrived at in another way. The constant of aberration (see ASTRONOMY), or the maximum apparent change of a star's true place due to the motion of the observer, depends on the relative velocity of the motion of the observer in space compared with the velocity of light. The angular velocity of the observer is perfectly known; hence if his linear velocity is known his radius of motion is known. Thus, if the constant of aberration and the velocity of light are independently determined, the radius of motion (that is, the sun's parallax) will be found.

There are thus three distinctive typical methods: (1) the gravitational method, depending on terms in the lunar and planetary theories, the constants of which are determined by observation; (2) the geometrical or direct observational method; and (3) the physical method.

The constant of the lunar parallax may be determined by a method precisely similar to that followed in the meridian declination observations of Mars. Our knowledge of the parallax of the moon depends at present entirely on such observations made nearly simultaneously at the Royal Observatories of Greenwich and the Cape of Good Hope. The resulting values of the parallax, found directly from these observations, are then multiplied by a factor which expresses the relation between the constant of the lunar parallax (see ASTRONOMY), and the moon's tabular parallax at the time; thus each nearly simultaneous observation at the two observatories gives an independent determination of the constant of the lunar parallax.

A better method, however, will be found when the results of numerous occultations of stars have been employed to determine the constants of a new and more accurate lunar theory.

The best determination of the constant of the lunar parallax is that of Mr. Stone, viz.,  $3,422.71''$  (*Mem. R.A.S.*, vol. xxxiv. pp. 11–16), derived from meridian observations at Greenwich and the Cape of Good Hope.

The constant of parallax of a fixed star is the maximum angle which a line equal to the earth's mean distance from the sun would subtend if viewed at the star. The distances of the fixed stars are so remote that till very recent times their parallaxes have been found to be insensible; that is to say, the earth's orbit viewed from the nearest fixed star presents a disk (or ellipse) too small for measurement.

The limits of this article do not permit a detailed history of the early attempts of astronomers to determine the parallaxes of the fixed stars. The reader is referred on this point to Peters' *Précis historique des travaux sur la parallaxe des étoiles fixes*, forming the first section of his celebrated work *Recherches sur la Parallaxe des étoiles fixes*, (*Mém. de l'Acad. Imp. de St. Petersbourg*, see *Math. et Physiques*, vol. v.) The most notable incident in that history was the discovery of aberration by Bradley, in 1728, when engaged in an unsuccessful attempt to determine the parallax of the star  $\gamma$  Draconis.

The first determination of the parallax of a fixed star is due to Henderson, His Majesty's astronomer at the Cape of Good Hope, in 1832 and 1833. It was followed by the nearly simultaneous discoveries of the parallax of  $\beta$  Cygni by Bessel and that of  $\alpha$  Lyræ by Struve from observations made in the years preceding 1840. Since that time similar researches have been prosecuted with gradually increasing success.

PARALLELS, THEORY OF. The fundamental principles of mathematics have not in general received from mathematicians the attention which they deserve. Mathematical science might in fact be compared to a building far advanced in construction. As to the firmness of its foundations there can be no doubt, to judge by the weighty superstructure which they carry; but the aspect of the building is not a little marred by the quantity of irrelevant rubbish which lies around those foundations, concealing their real strength and security.

The question of the parallel axiom in Euclid's geometry is to some extent an exception. There have been endless discussions concerning it. The difficulty is well known, and will be found succinctly stated in the article GEOMETRY, (*q.v.*) Those who have treated the subject have devoted themselves either to criticising the form of Euclid's axiom, suggesting modifications or substitutes (sometimes with undoubted advantage, *e.g.*, Playfair), or to questioning its necessity, offering either to demonstrate the axiom or to dispense with it altogether. It would serve no useful purpose to attempt a complete account of the literature of the subject; we may refer the reader who is curious in such matters to the various editions of Perronet Thomson's *Geometry without Axioms*. It will be sufficient to mention Legendre's views, which, although by no means reaching to the root of the matter, may be held as indicating the dawn of the true theory. The delicacy of the question may be illustrated by the story which is told of Lagrange. It is said that toward the end of his life he wrote and actually took to the Institute a paper dealing with the theory of parallels. He had begun to read it; but, before he had proceeded very far, something struck him. He stopped reading, muttered, "Il faut que j'y songe encore," "It is proper that I should dream again," and put the paper in his pocket. There appears to be no doubt that the true theory first presented itself to the mind of Gauss. The history of the matter is interesting, and deserves to be more generally known than it appears to be. In his earlier days, before his career in life was determined, when he had to consider the possibility of his becoming a teacher of mathematics, he drew up a paper in which he gave a philosophical development of the elements of mathematics. It was probably in the course of this discussion (about 1792) that he first came across the difficulty of the parallel axiom. He arrived at the conclusion that geometry became a logically consistent structure only after the parallel axiom was given as part of its foundation; and he convinced himself that this axiom could not be proved, although from experience (for example, from the sum of the angles of the geodesic triangle Brocken, Hohenhagen, Inselberg) we know that it is at least very approximately true. If, on the other hand, this axiom be not granted, there follows another kind of geometry, which he developed to a considerable extent and called the antieucledian geometry.

PARALYSIS, or PALSY, the loss of the power of muscular action due to some interruption of the nervous mechanism by means of which such action is excited (see "Nervous System" in PHYSIOLOGY). In its strict sense the term might include the loss of the influence of the nervous system or any of the bodily functions, the loss of common sensation or of any of the special senses; but other terms have come to be associated with these latter conditions, and the word "paralysis" in medical nomenclature is usually restricted to the loss or impairment of voluntary muscular power. Paralysis is to be regarded rather as a symptom than as a disease *per se*, and is generally connected with some well-marked lesion of some portion of the nervous system. According to the locality and extent of the nervous sys-

tem affected, so will be the form and character of the paralysis. It is usual to regard paralysis as depending on disease either of the brain, of the spinal cord, or of the nerves distributed to parts and organs; and hence the terms cerebral, spinal, and peripheral paralysis respectively. The distribution of the paralytic condition may be very extensive, tending to involve in a greater or less measure all the functions of the body, as in the general paralysis of the insane (see INSANITY); or again, one half of the body may be affected, or one or more extremities, or it may be only a certain group of muscles in a part supplied by a particular nerve.

1. *Paralysis due to Brain Disease*.—Of this by far the most common form is palsy affecting one side of the body, or *Hemiplegia*. It usually arises from disease of the hemisphere of the brain opposite to the side of the body affected, such disease being in the form of hemorrhage into the brain substance, or the occlusion of blood-vessels, and consequent arrest of the blood supply to an area of the brain; or again it may be due to the effect of an injury, or to a tumor or morbid growth in the tissues of the brain. The character of the seizure and the amount of paralysis vary according to the situation of the disease or injury, its extent, and its sudden or gradual occurrence. The attack may come on as a fit of apoplexy, in which the patient becomes suddenly unconscious, and loses completely the power of motion of one side of the body; or a like result may arise more gradually and without loss of consciousness. In either case of "complete" hemiplegia the paralysis affects more or less the muscles of the tongue, face, trunk, and extremities. Speech is thick and indistinct, and the tongue, when protruded, points toward the paralyzed side owing to the unopposed action of its muscles on the unaffected side. The muscles of the face implicated are chiefly those of mastication. The paralyzed side hangs loose, and the corner of the mouth is depressed, but the muscles closing the eye are as a rule unimpaired, so that the eye can be shut, unlike what occurs in another form of facial paralysis (Bell's palsy). The muscles of respiration on the affected side, although weakened, are seldom wholly paralyzed, but those of the arm and leg are completely powerless. Sensation may at the first be impaired, but as a rule returns soon, unless the portion of the brain affected be that which is connected with this function. Rigidity of the paralyzed members is occasionally present as an early or a late symptom. In many cases of even complete hemiplegia improvement takes place after the lapse of weeks or months, and is in general first indicated by a return of motor power in the leg, that of the arm following at a longer or shorter interval. Such recovery of movement is, however, in a large proportion of cases only partial, and the side remains weakened. In such instances the gait of the patient is characteristic. In walking he leans to the sound side and swings around the affected limb from the hip, the foot scraping the ground as it is raised and advanced. Besides this the evidence of the "shock" is felt more or less upon the system generally, the patient rarely (though occasionally) recovering his nervous stability. The paralyzed parts retain as a rule their electric contractility, but they are apt to suffer in their nutrition both from disuse and also from certain degenerative changes which the interruption of nervous influence is apt to exercise upon them.

It is to be observed that in many instances the hemiplegia is only partial, and instead of the symptoms of complete paralysis above described there exist in varied combination only certain of them, their association depending on the extent and locality of the lesion in the brain. Thus there may be impairment of speech and some amount of facial paralysis, while the arm and leg

may be unaffected, or the paralysis may be present in one or both extremities of one side while the other symptoms are absent. Further, the paralysis may be incomplete throughout, and the whole of the side be weak, but not entirely deprived of motor power. To partial paralysis of this latter description the term "paresis" is applied. (See PARESIS.)

Besides hemiplegia, various other forms of paralysis may arise from cerebral disease. Thus occasionally the paralysis is crossed, one side of the face and the opposite side of the body being affected simultaneously. Or again, as is frequently observed in the case of tumors of the brain, the paralysis may be limited to the distribution of one of the cranial nerves, and may produce an association of phenomena (such as squinting, drooping of the eyelid, and impairment or loss of vision) which may enable the seat of the disease to be accurately localized.

2. *Paralysis due to Disease of the Spinal Cord.*—Of paralysis from this cause there are numerous varieties depending on the nature, the site, and the extent of the disease. Some of the more important only can be noticed.

*Paraplegia*, paralysis of both lower extremities, including usually the lower portion of the trunk, and occasionally also the upper portion—indeed the whole parts below the seat of the disease in the spinal cord—is a form of paralysis which is a not infrequent result of injuries or disease of the vertebral column, also of inflammation affecting the spinal cord (MYELITIS, *q. v.*), as well as of hemorrhage or morbid growths involving its substance. When due to disease, the lesion is generally situated in the lower portion of the cord. The phenomena necessarily vary in relation to the locality and the extent of the disease in the cord. Thus, if in the affected area the posterior part of the cord, including the posterior nerve roots, suffer, the function of sensation in the parts below is impaired because the cord is unable to transmit the sensory impressions from the surface of the body to the brain. If on the other hand the anterior portion of the cord and anterior nerves be affected, the motor impulses from the brain cannot be conveyed to the muscles below the seat of the injury or disease, and consequently their power of movement is abolished. In many forms of this complaint, particularly in the case of injuries, the whole thickness of the cord is involved, and both sensory and motor functions are arrested. Further, the functions of the bladder and bowels are apt to suffer, and either spasm or paralysis of these organs is the result. The nutrition of the paralyzed parts tends to become affected, and bedsores and wasting of the muscles are common. Occasionally, more especially in cases of injury, recovery takes place, but in general this is incomplete, the power of walking being more or less impaired. On the other hand the patient may linger on for years bedridden, and at last succumb to exhaustion or to some intercurrent disease.

A form of spinal paralysis, often showing itself as paraplegia, occasionally occurs in children, and is termed—

*Infantile or Essential Paralysis.*—It is caused by an inflammatory affection limited to the anterior portion of the gray matter of the spinal cord throughout a greater or less extent, and affects, therefore, the function of motion, leaving that of sensation unimpaired. This disease is most common during the period of first dentition (although a similar affection is sometimes observed in adults). The commencement may be insidious, or there may be an acute febrile attack lasting for several days. In either case paralysis comes on, at first very extensive, involving both upper and lower extremities, but tending soon to become more limited and

confined to one or other limb or even to a group of muscles. The affected muscles lose their electric contractility and are apt to waste. Hence limbs become shortened, shriveled and useless, and deformities such as club-foot may thus be readily produced. In many instances recovery is complete, and the prospect of amendment is all the greater if the muscles show any reaction to electricity. There is throughout an absence of some of the more distressing of the phenomena of paraplegia, such as disturbances of the bladder and bowels or extensive bedsores, and in general the health of the child does not materially suffer.

*Progressive Muscular Atrophy or Wasting Palsy* is a disease usually occurring in early or middle life. It is characterized by the wasting of certain muscles or groups of muscles accompanied with a corresponding weakness or paralysis of the affected parts, and is believed to depend on a slow inflammatory change in the anterior cornua of the gray matter of the spinal cord. It is insidious in its onset, and usually first shows itself in the prominent muscular masses in the palm of the hand, especially the ball of the thumb, which becomes wasted and deficient in power. The other palmar muscles suffer in like manner, and as the disease advances the muscles of the arm, shoulders and trunk become implicated if they have not themselves been the first to be attacked. The malady tends to spread symmetrically, involving the corresponding parts of the opposite sides of the body in succession. It is slow in its progress, but, notwithstanding it may occasionally undergo arrest, it tends to advance and involve more and more of the muscles of the body until the sufferer is reduced to a condition of extreme helplessness. Should some other ailment not be the cause of death, the fatal result may be due to the disease extending so as to involve the muscles of respiration.

Another form of paralysis in certain respects resembling the last, and supposed by some to be due to a similar cause, is *Pseudo-hypertrophic Paralysis*, a condition occurring most frequently in male children, in whom in such cases there exists at first a remarkable enlargement of certain muscles or groups of muscles, followed sooner or later by wasting and paralysis. The enlarged muscles are chiefly those of the calf and hips, and their abnormal size is caused by an over-development of their connective tissue, and is therefore not a true hypertrophy. The child acquires a peculiar attitude and gait. He stands with his legs widely separated, his body arched forward, and in walking assumes a rocking or waddling movement. Later on the enlarged muscles lose their bulk, and at the same time become weakened in power, so that walking becomes impossible, and the child is completely paralyzed in the limbs and all other affected parts. In most instances death takes place from some intercurrent disease before maturity.

*Paralysis Agitans or Trembling Palsy* is a peculiar form of paralysis characterized chiefly by trembling movements in certain parts, tending to become more widely diffused throughout the body. It is a disease of advanced life. The symptoms come on somewhat insidiously, and first show themselves chiefly by involuntary tremblings of the muscles of the fingers, hand, arm, or leg, which are aggravated on making efforts or under excitement. These trembling movements become more marked and more extensive with the advance of the disease, and along with the tremors there generally occurs increasing weakness of the affected muscles. This is very manifest in walking, the act being performed in a peculiar tottering manner with the body bent forward. The trembling movements cease during sleep. This disease is a chronic one, and is intractable to treatment, but life may be prolonged for many years.

*Glosso-labio-laryngeal Paralysis* is a form of paralysis affecting, as its name indicates, the functions of the tongue, lips, and larynx (besides others), and depending upon disease of certain localities in the medulla oblongata from which the nerves presiding over these functions arise. The symptoms come on slowly, and are generally first manifested in some difficulty of speech owing to impaired movements of the tongue. Associated with this there is more or less difficulty in swallowing, owing to paralysis of the muscles of the pharynx and soft palate, by which also the voice is rendered nasal. With the advance of the disease the paralysis of the tongue becomes more marked. It cannot be protruded, and frequently undergoes atrophy. Certain of the facial muscles become implicated, especially those in the neighborhood of the mouth. The features become expressionless, the lips cannot be moved in speaking, the mouth remains open, and the saliva flows abundantly. The muscles of the larynx may also be involved in the paralysis. In the later stages of the malady the power of speech is completely lost, the difficulty in swallowing increases to a degree that threatens suffocation, the patient's condition altogether is one of great misery, which is in no way mitigated by the fact of his mental power remaining unaffected. Complications connected with the respiratory or circulatory functions, or disease affecting other parts of the nervous system with which this complaint may be associated, often terminate the patient's sufferings, and in any case life is seldom prolonged beyond two or three years.

3. *Peripheral Paralysis*, or local paralysis of individual nerves, is of not infrequent occurrence. The most common and important examples of this condition can only be briefly referred to.

*Facial paralysis*, *Bell's Palsy*, are the terms applied to paralysis involving the muscles of expression supplied to the seventh nerve. It is unilateral, and generally occurs as the result of exposure of one side of the head to a draught of cold air which sets up inflammation of the nerve as it passes through the aqueductus Fallopii, but it may also be due to injury, or disease either affecting the nerve near the surface or deeper in the bony canals through which it passes, or in the brain itself, involving the nerve at its origin. Here the paralysis is manifested by a marked change in the expression of the face, the patient being unable to move the muscles of one side in such acts as laughing, whistling, etc., or to close the eye on that side. The mouth is drawn to the sound side, while, although the muscles of mastication are not involved, the food in eating tends to lodge between the jaw and cheek on the palsied side. Occasionally the sense of taste is impaired. In the ordinary cases of this disease, such as are due to exposure, recovery usually takes place in from two to six weeks, the improvement being first shown in the power of closing the eye, which is soon followed by the disappearance of the other morbid phenomena. When the paralysis proceeds from disease of the temporal bone, or from tumors or growths in the brain, it is more apt to be permanent, and is in many cases of serious import. Throughout there is no diminution of sensibility in the paralyzed muscles; but they early lose their reaction to faradization, retaining that to galvanism.

*Lead Palsy* is a not uncommon form of local paralysis. It is due to the poisonous action of lead upon the system, and, like the other phenomena of lead poisoning, affects chiefly workers in that metal (see *LEAD*). The pathology of this disease is still unsettled, but it is believed to depend upon the local effect of the lead upon the nerves of the part rather than to any disease, at least in the first instance, of the nerve centers. The paralysis in this case is as a rule confined to the mus-

cles of the forearm which extend to the hand, and as they lose entirely their power the hand cannot be raised when the arm is held out, which gives rise to the condition termed "wrist drop." The paralysis may come to affect other muscles of the arms as well as certain of those of the legs and trunk, and along with the paralysis there occurs wasting of the affected muscles and loss of their electrical reactions. Occasionally in severe cases other nervous phenomena, such as convulsions, delirium, etc., may become superadded. The symptoms usually disappear on the removal of the patient from the source of lead contamination, along with the application of the treatment appropriate to poisoning with this metal—and all the more speedily if the case has not been of long duration and the affected muscles have not undergone atrophic change.

A form of peripheral paralysis not unlike the last occasionally results from chronic alcoholism. The paralysis occurring after diphtheria, another example of the peripheral variety, has been already referred to (see *DIPHTHERIA*).

It is impossible in a general notice like the present to refer at any length to the treatment of paralysis. The conditions of the disease in any particular case and its associations are so manifold that they can only be fully understood and appreciated by the medical expert under whose direction alone treatment can be advantageously carried out. It may be stated generally, however, that, since paralyzed muscles tend to undergo certain degenerative changes (see *PATHOLOGY*), it becomes an object in treatment to endeavor to maintain as long as possible their molecular integrity. With this view, when pain and other acute symptoms which may be present have ceased, the use of nervine tonics such as iron, quinine, and strychnine, and the suitable dieting of the patient, are the best constitutional remedies; while of local applications, frictions, or massage, but more particularly the employment of electricity, will be found of service, the latter agent often yielding markedly beneficial results.

*PARAMARIBO*, the administrative and commercial capital of Dutch Guiana or Surinam, is situated on the right bank of the Surinam, which, though at that point twenty miles from the sea, is a tidal river nearly a mile broad and eighteen feet deep. Built on a plateau about sixteen feet above low-water level, Paramaribo is well drained, clean, and in general healthy; the straight canals running at right angles to the river, the broad, straight, tree-planted streets, the spacious squares, and the solid if plain-looking public buildings, would not be unworthy of a town in the Netherlands. Among the more conspicuous edifices are—Fort Zeelandia (used as a civil and military prison), at the north corner, between the town proper and the Combé suburb; the Government-house, surrounded by a magnificent garden and park; the town-house, with a tower one hundred feet high; the law courts, the public hospital, where there is a remarkable betel-nut avenue fifty feet in height; the Reformed Dutch, Lutheran, Moravian, and Roman Catholic churches; and the Portuguese and Dutch synagogues. The population, barely 16,000 in 1854, was 20,373 in 1869, and is now (1890) 24,600.

*PARANA*. See *PLATE RIVER*.

*PARANAHYBA* (*PARNAHYBA*, or *PERNAHYBA*), *SÃO LUIZ DE*, a city of Brazil, the chief port of the province of Piahy, is situated on the right bank of the important Rio de Paranyha, near the beginning of its delta. It has a population of about 15,000, and trades in cotton, leather, etc., but its port is little visited by foreign steamers.

*PARASITISM*. The problem suggested by the occurrence of parasites not only in the intestines or the

kidneys but even in flesh and blood, in eye or brain, has occupied alike physician and naturalist from the earliest times. From ancient Egyptian and Jewish sanitary and religious codes we may perhaps infer considerable knowledge of the distribution and danger of parasites—unclean animals, like the pig, rabbit, and dog, being peculiarly infested with them. The schoolmen, too, perplexed themselves with quaint hypotheses as to the time and place and mode of the introduction of the parasites of man, while the long persistence of mediæval myths is evidenced by the “*Furia infernalis*” of the *Systema Naturæ*. The spontaneous generation of parasites seems never to have been doubted until the commencement of the eighteenth century, when Redi proved the origin of maggots from eggs of the blow-fly, and Swammerdam announced the similar origin of lice and other insect parasites. Both naturalists, however, opposed the extension of their results to the *Entozoa*, but the discovery of microscopic animalcules, and the reflection that these must readily be introduced into the body, induced Boerhaave to suggest the origin of parasites from free-living worms and infusorians. The sexuality and characteristics of a few *Entozoa* gradually became better known, while Linnæus, though little dreaming of their complex form-history, expelled the spontaneous generation theory by the fortunate mistake of identifying the free *Bothriocephalus* of the stickleback as the young stage of *B. latus* of man, and certain free Planarians and Nematoids as the young of liver flukes and thread worms. His school vastly increased the hitherto scanty catalogue of known forms, while their exacter knowledge rendered his hypothesis improbable. The origin of *Entozoa* from eggs which leave the body of their host, enter new hosts in food or drink, and when developing in other organs than the alimentary are carried thither by the circulation, was clearly put forward by Pallas, who also revived the early view of inheritance, which had been propounded before by the contemporaries of Leeuwenhoek. With the labors of Rudolphi and Bremser helminthology rose to the rank of an important special study, yet the degeneration of the Linnæan school had nowhere fuller course: observation of faunistic and systematic detail excluded all physiological or morphological research, and the knotty problem of origin was simply cut by a return to the hypothesis of spontaneous generation. This view seemed supported by the absence of reproductive organs in cystic parasites, and reigned almost undisputed until the accumulation of a new chain of evidence. Of this the main links were the discovery of the ciliated larva of a Trematode (*Monostomum*) by Mehlis, in 1831, of the *Redia* or *Cercaria* stages of the same genus, and of the six-hooked embryo of *Tænia* by Siebold in 1835, and the renewed study of *Bothriocephalus latus* by Eschricht, who maintained that the encysted forms were persistently larval, and that the life-history of the *Entozoa* should be viewed as broadly parallel to that of parasitic insects. Yet in spite of all this, and of the corroborative researches of Valentin, many helminthologists remained obstinate, until these incredible life-histories had been confirmed and treated as so many other cases of the “*Alternations of Generations*” in the epoch-making work of Steenstrup (1842). Dujardin next observed the wanderings of *Mermis*, and Siebold those of *Gordius*; the latter, however, advanced the doctrine that cysts were not larval stages, but mere pathological modifications of those worms which had chanced to “wander” into situations unfitted for their normal life. Meanwhile the important labors of Van Beneden traced the actual development of the cystic parasites of the bony fishes into the tapeworms of the rays and dogfishes which had devoured them, so proving that the

transmission of the parasites depended upon the mode of feeding. These results were soon confirmed by Küchenmeister, who not only transmuted cyst into tapeworm by transmission in food, but redeveloped the cystic form by feeding with eggs from the adult tapeworm, thus (1852-53) commencing the modern era of experimental helminthology. Häubner and Leuckart eagerly followed for the same group; Filippi, Valette, Pagenstecher, and Cobbold made similar investigations on Trematodes; while Leuckart transferred *Pentastomum* from rabbit to dog, and traced the formidable *Trichina* from pig to man. From this time (1860) the advances of our knowledge have been no longer in principle, though numerous and important, but in detail. To Küchenmeister, Cobbold, Davaine, and others, but more especially to Leuckart, we owe valuable general works.

It is among vertebrates that parasitism is most frequent and most fatal. Fishes swarm externally with Trematodes, leeches, and parasitic crustaceans, internally with cysts and intestinal worms all too numerous for enumeration. Nothing gives a more vivid idea of the extent to which parasitism has reached than an examination of a ray, or, even better, the common sunfish (*Orthogoriscus*). Amphibians are inhabited by many parasites—the common frog having almost constantly *Ascaris nigrovenosa* in its lungs, and infusorial parasites in its rectum, and may also yield *Distomum*, *Echinorhynchus*, etc., twenty species in all. Lizards harbor tapeworms, Nematoids, including species of *Trichina*, more rarely Trematodes. Ophidians have all kinds of parasitic worms, Chelonians chiefly Nematoids and Trematodes. The parasites of birds are of extraordinary number and variety; preying, fishing, and omnivorous birds serve, of course, very constantly as intermediate hosts; but graminivorous birds are hardly more exempt. The number of parasites is often so vast as to occasion the most serious disease; thus the “gapes” of poultry is due to the choking of the bronchial passages by multitudes of Nematoids (*Sclerostoma syngamus*), and the grouse disease to a similar cause (*Strongylus pergracilis*). Yet a great number of parasites may be borne without apparent injury: thus the post-mortem examination of a single stork has yielded twenty-four *Filaria* and sixteen *Strongylus* from the lungs and air passages, one hundred *Spiroptera* from the coats of the stomach, more than a hundred of various species of *Distomum*, and many hundreds of *Holostomium* from the gullet and intestine. Ticks and insect parasites are also common; of these the most remarkable are the feather-eating *Mallophaga*. The majority of the *Mammalia* have as internal parasites many different species of worms either in adult or cystic form, which are fully described in veterinary works. The special parasites of man are estimated by Cobbold at as many as 121 species (13 Trematodes, 16 Cestodes, 21 Nematoids, 10 Leeches, 17 Arachnids, 44 Insects); many of these, especially among insects, have occurred only very rarely, and should not be reckoned, e.g., *Musca vomitoria* and *Blaps mortisaga*, while a considerable number of the truly parasitic forms have only been once or twice described—the above estimate thus becoming reduced well-nigh to half.

The various modes of transmission of parasites, though of great practical importance, do not call for much discussion here. They may be summarized as follows:—(1) The majority of parasites reach their hosts through the medium of food or drink; (2) eggs are in some cases transferred from one animal to another by actual bodily contact, e.g., the eggs of *Pentastomum* by the licking of dogs; (3) sometimes the eggs are deposited in or on the host by the mother, for example, by insect parasites, such as *Ichneumons*, *Æstridæ*, etc.

(4) in some rare cases parasites are transmitted by self-infection—for example, young *Trichinæ*, born free in the alimentary canal of their host, bore their way thence directly into the muscles, there to grow into the well-known encapsuled worms. Eggs or proglottides of tapeworm may, on gaining the exterior, be transmitted inadvertently to the mouth, and so recommence their life-cycle within the same host.

The mode of diffusion of the ova of parasites presents many analogies to that of seeds in the vegetable kingdom; thus wind and water are alike utilized, passing animals may serve as unconscious bearers, and the like. Though well protected by a usually thickened egg-shell and an often remarkable degree of vitality, so as to resist prolonged drought, burial, and other vicissitudes, the parasite has an exceedingly small chance of success in finding a host; to preserve the species from extinction an enormous number of eggs must be produced, far exceeding that of free-living organisms. Thus Leuckart points out that as a tapeworm has an average lifetime of two years, and produces in that time about 1,500 proglottides, each containing say 57,000 ova, and since the species is not increasing in numbers, an ovum has thus only one chance in 85,000,000 of reaching maturity. The difficulties are of course increasingly greater as the life-history becomes more complicated, demanding an increasing number of hosts. Given a sufficient number of eggs, however, no difficulty is insuperable, and few parasitic forms accordingly seem in any risk of disappearance, except, it is to be hoped, in the case of civilized man and the domestic animals, where the large consumption of cooked food, aided by conscious hygienic precautions and medical aid, tends to exclude or remove them.

As the result of the association of two organisms with more or less constancy, various mutual modifications of form and function must obviously occur. The more important effects of parasite on host may be briefly outlined. Semper cites numerous cases where the commensal or parasite has a mechanically transforming effect on the host. Thus a horny coral with which an annelid is constantly associated has become permanently modified to form an encasing tube. Worms inside corals have enlarged the base of the cavity by stimulating growth, and may also produce permanent pores. Pycnogonids on *Campanularia* produce galls, which acquire specific characters, and various species of crab parasitic on corals form galls, two of which, coalescing, form a sort of "cave dwelling" with two fissures which are kept open by the respiratory currents of the crab, which thus both stimulates and checks the growth of the polyps. In higher animals, and with more intimate parasitism, the mechanical influences of the parasite on the host are more serious and more markedly pathological. Thus parasitic worms, by their size and number, frequently close up passages such as arteries, windpipe, etc., causing often fatal results. But many parasites are also actively destructive to certain tissues of their host—thus, as Semper points out, *Peltogaster* destroys the female reproductive organs of *Pagurus*, a Trematode those of *Limnæa stagnalis*, the larva of a fly (*Cuterebra emasculator*) the testes of various species of American squirrel. In none of the cases, however, is the general vitality of the host affected. The results of active motion within the host are productive of still more serious mischief; thus the internal migration and burrowing of such parasites as *Trichina* and *Bilharzia* is well known to produce violent inflammation. The perforation of vessels, the consequent extravasation of blood, and the destruction of tissue often end fatally for the host. Leuckart distinguishes pathological effects as due either to growth and increase of parasites, or to their wander-

ings within the host, or thirdly to the very considerable loss of nourishment which a number of parasites of appreciable size necessarily entails. Some blood-sucking parasites are specially dangerous, and many less ferocious forms doubtless poison their host to some extent by their waste products. Roux also notes how parasites—an *Echinococcus*, for example—by inducing a flow of nutritive material, may develop a network of capillaries and produce other histological changes.

The history of the medical aspects of parasitism can only be very briefly alluded to. From the time of the ancient Arabian physicians some diseases, such as itch, have been referred to parasites. With the increasing knowledge as to the prevalence and importance of parasitism there arose a distinct parasitic theory of disease. In spite of the gradual unraveling of the mysteries of origin and life-history, physicians long clung conservatively to the old hypothesis of spontaneous generation, even Bremser regarding the pathological states of the host not as caused by the parasites, but as causing and in fact creating them. It was not till within the last forty years that, with the rise of experimental helminthology, medical science shook itself free from superstition and ignorance, and devoted close attention to ætiology and treatment, culminating in that systematic warfare against all forms of parasitism which now occupies so important a place in medicine and the veterinary art.

*Vegetable Parasitism.*—The name of parasites has been given to those plants which are nourished wholly or partially at the expense of other living organisms. The degree and nature of the benefit thus obtained varies greatly with different plants, and the effect produced upon the host ranges from an almost imperceptible one to complete destruction. At one extreme are certain forms which, while drawing the nourishment necessary for life from their hosts, yet do so in such fashion that both organisms continue to live in intimate association, and, it may be, rendering mutual help. From these by a series of gradations we come to parasites of such a destructive influence as to cause widespread death to certain animal and vegetable forms of life. This physiological group is closely related to another, the saprophytes, which obtain their nourishment from the dead remains of organisms. True parasites belong exclusively to the dicotyledonous flowering plants and the fungi. A few algæ are partial parasites.

The remarkable appearance presented by most parasitic flowering plants undoubtedly attracted notice in remote times. They are frequently mentioned by early writers, but there is no evidence sufficient to enable us to determine whether they were regarded as independent plants or merely as pathological excrescences—unless in the one case of the mistletoe, which was recognized as the former by Pliny, who gives an account of its reproduction by seed. The effects of the attack of parasitic fungi were also observed in very early times, as there is abundant evidence to show, but the plants themselves which caused the damage were necessarily not detected as such from their minute size and obscure nature. We must come to the middle of the eighteenth century for the first attempt to establish a botanical group of flowering parasites. The knowledge of parasitic fungi has advanced gradually with the improvement of the microscope, and the accumulation of the life-histories of forms has grown up under the hands of numerous observers, among the earliest of whom Knight performed admirable service. With increasing knowledge of native and exotic forms, and the advance made in the fields of vegetable anatomy and physiology, the whole group of vegetable parasites has become more strictly defined,—the last noteworthy service being the establishment by De Bary (*Morph. u. Physiol. der*



*Pilze, Flechten u. Myxomyceten*) of the physiological group of "saprophytes" to receive those plants which differ from the parasites in obtaining their nourishment from the dead bodies of organisms and from soil rich in humus.

PARCÆ. See FATES.

PARCHMENT consists of skins of various animals, unhaired, cleaned, and dried so as to form sheets of uniform thickness suitable for writing upon and for the numerous other purposes to which such preparations are devoted (see PALEOGRAPHY). The skins employed for parchment are principally those of sheep, lambs, and calves; but goat and ass skins are similarly dressed for special purposes. The preliminary unhairing and cleaning of the skins is effected as in the leather manufacture (see LEATHER). In their moist flexible condition the unhaired skins are tightly and uniformly stretched over a wooden frame termed a herse, and on the flesh side they are carefully gone over with a semi-circular fleshing knife which removes all adherent flesh. The grain side is also gone over to clean the surface and squeeze out a proportion of the absorbed moisture. Ordinary binder's parchment and drumhead parchment need no further preparation, but are simply allowed to dry gradually on the frames on which the skins are stretched. But fine parchment for writing and vellum are powdered with chalk on the flesh side and carefully rubbed with fine pumice stone till a delicate uniform velvety surface is raised. All inequalities on the grain side are also removed by paring and rubbing with fine pumice. Stout vellum is made from calfskins, and ordinary qualities from split sheepskins; for drumheads, tambourines, and like applications goat and calfskins are used, and it is said that wolfskins yield the best drumheads.

*Vegetable Parchment*, or parchment paper, is a modified form of paper produced by chemical treatment, having considerable similarity to ordinary animal parchment. It is prepared by acting on ordinary unsized paper with dilute sulphuric acid, and immediately washing away all trace of acid. Paper so treated will be found to have undergone a remarkable change: the porous intertexture of cellulose composing unsized paper will have expanded and agglutinated, forming a homogeneous surface, translucent, horny, and parchment-like; it will have acquired about five times the strength of ordinary paper; it will become soft and flaccid when steeped in water, to which, however, it is impervious; and it is unaffected by boiling in water. It is most largely used as covers for preserve jars, bottles, etc., and to some extent for tracings of plans, charts, etc.

PARDON is the remission, by the power intrusted with the execution of the laws, of the penalty attached to a crime. The right of pardoning is coëxtensive with the right of punishing. In practice the prerogative is extremely valuable, when used with discretion, as a means of adjusting the different degrees of moral guilt in crimes or of rectifying a miscarriage of justice. By the law of England pardon is the sole prerogative of the king. This follows from the theory of English law that all offenses are breaches of the king's peace.

In the United States the power of pardon vested in the president is without any limitation in cases of offenses against the Federal laws, except in the case of impeachments (U. S. Constitution, art. ii., § 2). The power of pardon is also vested in the executive authority of the different States, with or without the concurrence of the legislative authority. Thus by the New York Code of Criminal Procedure, 1881, §§ 692, 693, the governor of the State of New York has power to grant reprieves, commutations, and pardons, except in

the case of treason, where he can only suspend the execution of the sentence until the case can be reported to the legislature, with whom the power of pardon in this case rests. The usual form of pardon in the United States is by deed under seal of the executive.

PARDUBITZ, a town of Bohemia, situated at the confluence of the Elbe and the Chrudimka, fifty-five miles to the east of Prague. The inhabitants, amounting to 10,000 in 1889, are engaged in the manufacture of sugar, agricultural implements, sweetmeats, spirits, beer, and iron.

PARÉ, AMBROISE, the father of French surgery, was born at Laval, in the province of Maine, in 1517, and died in 1590. A collection of his works was published at Paris in 1561, and was afterward frequently reprinted. Several editions have also appeared in German and Dutch. Among the English translations was that of Thomas Johnson, London, 1634. For Paré's professional career and services, see SURGERY.

PAREJA, JUAN DE, Spanish painter, was a mestizo, born in the West Indies about 1606, and in early life passed into the service of Velazquez, who employed him in color-grinding and other menial work of the studio. His extant works are not very numerous; the best known, *The Calling of St. Matthew*, now in the Royal Picture Gallery, Madrid, has considerable merit as regards technique, but does not reveal much originality, insight, or devotional feeling. He died in 1670.

PARENT AND CHILD. See BASTARD, INFANT, and MARRIAGE.

PARENZO, a city on the west coast of Istria (Austria-Hungary), thirty miles south of Trieste, with about 3,000 inhabitants, has considerable historic and architectural interest. It is built on a peninsula nowhere more than five feet above the sea-level; and from the fact that the pavements of the Roman period are three feet below the present surface it is inferred that this part of the coast is slowly subsiding. The well-preserved cathedral of St. Maurus was erected by Euphrasius, first bishop of Parenzo, probably between 535 and 543.

PAREISIS, a form of partial paralysis, affecting principally and primarily the cerebral region, and indirectly the nervous system of other parts of the body. It is a term of comparatively recent introduction, and is principally used of those cases in which motor ataxy is a prominent symptom. Its treatment, in the nature of things, must coincide with that for paralysis.

PARGA, a town on the Albanian coast, in the Turkish vilayet of Janina, built by the Venetians in 1572. Its population does not now exceed 1,500.

PARHELIA. See HALO.

PARIAN CHRONICLE. This famous Chronicle is contained in the ARUNDELIAN MARBLES (*q.v.*), now at Oxford. It originally embraced an outline of Greek history from the reign of Cecrops, king of Athens (1582 B.C.), down to the archonship of Diognetus at Athens (264 B.C.), but the remaining portion extends no farther than 355 B.C.

PARINI, GIUSEPPE, Italian poet, was born in the district of Bosisio, in the Milanese, on May 22, 1729. In 1752 he published at Lugano, under the pseudonym of Ripano Eupilino, a small volume of *sciolto* verse which secured his election to the Accademia dei Transformati at Milan and to that of the Arcadi at Rome. In 1769 he was given the chair of *belles lettres* in the Palatine School. His subsequent lectures as professor of rhetoric in the Gymnasium di Brera are still of value, and as occupant of the chair of fine arts he was frequently consulted by the artists of the day in matters of taste and design. He died on August 15, 1799.

PARIS, the capital of France, and the second largest city in the world, is situated on the Seine river, which has a course of some seven miles through the city. Its total area is about thirty square miles, and its population (2,344,450 in 1886), is now (1890), not less than 2,600,000. The city occupies the center of what is known as the Paris basin, through which the Seine runs from southeast to northwest. The granitic substratum is covered by Jurassic, Cretaceous and Tertiary forms, and in many places building materials—freestone, limestone and gypsum—are laid bare by erosion. To this plenitude of building-stone Paris is largely indebted for its development. Back from the river on the north rise the heights of Charonne, La Villette, Montmartre, and the Buttes-Chaumont, and on the left bank are the Butte-aux-Cailles, the hill of St. Geneviève, and Montrouge. The ascent is gradual, the highest point being not more than 400 feet above sea-level, while the mean elevation is from 100 to 130 feet. Consequently the site is one of the finest possible for a large city, and art and nature have combined to render this one of the most beautiful on earth. There are three islands in the Seine within the bounds of Paris:—the island of St. Louis, the Ile de la Cité, and the Ile aux Cygnes. The river is crossed by numerous bridges, of which the chief architecturally and historically are the Pont Neuf, Pont d'Iena, Pont des Artes, Pont de la Concorde, and Pont des Invalides. The width of the Seine varies from 440 to 530 feet; it is embanked and quayed on both sides, and these embankments form fine, wide boulevards. The city is inclosed by a line of fortifications measuring over twenty-two miles in circumference. On the right side of the river it presents sixty-eight fronts, and on the left twenty-six, each consisting of a curtain connecting two demi-bastions. It is pierced by fifty-six gates, nine openings for railways, and two openings for the Ourcq and the St. Denis canals. Outside of this enceinte are a number of detached forts arranged in two main lines. First come the forts erected previous to 1870 at St. Denis, Aubervilliers, Romainville, Noisy, Rosny, Nogent, Vincennes, Ivry, Bicêtre, Montrouge, Vanves, Issy, and Mont Valérien; and next the new forts of Palaiseau, Villeras, Buc, and St. Cyr, which protect Versailles, and Marly, St. Jamme, and Aigremont, which surround St. Germain. On the right side of the Seine are Forts Corneilles, Domont, Montlignon, Montmorency, Écouen, Stains, Vaujours, Villiers, and Villeneuve St. Georges. Between the two lines the Chatillon fort occupies the site of the German batteries which bombarded Paris in 1871.

The old part of Paris, which is of great antiquity, is grouped chiefly about the Ile de la Cité, on which is the Cathedral of Notre Dame. In this division the streets are somewhat irregular, but elsewhere they are wide, and the elaborate system of boulevards perfected under the Second Empire affords ready access to all parts of the city.

The line of the boulevards, from the Madeleine to the Bastille, nearly three miles, is one of the busiest and most fashionable in the world; here are the Porte St. Denis, the Porte St. Martin, most of the large cafés, the Opera-House, and the various theaters distinguished as Le Vaudeville, Les Nouveautés, L'Opéra Comique, Les Variétés, Le Gymnase, La Porte St. Martin, La Renaissance, L'Ambigu, Les Folies Dramatiques, Dejazet, Beaumarchais, and Le Cirque. Traffic passes east and west from the Bastille to the Place de la Concorde by Rue St. Antoine and Rue de Rivoli. North and south the line of the Boulevard de Strasbourg and the Boulevard de Sébastopol stretches from the station of the Eastern Railway (Gare de l'Est) to the Seine,

and is continued by the Boulevard du Palais in the Cité and the Boulevard St. Michel, on the left side of the river, as far as the observatory. The total length is not less than two and one-half miles. On the right side of the river may also be mentioned the Rue Royale; the Malesherbes and Haussmann boulevards, which cross the most elegant quarters of the town; the Avenue de l'Opéra, which unites the Place du Palais Royal with the Place de l'Opéra, and terminates at the main entrance of the Opéra; the Rue de la Paix, Rue Auber, and Rue 4 Septembre, which also terminate in the Place de l'Opéra, and are remarkable for their magnificent shops; Rue LaFayette, one of the longest thoroughfares of Paris, traversing the town from the Opera to the end of La Villette; the Boulevard Magenta, from Montmartre to the Place de la République; Rue de Turbigo, from this Place to the Halles Centrales. The older streets, known as Richelieu, Vivienne, De la Chaussée d'Antin, St. Honoré, Montmartre, St. Denis, St. Martin, are full of shops and offices. The Place de l'Arc de Triomphe de l'Étoile is the center of twelve avenues stretching out from it like the spokes of a wheel, but not all as yet lined with buildings. On the left side of the river the main thoroughfare is the Boulevard St. Germain, from Pont Sully to the Pont de la Concorde, which passes in front of the school of medicine, the Place St. Germain des Prés, and the war office. The boulevards are paved with asphalt, and the arrangements for watering and cleaning are perfect.

No city in the world has such an abundance of public squares or "Places" as Paris. Chief among these are the Place de la Concorde, Place de l'Étoile, Place Vendôme, with the column and statue of Napoleon I.; Place du Carrousel, with a small triumphal arch commemorative of the campaign of 1806, which formed the entrance to the palace of the Tuileries, now demolished; Place des Victoires, with the equestrian statue of Louis XIV.; Place des Vosges, formerly Place Royale, with that of Louis XIII.; Place de la Bastille, with the column commemorative of the Revolution of July, 1830; Place de la République, with the Republic statue; Place de l'Hôtel de Ville; Place du Châtelet, with a column commemorative of the Italian campaign of 1796; those which take their names from the Bourse, the Palais Royal, and the Opera; Place de Rivoli, with the equestrian statue of Joan of Arc; Place Moncey, adorned with a monument in memory of the defense of Paris in 1814, as Place Denfert, at the opposite extremity of the town, is adorned with a colossal lion symbolizing the defense of 1871. South of the Seine are the Place St. Michel, adorned with a monumental fountain, and one of the great centers of traffic in Paris; Place du Panthéon; Place St. Sulpice; Place Vauban, behind the dome of the Invalides, and Place du Palais Bourbon, in front of the chamber of deputies.

The public gardens of Paris within the enceinte, although not numerous or large, are laid out with great taste. The gardens of the Tuileries suffered severely under the Commune (1871), when the palace was destroyed, but have been restored. The gardens of the Luxembourg, in front of the palace occupied by the senate, are rather larger than those of the Tuileries; with less regularity of form they present greater variety of appearance. In the line of the main entrance extends the beautiful Observatory Walk, terminating in a monumental fountain, which is in great part the work of Carpeaux. The Luxembourg conservatories are rich in rare plants. The Jardin des Plantes will be mentioned below in the list of scientific establishments. Beside these three great gardens laid out in the French taste, with straight walks and regular beds, there are several in what the French designate the English style. The

finest and most extensive of these, the Buttes-Chaumont Gardens, in the northeast of the city, occupy sixty-two acres of very irregular ground, which up to 1866 was occupied by plaster-quarries, limekilns, and brick-works. The "buttes" or knolls are now covered with turf, flowers and shrubbery. The Montsouris Park, in the south of the city, forty acres in extent, also consists of broken ground; in the middle stands the meteorological observatory. Monceau Park, surrounded by the most aristocratic quarters of modern Paris, is a portion of the old park belonging to King Louis Philippe, and is now the property of the town. The gardens of the Palais Royal are surrounded by arcades and fine shops. There is hardly, it may be further remarked, a district in Paris which has not of recent years its well-planned square kept up at municipal expense on some plot of ground cleared during the improvements. Such are those named after Tour St. Jacques (one of the most graceful monuments of old Paris), the Conservatoire des Arts et Métiers, the Temple, Montholon, Cluny, etc. There have recently been added the park of the Champs de Mars, and that of the Trocadéro with its fountains and aquarium.

But the real parks of Paris are the Bois de Boulogne and Bois de Vincennes, which belong to the city, though situated outside of the fortifications. The former is reached by the wide avenue of the Champs Élysées as far as the Arc de Triomphe, and thence by the avenue of the Bois de Boulogne or that of the Grande Armée. The first of these, with its sidewalks for foot passengers and equestrians, grass-plots, flower-beds, and elegant buildings with gardens and railings in front, affords a wide and magnificent prospect over the Bois and the hills of St. Cloud and Mont Valérien. The Bois de Boulogne covers an area of 2,158 acres, one-fourth of which is occupied by turf, one-eighth by roads, and the rest by clumps of trees, sheets of water, or running streams. Here are the two racecourses of Longchamps (flat races) and Auteuil (steeple-chases), and the gardens of the Acclimatization Society. The Bois de Vincennes, a little larger than the Bois de Boulogne, is similarly adorned with streams, lakes, cascades, and fountains.

One of the most notable of the public places of Paris is the Champ de Mars, a large sandy space in front of the École Militaire 1,100 yards in length, and 550 yards in breadth. On this the great Exposition of 1889 was located. The Field of Mars has had much to do with history. In 1790 60,000 Parisians participated in the voluntary labor of preparing it for the Fête de la Fédération, and on July 14th of that year (the anniversary of the taking of the Bastille) Louis XVI. swore fidelity to the new constitution there. Napoleon I. celebrated the *Champ de Mai* there on June 1, 1815, and the field was the site of the great Expositions of 1867 and 1878.

Paris is rich in public buildings, many of great architectural merit and others interesting by reason of their historical associations. The Palace of the Louvre, which lies on the right side of the Seine, in the heart of the city, consists of a quadrangle with an inner court 394 feet square, two galleries extending westward from two sides of the quadrangle, and two galleries external and parallel to these, and continued till they meet the side wings of the Tuileries. The east front of the Louvre is 548 feet long and 90 feet high, and the first story is occupied by Perrault's famous colonnade. Toward the west are those portions of the Tuileries which escaped the fire of 1871—the connecting galleries and (on the south) the Flora pavilion and (on the north) the Marsan pavilion, which was entirely rebuilt between 1872 and 1877. From Perrault's colonnade to the Flora pavilion the side facing the quay is

2,250 feet long. In the middle of each façade there is a pavilion rising above an archway. The western archway, which is surmounted by the clock, leads into Place Napoléon III., which has its center occupied by a square, and its north and south sides bordered with porticoes surmounted by statues of eminent Frenchmen. To the west is the Place du Carrousel. On the south side, at the junction of the Louvre and the Tuileries, is a gateway with three arches, of which the middle one is crowned with the bronze group by Mercier, *The Genius of the Arts*, erected in 1875. The river-front of the Louvre is in an older and more elegant style than the side facing Rue de Rivoli. It is connected with the buildings of the quadrangle by Henry IV.'s pavilion, which contains in its first story the elegant Apollo gallery.

The Palais de Justice in La Cité presents on the west side, toward Place Dauphine, a Greek façade by Duc (1865-70), one of the finest productions of modern art. From the Boulevard du Palais on the east it is separated by a magnificent eighteenth-century railing in wrought-iron and gilt. On this side lie the Salle des Pas Perdus and the Sainte-Chapelle. The fine square tower known as the Clock Tower stands at the corner formed by the Quai du Nord and the Boulevard du Palais; and on the north side lies the Conciergerie prison with the dungeon once occupied by Marie Antoinette. Opposite the Palais de Justice, on the other side of the boulevard, is the Tribunal de Commerce with a remarkable staircase under the cupola.

On the left bank of the Seine are the Luxembourg palace, the seat of the senate, and formerly the residence of Mary de' Medici; the Bourbon palace, the seat of the chamber of deputies, fronting the river and Pont de la Concorde, with a fine columned portico and pediment; the palace of the Legion of Honor, an exquisite building of Louis XIV.'s time; and the palace of the Institute, with a handsome dome. On the right side of the river lie the Élysée palace (in the Champs-Élysées), a vast building in a modern style, the residence of the president of the republic, and the palace of the Trocadéro, built for the Exhibition of 1878, the central rotunda of which contains the largest music-hall in Paris (for 15,000 auditors) and a colossal organ.

Among the government and administrative buildings may be mentioned the Hôtel de Ville, burnt in 1871, but rebuilt finer than before on the old site; the ministry of foreign affairs, where the congress of Paris was held in 1856; the ministry of marine, which occupies on Place de la Concorde one of the two pavilions erected by Gabriel on each side of Rue Royale; the ministry of war in the Boulevard St. Germain; the Bank, formerly the De la Vrillière "hôtel," built by Mansard; the Mint, with a fine façade stretching 394 feet along Quai Conti not far from Pont Neuf; the national printing establishment, formerly Cardinal Rohan's mansion; and the national record office, close at hand, formerly the Soubise mansion. These last two buildings are in the Quartier du Marais, where a great many ancient mansions are now used as warehouses and workshops.

The administrative buildings occupied by the various departments of state are principally situated on the left bank of the Seine. The Palais du Quai d'Orsay, formerly used by the Conseil d'Etat (Council of State), and the Cour de Comptes (treasury), was burned by the Communists and is still a ruin, although its walls are so strong that it can probably be restored. The palace of the Legion of Honor, near the Bridge of Solferino, was the residence of Mme. de Staël under the Directory.

The Chamber of Deputies, otherwise known as the Palais du Corps Legislatif or Palais Bourbon, was

built 1722 *et seq.* by the Prince de Condé, at a cost of 20,000,000 francs. It became national property in 1790, and was used for the sittings of the Council of Five Hundred. It is now occupied by the Chamber of Deputies. The residence of the president of the Chamber is to its right, and close by is the Ministry of Foreign Affairs, all these being opposite the Pont de la Concorde, and on the left bank of the Seine. The Ministry of Justice is on the west side of the Place Vendome.

The hotels of Paris are plentiful, and some of them, especially those on the right bank of the Seine, very large and magnificently furnished. The best are located in the Rue de Rivoli, Rue de Castiglione, Rue St. Honoré, Rue de la Paix, Place Vendome, and on the Boulevards des Capucines, and des Italiens, on the Avenue de l'Opéra, and in and near the Champs Elysée. The restaurants of the best class are found on the Boulevards des Capucines, des Italiens, and Poissonnière. The finest shops and retail stores are in the Boulevards, the Rue de la Paix, Avenue de l'Opéra, Rue Vivienne, and Rue de Rivoli, and there are very large stores near the Louvre, and in the Rue de Bac.

The largest and finest of the religious buildings of Paris is the cathedral of Notre Dame (426 feet long by 164 wide), restored between 1846 and 1879 by Viollet-le-Duc. As it now exists this church has five naves running the whole length of the building, and square chapels; the central *flèche*, recently restored, is 312 feet high, and two massive square towers worthily crown the principal façade, which is one of the most beautiful that have come down to us from the Middle Ages. The transept has also two façades, which, while less imposing, are more richly decorated with chiseled work, dating from about the middle of the thirteenth century. Of the elaborate decoration of the interior all that is old is a part of the screen of the choir, from the fourteenth century.

St. Geneviève or the Panthéon, consecrated by the Convention to illustrious men, but since restored to Christian worship, has the form of a Greek cross with a dome in the center and a columned portico in front, the pediment of which contains an immense bas-relief by David of Angers representing great men crowned by their country. Fénelon, Rousseau, Voltaire, Mirabeau, Laplace, Cuvier, etc., may be distinguished. The crypt contains the tombs of Soufflot (the architect of the church), Rousseau, Voltaire, and Victor Hugo. Near St. Geneviève stand St. Étienne du Mont with a magnificent roodloft, and the chapel of St. Geneviève with the tomb of this patroness of Paris. The Madeleine, intended by Napoleon I. for a temple of victory, has the form of a Greek temple. At St. Germain des Près, St. Severin, and St. Vincent de Paul are beautiful frescoes by Hippolyte Flandrin, to whom a monument has been erected in St. Germain.

Of other religious edifices may be mentioned the new church of the Sacred Heart on the heights of Montmartre; St. Sulpice (almost as large as Notre Dame); St. Germain l'Auxerrois; St. Roch, from the steps of which Napoleon Bonaparte directed his cannon on the 13th Vendemiaire against the royalists who were about to attack the Convention.

There are many buildings in Paris devoted to entertainment and amusement, and of these the Grand Opera and L'Opéra Comique may be particularly mentioned. The first is the National Academy of Music and Dancing. It was begun by Napoleon III. in 1861 and completed under the republic in 1875. It covers two and three-fourths acres and cost \$7,220,000. The Opéra Comique is the home of light opera; the Théâtre Français and the Odéon of the classic drama.

Beside these there are the Gymnase and the Vaudeville, Les Folies Dramatiques, Les Bouffes, and nearly a hundred others.

Among the artistic adornments of Paris must be noted the Arc de Triomphe de l'Etoile (the Arch of the Star), the largest triumphal arch in existence. It was begun by Napoleon I. in 1806 to commemorate the glories of France, and was completed in 1836. It consists of a vast arch 67 feet high and 146 feet wide, intersected by a lower transversal arch. The whole structure is 160 feet high, 146 feet wide and 72 feet deep, and it is elaborately ornamented with statuary, groups in bronze and bas-reliefs. There is a smaller arch, a replica of that of Severus, in the Place du Carrousel. The Column Vendome in the Place of the same name, is constructed of masonry cased with bronze plates inscribed with battle scenes. The metal used was obtained by melting down 1,200 Austrian and Russian cannon. It is 142 feet in height and is surmounted by a statue of Napoleon I. In May, 1871, it was overthrown by the Communists, but has since been restored. The Column of July, built in honor of the civic heroes of the 1830 Revolution, stands on the Place de la Bastille. In the vaults under it are buried many hundreds of the victims of the Revolutions of 1830 and 1848. The Obelisk of Luxor, brought from Egypt in 1833, adorns the magnificent Place de la Concorde, the finest in the world, and the scene of the execution of Louis XVI. and Marie Antoinette, of Charlotte Corday, Danton, Robespierre, Camille Desmoulins, Hebert, St. Just, and nearly 3,000 others, who perished by the guillotine between January 21, 1793, and May 3, 1795. The Place de la Concorde also contains eight stone figures emblematic of the chief towns of France.

In the center of the court of the New Louvre is a gigantic monument to Leon Gambetta. Other noticeable statues are those of Joan of Arc, Moliere, and Henry IV., the latter on the Pont Neuf.

The Hôtel des Invalides, with its conspicuous gilded dome, occupies an area of about thirty acres and was founded in 1670 by Louis XIV. Soldiers disabled by wounds and those who have served for thirty years are entitled to admission, and there is room for 5,000. The chief attraction of the Invalides is the tomb of Napoleon I., where the great conqueror rests in a magnificent sarcophagus of granite.

Of educational institutions of the higher order the greatest is the Sorbonne, founded in 1629, and recently removed into more capacious quarters in the street named after it. It comprises the three faculties of theology, letters, and science, and has over 10,500 students. The Collège de France, with thirty-nine professors, is under the direct control of the minister of public instruction.

The so-called *salles d'asile* are infant schools for children from three to six years of age, *i.e.*, from the time when their mothers place them in the *crèches* or day-nurseries, to the time when they may be admitted to the primary schools. The municipality maintains 126 secular *salles d'asile* receiving 15,939 children, and one *salle congréganiste*, (*i.e.*, under the management of a religious society) with 279 children. The private establishments comprise 23 secular "salles" with 1,243 children, and 39 congreganist "salles" with 4,231.

There are 173 primary secular schools (56,369 pupils) for boys, 161 secular schools (46,579 pupils) and 2 congreganist schools (765 pupils) for girls. The private primary schools are 183 secular schools and 70 congreganist for boys, 577 secular schools and 136 congreganist for girls—number of pupils unknown. At certain hours the primary schools are transformed into classes for adults—116, with 14,288 pupils. The

"higher schools" (*écoles supérieures*) supply education for industrial or commercial careers. They have 677 pupils between six and thirteen years of age and 2,956 above thirteen, who are distributed among the Collège Chaptal and the Turgot, Lavoisier, Colbert, J. B. Say, and Arago schools. The apprentice school (*école d'apprentis*) with 228 pupils, the normal schools (for males, 205 pupils; for females, 68 pupils), and the Pape-Carpentier school, which trains matrons for *salles d'asile* complete the list of the municipal establishments for primary education. Besides there are private normal schools for Protestant teachers (male and female), a private normal school for girls, normal classes for ladies under the auspices of the Society for Elementary Instruction, and professional schools for both girls and boys. Commercial instruction is given in two schools placed under the patronage of the chamber of commerce, and a special commercial high school established about 1880. Municipal libraries, subsidized by the city, have been established in all the arrondissements; they lent 401,415 works, the number of books contained in the libraries being 89,355.

Secondary education is provided by the municipal Collège Rollin; in the national lycées (Louis le Grand, Henry IV., St. Louis, and Vanves), which have both boarders and day pupils; the Charlemagne and Condorcet lycées, for day pupils only; and the Collège Stanislas, more especially for boarders. It is between these establishments, subjected to the same university programme, and the Versailles lycée that the great competition of the Sorbonne takes place at the close of each school year. The number of their pupils (Stanislas excepted) is over 10,000. There are also private secular and ecclesiastical schools with nearly 30,000 pupils.

The *Bibliothèque Nationale*, the most extensive library in the world, stands in the block formed by the Rues de Richelieu, des Petit-Champs, Vivienne and Colbert, on the site of the palace of Cardinal Mazarin. It contains over 2,500,000 volumes, beside most elaborate collections of books and maps, engravings, medals and antiques, and has a public reading-room and halls for study.

Among the learned societies of Paris the first in importance is the Institut de France, which has already been described (see INSTITUTE OF FRANCE). The committee of learned societies at the ministry of public instruction forms, as it were, the center of the various societies not maintained by the government; and the French Association for the Advancement of the Sciences, founded in 1872, is based on the model of the older British society, and like it meets every year in a different town. The other societies may be classified as follows:—1. *Historical or Geographical*—History of France, Antiquaries of France (till 1814 known as Celtic Academy), Historic Studies, Numismatics and Archæology, Bibliophiles, School of Charters, Ethnography, Geography (1821, and thus the oldest of its class), Asiatic (1822), French Alpine Club (Club Alpin); 2. *Natural and Medical Sciences*—Anthropology, Zoölogical Acclimatization (which has the direction of the zoölogical gardens in the Bois de Boulogne), Entomological, Geological, Surgery, Anatomy, Biology, Medical of the Hospitals, Legal Medicine or Medical Jurisprudence, Practical Medicine, Pharmacy, Agriculture, Horticulture; 3. *Industrial and Moral Sciences*—Encouragement of National Industry, Statistics, Elementary Instruction, Franklin (for the foundation of popular libraries); 4. *Positive Sciences and Fine Arts*—Philomathic, Physical, Philotechnic, Athenæum of the Arts, Sciences, and Literature (1792), Concerts of the Conservatoire de Musique (1759).

Paris is largely supplied with newspapers, many of

which have a great circulation. Of these the chief are the *Republique Française* (founded by Gambetta and now conducted by M. Clemenceau), the *Moniteur*, official organ, the *Gazette de France*, *Le Monde*, *Le Constitutionnel*, *L'Univers*, *Le Soliel*, *Le Pays* (Bonapartist), *La Justice*, *Le Paix*, *Figaro*, and *Le Petit Journal*. There are also many illustrated papers.

The Jardin des Plantes (1626), about seventy-five acres in extent, forms one of the most interesting promenades in Paris; its museum of natural history (1793), with its zoölogical gardens, its hothouses and greenhouses, its nursery and naturalization gardens, its museums of zoölogy, anatomy, anthropology, botany, mineralogy, and geology, its laboratories, and its courses of lectures by the most distinguished professors in all branches of natural science, make it an institution of universally acknowledged eminence.

The richest museum in Paris occupies the Louvre, the finest of its palaces. On the ground floor are museums (1) of ancient sculpture, containing such treasures as the *Venus of Milo*, the *Pallas of Velletri* (the most beautiful of all statues of Minerva), the colossal group of the Tiber, discovered at Rome in the fourteenth century, etc.; (2) of mediæval and renaissance sculpture, comprising works by Michelangelo, Jean Goujon, Germain Pilon, John of Bologna, etc., and special rooms devoted to early Christian monuments and to Jewish antiquities (this last a feature peculiar to the Louvre); (3) of modern French sculpture, with works by Puget, Coustou, Coysevox, Chaudet, Houdon, Rude, David of Angers, etc.; (4) of Egyptian sculpture and inscriptions; (5) of Assyrian antiquities; (6) of Greek and Phœnician antiquities; (7) of engraving. On the first floor are (1) the Lacaze museum, a magnificent collection of pictures presented to the state by M. Lacaze in 1869; (2) the splendid musée de peinture; (3) the Campana museum; (4) a museum of Greek antiquities; (5) a museum of Egyptian antiquities; (6) an Oriental museum (Persian pottery, Chinese vases, lacquered work, etc.); (7) the Lenoir museum (snuff-boxes, jewels, miniatures, lacquered wares, bequeathed to the Louvre by M. and Madame Lenoir in 1874); (8) the Duchatel room, bequeathed by the widow of the minister of that name (*La Source*, a masterpiece by Ingres); (9) the Timbal, His de la Salle, and Davilliers collections, consisting respectively of furniture and curiosities, drawings, pottery, and tapestry; (10) a mediæval and renaissance museum, comprising French, Italian, or Hispano-Moorish pottery and terra-cotta ware, as well as objects in bronze, glass, and ivory—the Sauvageot collection being of note; (11) the museum of drawings and chalks, of which the more valuable are preserved in drawers; (12) a museum of ancient bronzes; (13) the Apollo gallery, adorned by the leading artists who have been employed on the palace, and containing the royal gems and jewels, articles of goldsmith's work, and enamels. The second floor accommodates the naval museum, the ethnographic museum (African, Chinese, Mexican), part of the French school of painting, and rooms for the study of Egyptian papyrus-rolls.

The museum of the Luxembourg, installed in a portion of the palace occupied by the senate, is devoted to works of living painters and sculptors acquired by the state. They remain there for ten years after the death of the respective artists, when the finest are selected for the Louvre.

The Cluny museum occupies the old mansion of the abbots of that order, built in the fifteenth century by Jacques d'Amboise. It was founded by M. du Sommerard, whose collections were acquired by the state in 1843. Increased from year to year since that date, it

now contains about 10,000 articles—pieces of sculpture in marble and stone, carvings in wood, ivories, enamels, terra-cottas, bronzes, furniture, pictures, stained glass, pottery, tapestry, glassware, locksmith-work, and jewelry of mediæval and Renaissance times. In the neighborhood are the remains of the ancient palace of the emperor Julian; in the midst of the ruins, and in the garden which surrounds them, has been collected a Gallo-Roman museum, to which have been added many fragments of mediæval sculpture or masonry, found in the city or its vicinity. The Carnavalet museum occupies the mansion in which Madame de Sévigné resided; it is a municipal museum, in which are brought together all objects of interest for the history of Paris. The artillery museum, in the Hôtel des Invalides, comprises ancient armor, military weapons, flags, and an ethnographic collection reproducing the principal types of Oceania, America, and the coasts of Africa and Asia. The permanent exhibition of the products of Algeria and the colonies is in the Palais de l'Industrie; and finally the Trocadéro palace contains a museum of comparative sculpture and ethnographic galleries for exhibiting curiosities brought home from distant countries by the principal French official travelers.

Paris is divided for municipal purposes into twenty arrondissements. Each arrondissement is divided into four quarters, each of which nominates a member of the municipal council. The functionaries of the arrondissement are—a mayor (*maire*) and three deputies (*adjoints*) nominated by the prefect of Seine, who act as registrars, and preside over the poor-relief (*bureau de bienfaisance*) of their arrondissement, and a justice of the peace (*judge de paix*) nominated by the government. There is no elective mayor of Paris; the president of the municipal council, who is nominated by his colleagues, merely acts as chairman of their meetings. When occasion requires, the function of mayor of Paris is discharged by the prefect of Seine. The municipal council discusses and votes the budget of the city. The prefect of Seine and the prefect of police (both magistrates named by the government, but each with a quite distinct sphere of action) represent the executive authority as opposed to the municipal council, which latter has no power by refusing a vote of credit to stop any public service the maintenance of which legally devolves on the city; in case of such refusal the minister of the interior may officially insert the credit in the budget; and in like manner he may appeal to the head of the state to cancel any decision by which the council has exceeded its legal functions. The prefecture of Seine comprises a departmental service, differing in no essential particular from that of other prefectures, and a municipal service for the city of much more importance. Elections, rates, municipal debt, city schools, public lands, municipal buildings, markets and market-places (in respect to the collection of dues), cemeteries, roads and streets, public edifices, water-works and sewers, promenades and plantations, river navigation and river ports, public pawnbroking establishments, and the relief of the poor, are all under the control of the prefecture of Seine.

The prefecture of police includes the whole department of Seine and the neighboring communes of the department of Seine-et-Oise—Meudon, St. Cloud, Sèvres, and Enghien. It consists of three sections—political police, police of public safety, and administrative police, the former two being rather national than municipal. The state consequently repays two-fifths of the annual budget of about \$4,000,000 which this prefecture receives from the city.

The municipal police deals with public health, civil

order, and repression of crimes and misdemeanors, whether against person, property, or morals. It exercises surveillance over lodging-houses, the insane, and prostitutes, tests weights and measures, and has charge of the markets, the public vehicles, the fire department, sanitary arrangements, and exhumations and reinterments in the cemeteries.

The prefect of police has a staff of about 9,000 officials—*commissaires de police*, *officiers de paix*, *gardiens de la paix* (a kind of police-magistrate), and inspectors. He has also under his orders the *sapeurs pompiers* or fire-brigade (1,742 men), and the republican guard, long called the municipal guard, which numbers 3,295 men, besides a mounted force of 726. He has full control over the budget of his department, which is voted *en bloc* by the municipal council.

The climate of Paris is fairly uniform, the mean temperature, calculated for seventy-five years, being 51° Fahr. The highest known registration was 101°, the lowest —14° Fahr. The Seine freezes in whole or in part about once in ten winters. Rain falls on the average on 143 days per annum, and snow on 12 days. The numerous railways radiating from Paris start from nine different stations. In addition to the great trunk lines to the north, to Lyons and the Mediterranean, to Orleans, to Strasburg and Germany, and to the west of France there is a central railroad connecting the suburbs and a new metropolitan junction line nearly completed. Intramural communication is afforded by cabs, omnibuses, tramways, steamboats, and a railway (the Chemin de Fer de Ceinture). The steamboats ply up the river to Charenton, down the river to Suresnes. Within the city they plied on 329 days, made an aggregate of 8,162 days of service, traversed 497,997 miles, and conveyed 11,170,980 passengers. The omnibus company employs both ordinary omnibuses and tramway cars. It has 610 omnibuses and 255 tram-cars, conveying 200,187,455 passengers. The two tramway companies, distinguished as Northern and Southern, have conveyed respectively 26,076,761 and 27,067,951 passengers. The Chemin de Fer de Ceinture, which runs around the city just within the fortifications, conveyed 21,617,909. Paris has about 15,000 cabs (*voitures* and *fiacres*). The omnibuses and street-cars stop only at the stations, about two blocks apart, where waiting-rooms are provided for intending passengers. Numbered tickets are issued at these stations, and passengers take their turns. Overcrowding is impossible, and every person gets a seat. The fare is 6 cents inside and 3 cents outside for any distance within the fortifications, and by the system of *correspondances* or transfers one can ride practically all over Paris for one fare.

Paris derives its water-supply (1) from the Seine and the Marne, (2) from the Ourcq Canal, (3) from artesian wells, and (4) from springs. (1) The two steam-pumps at Chaillot on the Seine raise each at their ordinary rate 635,688 cubic feet and at their maximum 1,518,588 in the twenty-four hours. The ten pumps at Port à l'Anglais and Maisons-Alfort above Paris, at St. Ouen below Paris, and at the Quai d'Austerlitz and Auteuil (within the city), can supply about 600,372,000 cubic feet per annum. In 1880 about 2,119,000 cubic feet on an average were taken daily from the Seine. The water is stored in reservoirs at the highest points in Passy, Montmartre, Charonne, and Gentilly. The establishment at St. Maur, situated on the canal which closes the loop of the Marne, and partly moved by the head of water and partly by steam, supplies the Bois de Vincennes and the elevated districts of Belleville and Ménilmontant. It can furnish 2,896,000 cubic feet in the twenty-four hours. (2) The Ourcq Canal, which is also used as a waterway, comes from the department

of Aisne, and terminates at the La Villette basin, which also receives the St. Denis and St. Martin Canals. It brings a volume of 4,414,500 cubic feet per day, to which are added in summer from 2,000,000 to 2,500,000 cubic feet procured from the Marne near the confluence of the Ourcq, and discharged into the canal. The water is hardly suitable for domestic use, owing to the quantity of foreign matter which it contains. (3) The water of the artesian wells is much purer. The Grenelle well is 1,797 feet deep, and reaches the greensand; its daily yield is 12,360 cubic feet of water at a temperature of 80° Fahr., which rises to a height of 238 or 239 feet, and can thus be carried to the summit of Mont St. Geneviève. The Passy well is 1,922 feet deep, and yields an average of 233,000 cubic feet in the twenty-four hours. The total daily water-supply is over 20,000,000 cubic feet. There is an abundant supply of public fountains, public baths, and wash-houses. Peculiar features of Paris are the floating baths and wash-houses in the Seine.

The drainage system has been greatly extended of late years. The drainage of both sides of the river is collected in a great sewer ending in the Seine at Clichy, opposite Asnières; the main sewer of the left side of the river is connected with that of the right side by a siphon which passes under the Seine by a tunnel near the Pont de l'Alma. A departmental sewer, receiving the waters of the elevated districts of Charonne, Ménilmontant, Belleville, and Montmartre, terminates at St. Denis. These sewers are much more than great drains: they are used as passages for water-pipes, gas-pipes, telegraph-wires, and pneumatic tubes. The two largest classes of them have a height respectively of fourteen and a half feet and seventeen feet six inches at the key-stone, and a width respectively of eighteen feet five inches and seventeen feet at the spring of the arch. The smallest class is only six feet high and three feet wide. The most usual class, of which there are 171 miles, has a height of seven and a half feet, and a width of four and a half feet.

The sewage from these mains is partly employed in irrigation in the plain of Gennevilliers, on the left bank of the Seine, opposite St. Denis and Clichy. At the close of 1881 1,216 acres were under treatment, though the system was only commenced in 1872 on a tenth of that area; and the drains employed, varying from one to four feet in diameter, had an extent of twenty-one miles, and discharged the sewage by 571 outlets. The quantity of sewage discharged daily by the sewers varies from 10,171,000 cubic feet to 13,112,266 cubic feet.

The cemeteries of Paris are widely-known. Chief of these is Pere-la-Chaise, situated on a hill at the north-east end of the city, one and one-half miles from the Place de la République. It was laid out as a cemetery in 1804. In 1814 it was the scene of an engagement between French and Russian troops, and in May, 1871, the Communists made their last stand here against the government troops. The sarcophagus of Abelard and Heloise, reconstructed from an old monument, is one of the features of Pere-la-Chaise. Space would fail to tell of the monuments to the distinguished dead to be found here. Among them are those of "the lost La Bédouère;" Casimir Perier; Raspail and Blanqui, revolutionists; Adolphe Thiers, Bellini and Cherubini, the composers; Marshal Kellermann; the Abbé Sieyès; Marshal Macdonald; Talma, the tragedian; Admiral Sir Sidney Smith; Marshal Masséna; Beaumarchais; Béranger; Cambacérès; Geoffroy Saint-Hilaire; Lafontaine; Laplace; Gay-Lussac; Balzac; the Duc de Morny, Delacroix, the painter; Charles and Louis Blanc, Rossini, Alfred de Musset, Ledru Rollin,

Auber, Arago, Mlle. Rachel, and hundreds of others. The other cemeteries of Paris are Montmartre, Montparnasse, St. Ouen (2), and Ivry (2). The Catacombs in the ancient quarries under the southern part of the city contain the remains of hundreds of thousands.

The courts are housed in the Palais de Justice on the Island of the City. It occupies the site of the ancient palace of the kings of France, but very little of the original remains. The Palais was almost completely restored between 1859 and 1870, but a greater part of it was burned under the Commune.

Paris is the seat of four courts having jurisdiction over all France: (1) the Tribunal des Conflits, for settling disputes between the judicial and administrative authorities on questions as to their respective jurisdiction; (2) the Council of State, for litigations between private persons and public departments; (3) the Cour des Comptes; and (4) the Cour de Cassation. The first three sit in the Palais Royal, the fourth in the Palais de Justice, which is also the seat of (1) a cour d'appel for seven departments (five civil chambers, one chamber of appeal for the correctional police, one chamber for preliminary proceedings), (2) a cour d'assises (members nominated for a term of three months; two sessions per month), (3) a tribunal of first instance for the department of Seine (seven civil chambers for civil affairs, sequestration of real estate, and sale of personal property; four chambers of correctional police), (4) a police court where each *juge de paix* presides in his turn assisted by a *commissaire de police*. Litigations between the departmental or municipal administrations and private persons are decided by the *conseil de préfecture*.

The prefect of police, charged with the maintenance of public safety, has the prison department under his supervision. There are eight prisons in Paris—Mazas, La Santé, Ste. Pélagie, St. Lazare (for females), the dépôt (police station) of the prefecture of police, the Conciergerie or lock-up at the Palais de Justice, the Grande Roquette (for condemned criminals), and the Petite Roquette reformatory. The Tribunal de Commerce, opposite the Palais de Justice, is a magnificent structure.

The most recent vital statistics obtainable show that the number of females in Paris exceeds the males by about 13,000. The twenty arrondissements, with an area of 19,177 acres, contained a population of 2,239,928, dwelling in 77,014 houses; giving 117 persons to the acre. The births numbered in one year 59,874, and the deaths 57,066.

The lighting of Paris is practically in the hands of the gas company, electric lighting being still in the experimental stage, and oil being used only in a small and ever-diminishing number of out-of-the-way streets. The daily consumption reaches a maximum (36,005,949 cubic feet) in December and a minimum (14,073,112 cubic feet) in July.

The manufacturing industries of Paris are many and varied. The larger manufacturing establishments comprise engineering and repairing works connected with the railways, similar private works, foundries, and sugar refineries. Government works are the tobacco factories of Gros Caillou (2,000 workmen) and Reuilly (1,000), the national printing establishment (1,000), the mint (where money and medals are coined by a contractor under state control), and the famous tapestry factory and dyeworks of the Gobelins. The list of minor establishments is a very varied one; most of them devoted to the production of the so-called *articles de Paris*, and carrying the principle of the division of labor to an extreme. The establishments which rank next to those above mentioned in the number of workmen are the chemical factories, the gasworks, the printing-offices,

cabinet-makers' workshops, boot factories, tailoring establishments, hat factories, and works for the production of paper-hangings.

Official returns state the number of workpeople at over 600,000, whose annual wages equal \$200,000,000. The largest financial institution in Paris, and in fact in the world, is the Bank of France, which has the exclusive privilege of issuing bank notes. It has ninety branches in the provinces. Other important financial establishments are the Caisse des Dépôts et des Consignations, the Crédit Foncier, and the Comptoir National d'Escompte. The postoffice controls the telegraph and money-order business, and pneumatic tubes are used for the dispatch of messages. The telephonic system is being rapidly extended.

The administration of public charity is in the hands of the government, and the hospitals are supported by subsidies and certain taxes, as those on theaters and the Mont de Piété, the government pawnshop. The Hôtel-Dieu, rebuilt in La Cité recently at a cost of \$9,000,000, has a world-wide reputation. La Salpêtrière, the oldest of all, occupies seventy-four acres. More than 100,000 patients are relieved every year at the fifty-eight houses of relief. The Bicêtre contains 700 male, and the Salpêtrière 720 female insane patients. Foundlings and orphans are supported at the Hospice des Enfants Assistés.

Paris is the seat of a military government, whose commandant has under him all the troops stationed in the departments of Seine and Seine-et-Oise. The soldiers recruited in the two departments are distributed among the second, third, fourth, and fifth *corps d'armée*, whose headquarters are at Amiens, Rouen, Le Mans, and Orleans. The principal barracks belonging to the state in Paris are those of the military school of Prince Eugene and Napoleon; the town possesses the barracks of the republican guard, the gendarmes, and the firemen in different quarters. The most important are those of La Cité, to which the prefecture of police was transferred after the destruction of its former buildings by fire in 1871. Besides the war office and the hospitals named above the main establishments comprise the dépôt of the fortifications, the central artillery dépôt with the workshops of St. Thomas d'Aquin, and the dépôt of the commissariat department.

#### HISTORY.

An island in the Seine, now almost lost in the modern city, and then much smaller than at present, was for centuries the entire site of Paris. The sole importance of the town lay in its being the capital of a similarly insignificant Gallic people, who navigated the lower course of the Seine, and doubtless from time to time visited the coasts of Britain. So few were its inhabitants that they early put themselves under the protection of their powerful neighbors the Senones, and this vassalship was the source of the political dependence of Paris on Sens throughout the Roman period, and of a religious subordination which lasted till the seventeenth century. The capital did not at once take the name of the Parisii, whose center it was, but long kept that of Lucetia, Lucotetia, or Lutetia, of which Lutèce is the generally recognized French form.

Lutetia was somewhat neglected under the Roman emperors of the first centuries. Its inhabitants continued quietly carrying on their river traffic, and devoted part of their wealth to the maintenance of a great temple to Jupiter built on the site of the present cathedral of Notre Dame. It is not known at what date Christianity was introduced into the future capital of France; but it is probable, judging by the use of the title "city," that Lutetia was the see of one of the earliest of the bishoprics of Gallia Celtica.

Lutetia was in some sort the cradle of Christian liberty, having been the capital, from 292 to 306, of the mild Constantius Chlorus, who put an end to persecution in Brittany, Gaul, and Spain, over which he ruled. This emperor fixed his residence on the banks of the Seine. There was the imperial palace, the remains of which, a magnificent vaulted chamber, beside the Hôtel de Cluny, are now known, probably correctly, as Julian's Baths. At some distance up the river, in the quarter of St. Victor, excavations in 1870 and in 1883 laid bare the foundations of the amphitheater, which was capable of holding about 10,000 spectators, and this suggests the existence of a population of 20,000 to 25,000 souls.

Numerous calamities befell Paris from 586, when a terrible conflagration took place, to the close of the Merovingian dynasty. The kings in the long run almost abandoned the town, especially when the Austrasian influence under the mayors of the palace tended to shift the center of the Frankish power toward the Rhine.

Though the Merovingian period was for art a time of the deepest decadence, Paris was nevertheless adorned and enriched by pious foundations.

The first Carolingian, Pippin the Short, occasionally lived at Paris, sometimes in the palace of Julian, sometimes in the old palace of the Roman governors of the town, at the lower end of the island; the latter ultimately became the usual residence. Under Charlemagne Paris ceased to be the capital; and when feudal France was constituted under Charles the Bald it was liberally bestowed, like any ordinary place, on mere counts or dukes.

With Hugh Capet, in 987, the capital of the duchy of France definitely became the capital of the kingdom, and in spite of the frequent absence of the kings, several of whom preferred to reside at Orleans, the town continued to increase in size and population, and saw the development of those institutions which were destined to secure its greatness.

Philip Augustus may be considered the second founder of Paris, and he there built for himself, near St. Germain l'Auxerrois, the Louvre, the royal dwelling *par excellence*, whose keep was the official center of feudalism. He created or organized a regular system of administration with its headquarters at Paris; and under his patronage the public lectures delivered at Pré-aux-Clercs were regulated and grouped under the title of a university in 1200.

This university, the most famous and flourishing in Christendom, considerably augmented the local population, and formed, as it were, a new town on the left side of the river, where the important abbeys of St. Geneviève, St. Germain-des-Prés, and St. Victor, and a vast Carthusian monastery already stood. Colleges were erected to receive the students of the different countries, and became the great meeting-place of the studious youth of all Europe. Under St. Louis, Robert de Sorbon, a common priest, founded, in 1253, an unpretending theological college which afterward became the celebrated faculty of the Sorbonne, whose decisions were well-nigh as authoritative as those of Rome.

Philip the Fair increased the political importance of the capital by making it the seat of the highest court in the kingdom, the *parlement*, which he organized between 1302 and 1304, and to which he surrendered a part of his Cité palace. In 1420 a treaty, from the ignominy of which Paris happily escaped, gave a daughter of Charles VI. to Henry V. of England, and along with her, in spite of the Salic law, the crown of France. The king of England made his entry into Paris in December, 1420. Charles VI. remained almost



abandoned at the Hôtel St. Paul, where he died in 1422, while his son-in-law went to hold a brilliant court at the Louvre and Vincennes. Henry V. of England also died in 1422. His son Henry VI., then one year old, came to Paris nine years later to be crowned at Notre Dame, and the city continued under the government of the duke of Bedford till his death, in 1435.

Without assuming the mission of delivering Paris, Joan of Arc, remaining with Charles VII. after his coronation at Rheims, led him toward the capital; but the badly conducted and abortive enterprise almost proved fatal to the Maid of Orleans, who was severely wounded at the assault of the gate of St. Honoré on September 8, 1429. The siege having been raised, Charles awaited the invitation of the Parisians themselves upon the defection of the Burgundians and the surrender of St. Denis. The St. Jacques gate was opened by the citizens of the guard to the constable Arthur of Richemont on April 13, 1436.

Previous to 1533, the date of the commencement of the Hôtel de Ville and the church of St. Eustache, Paris did not possess, apart from the "Court of Accounts," any important building in the new style. Between 1527 and 1540 Francis I. demolished the old Louvre, and in 1541 Pierre Lescot began a new palace four times as large, which was not finished till the reign of Louis XIV.

When, after the murder of the duke of Guise at Blois at the close of 1588, Henry III. desired to return to Paris, he was not yet master of the city, and was obliged to besiege it in concert with his presumptive heir, the king of Navarre. The operations were suddenly interrupted on August 1, 1589, by the assassination of the king, and Henry IV. carried his arms elsewhere. He returned with his victorious forces in 1590. This second siege lasted more than four years.

Henry IV., who carried on the building of the Louvre, was the last monarch who occupied it as a regular residence. Attempts on his life were made from time to time, and at last on May 14, 1610, he fell under Ravallac's knife near the market-house in Rue de la Ferronnerie. Whether royalty gave it the benefit of its presence or not, Paris continued all the same to increase in political importance and in population. If the city on the left side of the river neither extended its circuit nor increased its population, it began in the sixteenth century to be filled with large mansions (hôtels), and its communications with the right bank were rendered easier and more direct when Henry IV. constructed across the lower end of the island of La Cité the Pont Neuf, which is now the oldest bridge in Paris. Mary de Medici built the palace of the Luxembourg, which, after being extended under Louis Philippe, became the seat of the senate.

Louis XIII. finished, with the exception of the eastern front, the buildings inclosing the square court of the Louvre, and carried on the wing which was to join the palace to the Tuileries. Richelieu built for himself the Palais Royal, since restored, and rebuilt the Sorbonne, where now stands his magnificent tomb by Girardon. The island of St. Louis above La Cité, till then occupied by gardens and meadows, became a populous parish, whose streets were laid out in straight lines, and whose finest houses still date from the seventeenth century. Though Louis XIV. ceased to stay in Paris after he grew up, he did not neglect the work of embellishment. On the site of the fortifications of Étienne Marcel, which during the previous hundred years had been gradually disappearing, he laid out the line of boulevards connecting the quarter of the Bastille with that of the Madeleine. Though he no longer inhabited the Louvre (and it never was again the seat

of royalty), he caused the great colonnade to be constructed after the plans of Claude Perrault. The Place Vendôme, the Place des Victoires, the triumphal gates of St. Denis and St. Martin, and several fountains, are also productions of the reign of Louis XIV. The hospital of La Salpêtrière, with its majestically simple dome, was finished by Libéral Bruant. The Hôtel des Invalides, one of the finest institutions of the Grand Monarque, was also erected, with its chapel, between 1671 and 1675, by Bruant; but it was reserved for the architect Hardouin Mansart to give to this imposing edifice a complement worthy of itself; it was he who raised the dome, which rises 344 feet above the ground.

In 1789 Paris doubled its extent by the accession of the great monasteries, the faubourgs of St. Germain and St. Marceau, the Jardin des Plantes, and the whole of Mont Ste. Geneviève. The line of the new enceinte is still marked by a circuit of boulevards passing from the Champs de Mars at Pont d'Austerlitz by Place de l'Enfer and Place d'Italie. Similar enlargements, also marked out by a series of boulevards, incorporated with the town on the right side the faubourgs of St. Antoine and Poissonnière and the quarters of La Chaussée d'Antin and Chaillot. During the consulate hardly anything of note took place at Paris except the explosion of the infernal machine directed against Bonaparte on December 24, 1800. The coronation of Napoleon by Pope Pius VII. was celebrated in Notre Dame on December 2, 1804. After the return of the Bourbons, Paris had to submit to a treaty more humiliating than the capitulation. Already in 1763 Louis XV. had signed in his capital the treaty with England known as the shameful (*Honteuse*), by which he surrendered a great part of the American and Indian colonies, and notably Canada. That of May 30, 1814, was more truly disastrous, since it dismembered the mother-country, canceled almost all the conquests of the republic and the empire, and lessened the military strength of France by robbing it of half its fleet. And worse even than this was the treaty of November 28, 1815, which not only suppressed the slight accession of territory recognized by the treaty of 1814, and doomed to demolition the fortifications of Huningue, but exacted a war indemnity of 700,000,000 francs (\$140,000,000), and demanded the maintenance in seven departments of 150,000 soldiers of the allied army until the payment of the entire sum.

Under Louis XVIII. the only event of note that occurred in Paris was the assassination of the duke of Berri by Louvel, February 13, 1820. Ten years later the revolution of 1830, splendidly commemorated by the Column of July in Place de la Bastille, put Charles X. to flight and inaugurated the reign of Louis Philippe, a troublous period which was closed by the revolution of 1848 and a new republic. It was this reign, however, that surrounded Paris with bastioned fortifications, with ditches and detached forts. The republic of 1848 brought no greater quiet to the city than did the reign of Louis Philippe. The most terrible insurrection was that of June 23 to 26, 1848, distinguished by the devotion and heroic death of the Archbishop Affre. It was quelled by General Cavaignac, who then for some months held the executive power. Prince Louis Napoleon next became president of the republic, and after dissolving the chamber of deputies on December 2, 1851, caused himself to be proclaimed emperor just a year later. The second empire completed that material transformation of Paris which had already begun at the fall of the ancient monarchy. It was under the first empire that the new series of improvements were inaugurated which have made Paris a modern city. Napoleon I. began the Rue de Rivoli,

built along this street the wing intended to connect the Tuileries with the Louvre, and erected in front of the court of the Tuileries the triumphal arch of the Carrousel, in imitation of that of Septimius Severus at Rome. In the middle of the Place Vendôme was reared, on the model of Trajan's column, the column of the grand army, surmounted by the statue of the emperor. To immortalize this same grand army he ordered from the architect Pierre Vignon a Temple of Victory, which, without changing the form of its Corinthian peristyle, has become the church of the Madeleine; the entrance to the avenue of the Champs Élysées was spanned by the vast triumphal arch De l'Étoile (of the star), which owes its celebrity not only to its colossal dimensions and its magnificent situation, but also to one of the four subjects sculptured upon its faces—the *Chant du Départ* or *Marseillaise*, one of the masterpieces of modern sculpture. Another masterpiece was executed by David of Angers, the pediment of the Panthéon, not less famous than Soufflot's dome. The museum of the Louvre, founded by decree of the Convention on July 27, 1793, was organized and considerably enlarged; that of the Luxembourg was created in 1805, but was not appropriated exclusively to modern artists till under the Restoration. The Conservatoire des Arts et Métiers, due to the Convention, received also considerable additions in the old priory or abbey of St. Martin des Champs, where the Council of Five Hundred had installed it in 1798.

Under the Restoration and under the government of July many new buildings were erected; but, with the exception of the Bourse, constructed by the architects Brongniart and Labarre, and the colonnade of the chamber of deputies, these are of interest not so much for their size as for the new artistic tendencies affected in their architecture.

Under Louis Philippe the Place de la Concorde was altered in various ways, and adorned with eight statues of towns and with two fountains; on October 25, 1836, the Egyptian obelisk, brought at great expense from Luxor, was erected in the center. The general restoration of the cathedral of Notre Dame was voted by the Chamber in 1845, and intrusted to Viollet-le-Duc; and the palace of the Luxembourg and the Hôtel de Ville were considerably enlarged at the same time, in the style of the existing edifices.

But the great transformer of Paris in modern times was Napoleon III. To him or to his reign we owe the Grand Opéra, the finest theater in the world; the new Hôtel-Dieu; the finishing of the galleries which complete the Louvre and connect it with the Tuileries; the extension of the Palais de Justice and its new front on the old Place Dauphine; the tribunal of commerce; the central markets; several of the finest railway stations; the viaduct at Auteuil; the churches of La Trinité, St. Augustin, St. Ambroise, St. François Xavier, Belleville, Ménilmontant, etc. For the first international Paris exhibition (that of 1855) was constructed the "palace of industry;" the enlargement of the national library was commenced; the museum of French antiquities was created by the savant Du Sommerard, and installed in the old "hôtel" built at the end of the fifteenth century for the abbots of Cluny.

All this is but the smallest part of the memorials which Napoleon III. left of his presence. Not only was the city traversed in all directions by new thoroughfares, and sumptuous houses raised or restored in every quarter, but the line of the fortifications was made, in 1859, the limit of the city. The area was thus doubled, extending to 7,450 hectares or 18,410 acres, instead of 3,402 hectares or 8,407 acres. It was otherwise with the population; to the 1,200,000 inhabitants which Paris

possessed in 1858 the incorporation of the suburban zone only added 600,000.

Paris had to pay dearly for its growth and prosperity under the second empire. This government, which, by straightening and widening the streets, thought it had effectually guarded against the attempts of its internal enemies, had not sufficiently defended itself from external attack, and at the first reverses of 1870 Paris found itself prepared to overthrow the empire, but by no means able to hold out against the approaching Prussians. The two sieges of Paris in 1870-71 are among the most dramatic episodes of its history. The first siege began on September 19, 1870, with the occupation by the Germans of the heights on the left side of the river and the capture of the unfinished redoubt of Châtillon. Two days later the investment was complete. General Trochu, head of the French Government and governor of the city, had under his command 400,000 men. The guards displayed a certain warlike spirit, but it was for the sole purpose of exciting disorder. Open revolt broke out on October 31st; it was suppressed, but increased the demoralization of the besieged and the demands of the Prussians. The partial successes which the French obtained in engagements on both sides of the river were rendered useless by the Germans recapturing all the best positions. In obedience to public opinion a great sortie was undertaken; this, in fact, was the only alternative to a surrender; for, the empire having organized everything in expectation of victory and not of disaster, Paris, insufficiently provisioned for the increase of population caused by the influx of refugees, was already suffering the horrors of famine. The bombardment began on December 27th, and great damage was done to the forts on the left of the Seine, especially those of Vanves and Issy, directly commanded by the Châtillon battery. A third and last sortie (which proved fatal to Regnault the painter) was attempted in January, 1871, but resulted in hopeless retreat. An armistice was signed on January 27th, the capitulation on the 28th. The revictualing of the city was not accomplished without much difficulty, in spite of the generous rivalry of foreign nations.

On March 1st the Germans entered Paris. This event, which marked the close of the siege, was at the same time the first preparation for the "commune;" for the national guard, taking advantage of the general confusion and the powerlessness of the regular army, carried a number of cannon to the heights of Montmartre and Belleville under pretext of saving them. President Thiers, appreciating the danger, attempted on March 18th to remove the ordnance; his action was the signal for an insurrection which, successful from the first, initiated a series of terrible outrages by the murder of the two generals, Lecomte and Thomas. The government, afraid of the defection of the troops, who were demoralized by failure and suffering, had evacuated the forts on the left side of the river and concentrated the army at Versailles (the forts on the right side were still to be held for some time by the Germans). Mont Valérien remained in the hands of the government, and became the pivot of the attack during the second siege. All the sorties made by the insurgents in the direction of Versailles (where the National Assembly was in session from March 20th) proved unsuccessful, and cost them two of their improvised leaders—Generals Flourens and Duval. The incapacity and mutual hatred of their chiefs rendered all organization and durable resistance impossible. On Sunday, May 21st, the government forces, commanded by Marshal MacMahon, having already captured the forts on the right side of the river, made their way within the walls; but they had still to fight hard from barricade to barri-

cade before they were masters of the city; Belleville, the special Red Republican quarter, was not assaulted and taken till Friday. Meanwhile the communists were committing the most horrible excesses; the archbishop of Paris (GEORGES DARBOY, *q.v.*), President Bonjean, priests, magistrates, journalists, and private individuals, whom they had seized as hostages, were shot in batches in the prisons; and a scheme of destruction was carried into effect by men and women with cases of petroleum (*pétroleurs* and *pétroleuses*). The Hôtel de Ville, the Palais de Justice, the Tuileries, the Ministry of Finance, the palace of the Legion of Honour, that of the Council of State, part of the Rue de Rivoli, etc., were ravaged by the flames; barrels of gunpowder were placed in Notre Dame and the Panthéon, ready to blow up the buildings; and the whole city would have been involved in ruin if the national troops had not gained a last and crowning victory in the neighborhood of La Roquette and Père-la-Chaise on May 28th. Besides the large number of insurgents who, taken in arms, were pitilessly shot, others were afterward condemned to death, to penal servitude, to transportation; and the survivors only obtained their liberty by the decree of 1879.

From this double trial Paris emerged diminished and almost robbed of its dignity as the capital; for the parliamentary assemblies and the government went to sit at Versailles. For a time it was thought that the city would not recover from the blow which had fallen on it. All came back, however—confidence, prosperity, and, along with that, increasing growth of population and the execution of great public works. The Hôtel de Ville has been rebuilt, the school of medicine adorned with an imposing façade, a vast school of pharmacy established in the old gardens of the Luxembourg, and boulevards completed. The exhibition of 1878 was more marvelous than those of 1855 and 1867, and unlike that of the latter year has left a lasting memorial—the palace of the Trocadéro. Still more wonderful and far-reaching in its results was the Paris exhibition of 1889, which attracted visitors from all parts of the world, and it, too, has left behind it a memorial of mechanical skill in the Eiffel tower.

PARIS, the son of Priam, king of Troy. Before he was born his mother Hecuba dreamed that she was delivered of a firebrand. The dream was interpreted that her child would ruin his country, and when Paris was born he was exposed on Mount Ida. His life was saved by the herdsmen, and he grew up among them, distinguished for beauty and strength, till he was recognized and received by his parents. When the strife arose at the marriage of Peleus and Thetis between Hera, Athena, and Aphrodite, each claiming the apple that should belong to the most beautiful, Paris was selected as the judge. The three rivals unveiled their divine charms before a mortal judge on Mount Ida. The scene afterward became a favorite subject in Greek art, and it is usual to represent Hermes escorting the goddesses. Each tried to bribe the judge, Hera by promising power, Athena wisdom, Aphrodite the most beautiful woman in the world. Paris decided in favor of Aphrodite, and thus made Hera and Athena the bitter enemies of his country. To gain the woman whom Aphrodite had promised, Paris set sail for Lacedæmon, deserting his old love CEnone, daughter of the river-god Cebren, who in vain tried to induce him to give up his purpose. He was hospitably received by Menelaus, whose kindness he repaid by seducing his wife Helena to flee with him to Troy.

PARIS, the capital of Bourbon county, Ky., is situated nineteen miles northeast of Lexington, at the junction of several railroads. It contains a court-house,

several colleges for females, a military institute, three newspaper offices, and banks, and is lighted by gas. Its manufactures include flour, hemp, and whisky, and its population is 6,200.

PARIS, a post-town, capital of Edgar county, Ill., in Paris township, on several railroads, nineteen miles west-northwest of Terre Haute, thirty-six miles south of Danville, and 170 miles east-northeast of St. Louis, Mo. It contains a court-house, seven churches, a normal academy, two national banks, and three newspaper offices. Population, 5,049.

PARIS, an active town, capital of Lamar county, Tex., is on the Texas and Pacific railroad (Transcontinental Division), sixty-four miles east of Sherman. It has a female seminary, a high school, two newspaper offices, and manufactories of brooms, furniture, plows, wagons, sash, blinds, etc. The population at the last census was 8,258.

PARIS, MATTHEW OF. See MATTHEW OF PARIS, *ante*.

PARISH. In England the parish may be regarded as essentially an ecclesiastical institution, being defined as the township or cluster of townships which was assigned to the ministrations of a single priest, to whom its tithes and other ecclesiastical dues were paid; and it has been decided that if a place has not a church, churchwardens and sacramentalia, it is not a parish in this original sense of the term.

The term "parish" is not in use as a territorial designation in the United States except in Louisiana, the fifty-eight parishes of which correspond to the counties of the other States of the Union.

PARK, MUNGO, a celebrated African traveler, was born in Selkirkshire, Scotland, on September 20, 1771, at Fowlshiels, on the Yarrow. Having received a good education, he was apprenticed to a surgeon named Anderson, in Selkirk, and then attended the university of Edinburgh for three sessions. He afterward obtained the post of assistant-surgeon on board the *Worcester* East Indiaman, and made the voyage, in 1792, to Bencoolen, in Sumatra, and on his return, in 1793, he contributed a description of eight new Sumatran fishes to the *Transactions* of the Linnæan Society. Park next offered his services to the African Association, and was successful in his application. On June 21, 1795, he reached the Gambia, but it was not till December 2d that he started for Pisania with only two negro servants into the interior, from which he was to return with the proud distinction of being the first of modern Europeans to reach the well-nigh fabulous waters of the Niger. He reached England December 22, 1796.

Again, on January 30, 1805, he sailed from Portsmouth for Africa, and the expedition started from Pisania on May 4th. On November 19th he sailed down the river from Sansanding with the "fixed resolution to discover the termination of the Niger or perish in the attempt." They managed to make their way to Bussa (Boussa), and they were there attacked by the natives, and were drowned in endeavoring to escape.

PARKER, JOHN HENRY, architectural archæologist, was born in London in 1806. He died January 31, 1884.

PARKER, MATTHEW, archbishop of Canterbury, was born at Norwich, August 6, 1504. He was educated partly in St. Mary's Hostel and partly in Corpus Christi College.

On Cranmer's election to the archbishopric of Canterbury, Parker received a license to preach, and soon became known in Cambridge and neighborhood as a divine of considerable oratorical power. He was summoned to preach at court; and in 1535 the queen, Anne Boleyn, appointed him her chaplain. He was

shortly afterward made dean of the college of St. John the Baptist, at Stoke, near Clare, Suffolk.

He was selected by Thomas Cromwell to preach at Paul's Cross, on account of "his learning in holy letters and uncorrupt judgment in the same." He was appointed one of the king's chaplains, and in the year 1541 was made a canon of Ely.

In December, 1558, he was summoned by royal command to London, where it was intimated to him that he was to be appointed to the primacy. His election to the office took place on the first of the following August, and his consecration on December 17th, in the chapel of Lambeth Palace.

During the fifteenth year of his primacy, Parker's best energies were devoted to defining more accurately the discipline and belief of the newly constituted Church of England, and to bringing about a general conformity. The Thirty-Nine Articles were passed by convocation, under his presidency, in 1562. In the year 1566 he issued his celebrated "Advertisements," "for the due order in the public administration of common prayers and using the holy sacraments, and for the apparel of all persons ecclesiastical." He died on May 17, 1575.

PARKER, THEODORE, a distinguished American rationalistic preacher and social reformer, born at Lexington, Mass., August 24, 1810. His father, John Parker, a small farmer and skillful mechanic, was a typical New England yeoman, and a Unitarian in his theology before Unitarianism was known in New England as a system, and a Federalist in his politics when there were but four Federalists in Lexington. Theodore's paternal grandfather, Captain John Parker, fired the first shot upon the British at the battle of Lexington, commanding on that occasion a troop of seventy men. The historic musket from which that shot was fired became one of the most valued ornaments of the grandson's study. He obtained the elements of knowledge in the schools of the district, which were open during the winter months only. During the rest of the year he worked on his father's farm. At the age of seventeen he became himself a winter schoolmaster, and in his twentieth year he entered himself at Harvard, working on the farm as usual while he followed his studies, and going over to Cambridge for examination only. At the close of his college career he began his translation of De Wette's *Introduction to the Old Testament*. His journal and letters show that he had made acquaintance with a large number of languages, including Hebrew, Chaldee, Syriac, Arabic, Coptic, Ethiopic, as well as the classical and the principal modern European languages. When he entered the divinity school he was an orthodox Unitarian; when he left it, he entertained strong doubts about the infallibility of the Bible, the possibility of miracles, and the exclusive claims of Christianity and the church. Emerson's transcendentalism greatly influenced him, and Strauss' *Leben Jesu* left its mark upon his thought. His first ministerial charge was over a small village parish, Roxbury, a few miles from Boston. He was ordained June, 1837, and held his pastorate there until the autumn of 1843.

In 1841 he preached at Boston a sermon on "the transient and permanent in Christianity," which presented in embryo the main principles and ideas of his final theological position, and the preaching of which determined his subsequent relations to the churches with which he was connected and to the whole ecclesiastical world. The only permanent element he discovered in the Bible, in Christianity, in Christ, was "absolute, pure morality, absolute, pure religion, the love of man, the love of God acting without let or hindrance." He denied all special authority to the Bible,

to Christ, to Christianity. He maintained that "Jesus had not exhausted the fullness of God." The Boston Unitarian clergy denounced the preacher, and declared that the "young man must be silenced." No Unitarian publisher could be found for his sermon, and nearly all the pulpits of the city were closed against him. To exchange with him was fatal to a minister's reputation for Unitarian orthodoxy. But when the Unitarian clergy cast Parker off the laity took him up. A number of gentlemen in Boston invited him to give a series of lectures there. The result was that he delivered, in the Masonic Hall, in the winter of 1841-42, as lectures, substantially the volume afterward published as the *Discourse of Matters Pertaining to Religion*. The lectures in their published form made his name famous throughout America and Europe, and confirmed the stricter sect of the American Unitarians in their attitude toward him and his supporters. In 1844 he resigned his charge at Roxbury and devoted himself exclusively to his work in Boston. In addition to his Sunday labors, he lectured throughout the States, and prosecuted his wide studies, collecting particularly the materials for an *opus magnum* on the development of religion in mankind. Above all, he took up the question of the emancipation of the slaves, and, at the imminent risk of his life, nobly and powerfully advocated in Boston and throughout the States, from the platform and through the press, the cause of the negroes. He assisted actively in the escape of fugitive slaves, and helped to furnish John Brown with means for carrying out his schemes of liberation. His Sunday sermons were themselves often elaborate essays, almost treatises, on great questions of social and political reform, and he was all along contributing articles and papers on literary, political, social, and theological subjects to the periodical press. By his voice, his pen, and his utterly fearless action in social and political matters, he became a great power in Boston and America generally. In January, 1859, he had an attack of bleeding of the lungs, and sought relief by retreating first to Santa Cruz, and afterward to Europe. He died at Rome, May 10, 1860.

PARKERSBURG, a city, next to Wheeling the largest city in West Virginia, is the capital of Wood County, is beautifully situated on the left bank of the Ohio river, at the mouth of the Little Kanawha river, about 95 miles below Wheeling, and 12 miles below Marietta. By railroad it is 384 miles west of Baltimore, and 195 miles east-by-north of Cincinnati. It is a western terminus of the Baltimore and Ohio Railroad, which here connects with the Marietta and Cincinnati Railroad. The railroad train here crosses a fine railway bridge which was erected in 1869-71, and cost more than \$1,000,000. It is one and one-third miles long, has six spans over the river and numerous approaching spans. Steamers ply both on the Ohio and the Little Kanawha, which is rendered navigable for thirty-eight miles. Parkersburg contains a courthouse, twelve churches, several high schools, three national banks, gasworks, a fine new building erected by the United States for a postoffice and courthouse, five oil refineries, two large lumber-mills, three iron-foundries, five machine-shops, chemical works, two boiler-shops, and two barrel factories. Three weekly newspapers and two monthly papers are published here. The city has an extensive trade in oil (petroleum), which is procured in this and adjoining counties. Population, 9,750.

PARLIAMENT. The British Parliament is the supreme legislature of the United Kingdom of Great Britain and Ireland, consisting of the King, or Queen, and the three estates of the realm, viz., the Lords Spiritual, the Lords Temporal, and the Commons.

## HISTORY.

The origin of parliament is to be traced to Anglo-Saxon times. And we find in the Anglo-Saxon polity, as developed during their rule in England, all the constituent parts of parliament. In their own lands they had chiefs and leaders, but no kings. But conquest and territorial settlement were followed by the assumption of royal dignities; and the victorious chiefs were accepted by their followers as kings. They were quick to assume the traditional attributes of royalty. But the Saxon monarch was a patriarchal king of limited authority, who acted in concert with his people; and, though his succession was hereditary, in his own family, his direct descendant was liable to be passed over in favor of a worthier heir. Such a ruler was a fitting precursor of a line of constitutional kings, who in later times were to govern with the advice and consent of a free parliament.

Meanwhile, any council approaching the constitution of a House of Lords was of slow growth. Centuries were to pass before the English nobility was to assume its modern character and denominations. At the head of each village was an eorl, the chief of the freemen, or ceorls—their leader in war and patron in peace. The king's gesiths and thegns formed another privileged class.

The revival of the Christian church, under the Anglo-Saxon rule, created another order of rulers and councilors, destined to take a leading part in the government of the state. The archbishops and bishops, having spiritual authority in their own dioceses, and exercising much local influence in temporal affairs, were also members of the national council, or witenagemôte, and by their greater learning and capacity were not long in acquiring a leading part in the councils of the realm. By these several orders, summoned to advise the king in affairs of state, was formed a council of magnates—to be developed, in course of time, into an Upper Chamber, or House of Lords.

The rise of the commons, as a political power in the national councils, was of yet slower development; but in the Anglo-Saxon moots may be discerned the first germs of popular government in England. In the town-moot the assembled freemen and cultivators of the "folk-lands" regulated the civil affairs of their own township, tithing, village, or parish. In the burgh-moot the inhabitants administered their municipal business, under the presidency of a reeve. The hundred-moot assumed a more representative character, comprising the reeve and a selected number of freemen from the several townships and burghs within the hundred. The shire-moot, or shire-gemôte, was an assembly yet more important. An ealdorman was its president, and exercised a jurisdiction over a shire, or district comprising several hundreds. Attended by a reeve and four freemen from every hundred, it assumed a distinctly representative character. Its members, if not elected by the popular voice, were, in some fashion, deputed to act on behalf of those whose interests they had come to guard. The shire-moot was also the general folk-moot of the tribe, assembled in arms, to whom their leaders referred the decision of questions of peace and war.

Superior to these local institutions was the witenagemôte, or assembly of wise men, with whom the king took counsel in legislation and the government of the state. This national council was the true beginning of the parliament of England.

The witenagemôte made laws, imposed taxes, concluded treaties, advised the king as to the disposal of public lands and the appointment and removal of offi-

cers of state, and even assumed to elect and depose the king himself. The king had now attained to greater power, and more royal dignities and prerogatives. He was unquestionably the chief power in the witenagemôte; but the laws were already promulgated, as in later times, as having been agreed to with the advice and consent of the witan. The witan also exercised jurisdiction as a supreme court. These ancient customs present further examples of the continuity of English constitutional forms.

The Anglo-Saxon polity was suddenly overthrown by the Norman Conquest. A stern foreign king had seized the crown, and was prepared to rule his conquered realm by the sword. He brought with him the absolutist principles of Continental rulers, and the advanced feudal system of France and Normandy. Feudalism had been slowly gaining ground under the Saxon kings, and now it was firmly established as a military organization.

Such a revolution seemed fatal to the liberties and ancient customs of Saxon England. What power could withstand the harsh conqueror? But the indestructible elements of English society prevailed over the sword. The king grasped, in his own hands, the higher administration and judicature of the realm; but he continued the old local courts of the hundred and the shire, which had been the basis of Saxon freedom. The Norman polity was otherwise destined to favor the liberties of the people, through agencies which had been designed to crush them. The powerful nobles, whom William and his successors exalted, became formidable rivals of the crown itself; while ambitious barons were in their turn held in check by a jealous and exacting church. The ruling powers, if combined, would have reduced the people to slavery; but their divisions proved a continual source of weakness. In the meantime the strong rule of the Normans, bitter as it was to Englishmen, repressed intestine wars and the disorders of a divided realm. Civil justice was fairly administered.

While these social changes were steadily advancing, the barons were already preparing the way for the assertion of popular rights. Ambitious, turbulent, and grasping, they were constantly at issue with the crown. The power of the people was ever increasing, while their oppressors were being struck down.

The crown was weakened by disputed successions and foreign wars, and the baronage by the blood-stained fields of civil warfare; while both in turn looked to the people in their troubles. Meanwhile the church was struggling, alike against the crown and the barons, in defense of its ecclesiastical privileges and temporal possessions. When William Rufus was threatened by his armed barons, he took counsel with Archbishop Lanfranc, and promised good laws and justice to the people. His promises were broken; but, like later charters, as lightly set aside, they were a recognition of the political rights of the people. By the charter of Henry I. restoring to the people the laws of Edward the Confessor, the continuity of English institutions was acknowledged: Henry II. commenced his reign with another charter. Under Richard I. the principle of representation was somewhat advanced, but it was confined to the assessment and collection of taxes in the different shires. It was under King John that the greatest progress was made in national liberties. The loss of Normandy served to draw the baronage closer to the English people; and the king soon united all the forces of the realm against him. He outraged the church, the barons, and the people. He could no longer play one class against another; and they combined to extort the great charter of their liberties at Runnymede. It was there ordained that no scutage or aid, except the three regular feudal aids, should be imposed, save by the

common council of the realm. To this council the archbishops, bishops, abbots, earls, and greater barons were to be summoned personally by the king's letters, and tenants in chief by a general writ through the sheriff. The summons was required to appoint a certain place, to give forty days' notice at least, and to state the cause of meeting. At length we seem to reach some approach to modern usage.

The charter of King John was again promulgated under Henry III., for the sake of a subsidy; and henceforth the commons learned to insist upon the redress of grievances in return for a grant of money. This reign was memorable in the history of parliament.

In the reign of Edward I. parliament assumed substantially its present form of king, lords, and commons. It formed part of Edward's policy to embrace the clergy in his scheme for the representation of all orders and classes of his subjects. They were summoned to attend the parliament of 1295, and succeeding parliaments of his reign, and their form of summons has been continued until the present time; but the clergy resolutely held aloof from the national council, and insisted upon voting their subsidies in their own convocations of Canterbury and York. Meanwhile the commons, unconscious of their future power, took their humble place in the great council of the realm. They knew that they were summoned for no other purpose than the taxing of themselves and their fellow townsmen; their attendance was irksome; it interrupted their own business; and their journeys exposed them to many hardships and dangers. It is not surprising that they should have shrunk from the exercise of so doubtful a privilege. But the principle of representation, once established, was to be developed with the expansion of society; and the despised burgesses of Edward I., not having seceded, like the clergy, were destined to become a potential class in the parliaments of England. Another constitutional change during this reign was the summoning of parliament to Westminster instead of to various towns in different parts of the country. This custom invested parliament with the character of a settled institution, and constituted it a high court for the hearing of petitions and the redress of grievances. The growth of its judicature, as a court of appeal, was also favored by the fixity of its place of meeting.

Henceforth the financial necessities of a succession of kings insured the frequent assembling of parliaments. Nor were they long contented with the humble function of voting subsidies, but boldly insisted on the redress of grievances and further securities for national liberties.

At this period the constitution of parliament was also settling down to its later and permanent shape. Hitherto the different orders or estates had deliberated separately, and agreed upon their several grants to the crown. The knights of the shire were naturally drawn, by social ties and class-interests, into alliance with the barons; but at length they joined the citizens and burgesses, and in the first parliament of Edward III. they are found sitting together as "the Commons."

This may be taken as the turning point in the political history of England.

The reign of Edward III. witnessed further advances in the authority of parliament, and changes in its constitution. The king, being in continual need of subsidies, was forced to summon parliament every year, and in order to encourage its liberality he frequently sought its advice upon the most important issues of peace or war, and readily entertained the petitions of the commons, praying for the redress of grievances. During this reign, also, the advice and consent of the commons, as well as of the lords spiritual and temporal,

was regularly recorded in the enacting part of every statute. But a more important event is to be assigned to this reign—the formal separation of parliament into the two Houses of Lords and Commons. The date of this event is not clearly established, but is generally assigned to the 17th Edward III.

Parliament had now assumed its present outward form. But it was far from enjoying the authority which it acquired in later times. Instead of enjoying an equal share in the framing of laws, the commons appeared before the king in the humble guise of petitioners. Their petitions, together with the king's answers, were recorded in the Rolls of Parliament; but it was not until the parliament had been discharged from attendance that statutes were framed by the judges, and entered on the statute rolls. Under such conditions legislation was, in truth, the prerogative of the crown rather than of parliament. Henry V., in the second year of his reign, promised "that nothing should be enacted to the petitions of the commons, contrary to their asking, whereby they should be bound without their assent;" but, so long as the old method of framing laws was adhered to, there could be no security against abuse; and it was not until the reign of Henry VI. that the introduction of the more regular system of legislating by bill and statute insured the thorough agreement of all the estates in the several provisions of every statute. The commons, however, notwithstanding these and other discouragements, were constantly growing bolder in the assertion of their rights. The foreign wars of Henry IV. and Henry V., by continuing the financial necessities of the crown, maintained for awhile the powers which parliament had acquired by the struggles of centuries. But a period of civil wars and disputed successions was now at hand, which checked the further development of parliamentary liberties. With the close of the Wars of the Roses the life of parliament seems to have well-nigh expired.

This check in the fortunes of parliament affords a fitting occasion for examining the composition of each of the three estates of the realm.

The archbishops and bishops had held an eminent position in the councils of Saxon and Norman kings, and many priors and abbots were from time to time associated with them as lords spiritual, until the suppression of the monasteries by Henry VIII. They generally outnumbered their brethren, the temporal peers, who sat with them in the same assembly.

The lords temporal comprised several dignities. Of these the baron, though now the lowest in rank, was the most ancient. Next in antiquity was the earl, whose official title was known to Danes and Saxons, and who after the Conquest obtained a dignity equivalent to that of count in foreign states. The highest dignity, that of duke, was not created until Edward III. conferred it upon his son, Edward the Black Prince. The rank of marquis was first created by Richard II., with precedence after a duke. It was in the reign of Henry VI. that the rank of viscount was created, to be placed between the earl and the baron. Since that time no new dignity has been invented, and the peerage consists of the five dignities of duke, marquis, earl, viscount, and baron. During the fifteenth century the number of temporal peers summoned to parliament rarely exceeded fifty, and no more than twenty-nine received writs of summons to the first parliament of Henry VII. There were only fifty-nine at the death of Queen Elizabeth. At the accession of William III. this number had been increased to about one hundred and fifty.

The commons formed a more numerous body. In the reign of Edward I. there were about 275 members, in that of Edward III. 250, and in that of

Henry VI. 300. In the reign of Henry VIII. parliament added twenty-seven members for Wales and four for the county and city of Chester, and in the reign of Charles II. four for the county and city of Durham. Between the reigns of Henry VIII. and Charles II. 130 members were also added by royal charter.

To resume the history of parliament at a later period, let us glance at the reign of Henry VIII. Never had the power of the crown been greater than when this king succeeded to the throne, and never had a more imperious will been displayed by any king of England. Parliament was at his feet to do his bidding, and the Reformation enormously increased his power. He had become a pope to the bishops; the old nobles who had resisted his will had perished in the field or on the scaffold; the new nobles were his creatures; and he had the vast wealth of the church in his hands as largesses to his adherents. Such was the dependence of parliament upon the crown and its advisers during the Reformation period that in less than thirty years four vital changes were decreed in the national faith. Each of the successive reigns inaugurated a new religion.

With the reign of Elizabeth commenced a new era in the life of parliament. She had received the royal prerogatives unimpaired, and her hand was strong enough to wield them. But in the long interval since Edward IV. the entire framework of English society had been changed; it was a new England that the queen was called upon to govern. The parliaments of Elizabeth, though rarely summoned, displayed an unaccustomed spirit. The conflicts between Elizabeth and the commons marked the revival of the independence of parliament, and foreshadowed graver troubles at no distant period.

James I., with short-sighted pedantry, provoked a succession of conflicts with the commons, in which abuses of prerogative were stoutly resisted and the rights and privileges of parliament resolutely asserted. The "remonstrance" of 1610 and the "protestation" of 1621 would have taught a politic ruler that the commons could no longer be trifled with; but those lessons were lost upon James and upon his ill-fated son.

The momentous struggles between Charles I. and his parliaments cannot be followed in this place. The earlier parliaments of his reign fairly represented the earnest and temperate judgment of the country. They were determined to obtain the redress of grievances, and to restrain undue prerogatives; but there was no taint of disloyalty to the crown; there were no dreams of revolution. But the contest at length became embittered, until there was no issue but the arbitrament of the sword. This period proved the supreme power of the commons, when supported by popular forces. Everything gave way before them. They raised victorious armies in the field, they overthrew the church and the House of Lords, and they brought the king himself to the scaffold.

On the restoration of Charles II. parliament was at once restored to its old constitution, and its sittings were revived as if they had suffered no interruption. No outward change had been effected by the late revolution; but that a stronger spirit of resistance to abuses of prerogative had been aroused was soon to be disclosed in the deposition of James II. and the "glorious revolution" of 1688.

On the union of Scotland in 1707, important changes were made in the constitution of parliament. The House of Lords was reinforced by the addition of sixteen peers, representing the peerage of Scotland, and elected every parliament; and the Scottish peers, as a body, were admitted to all the privileges of peerage,

except the right of sitting in parliament, or upon the trial of peers. No prerogative, however, was given to the crown to create new peerages after the Union; and, while they are distinguished by their antiquity, their number is consequently decreasing. To the House of Commons were assigned forty-five members, representing the shires and burghs of Scotland.

With the reign of George III. there opened a new period in the history of parliament. Agitation in its various forms, an active and aggressive press, public meetings and political associations, the free use of the right of petition, and a turbulent spirit among the people seriously changed the relations of parliament to the country. And the publication of debates, which was fully established in 1771, at once increased the direct responsibility of parliament to the people, and ultimately brought about other results.

In this reign another important change was effected in the constitution of parliament. Upon the union with Ireland, in 1801, four Irish bishops were added to the lords spiritual, who sat by rotation of sessions, and represented the episcopal body of the Church of Ireland. But those bishops were deprived of their seats in parliament in 1869, on the disestablishment of the Church of Ireland. Twenty-eight representative peers, elected for life by the peerage of Ireland, were admitted to the House of Lords. All the Irish peers were also entitled to the privilege of peerage. In two particulars the Irish peerage was treated in a different manner from the peerage of Scotland. The crown was empowered to create a new Irish peerage whenever three Irish peerages in existence at the time of the Union have become extinct, or when the number of Irish peers, exclusive of those holding peerages of the United Kingdom, has been reduced to one hundred. And, further, Irish peers were permitted to sit in the House of Commons for any place in Great Britain, forfeiting, however, the privilege of peerage while sitting in the Lower House. The expediency of both these provisions has often been called in question.

At the same time 100 representatives of Ireland were added to the House of Commons. This addition raised the number of members to 658. Parliament now became the parliament of the United Kingdom, and high hopes were entertained of a salutary fusion of diverse nationalities into a single assembly; but these hopes have scarcely been realized, and the relations of the Irish people to Great Britain and the imperial government continue to be a source of the gravest embarrassment and danger.

By the union of Scotland and Ireland, the electoral abuses of those countries were combined with those of England. The grave defects of the representation were notorious, and some minor electoral abuses had been from time to time corrected. But the fundamental evils—nomination boroughs, limited rights of election, the sale of seats in parliament, the prevalence of bribery, and the enormous expense of elections—though constantly exposed, long held their ground against all assailants.

The result of the memorable struggle which ensued may be briefly told. By the Reform Acts of 1832 the representation of the United Kingdom was reconstructed. In 1852, and again in 1854, Lord John Russell introduced further measures of reform; but constitutional changes were discouraged by the Russian war. In 1859 Lord Derby's Conservative government proposed another scheme of reform, which was defeated; and in 1860 Lord John Russell brought in another bill, which was not proceeded with; and the question of reform continued in abeyance until after the death of Lord Palmerston. Earl Russell, who succeeded him as

premier, was prompt to redeem former pledges, and hastened to submit to a new parliament, in 1866, another scheme of reform.

Still further reform bills were presented and enacted in 1867-68. In 1872 the subject was again taken up, but nothing was accomplished. In 1880 additional legislation ensued; and in 1884-85 sweeping changes were made with the result of placing representation in Great Britain and Ireland on a uniform basis, and the addition of nearly 2,000,000 voters to the election rolls. The redistribution of the kingdom resulted in an increase of representation for England and Scotland and a diminution for Ireland.

#### POWERS AND PRIVILEGES OF PARLIAMENT.

Such being the history and constitutional character of parliament, this survey would be incomplete without a more detailed view of the powers and privileges of each of its constituent parts, and of its ordinary proceedings.

*Prerogatives of the Crown.*—The crown, preëminent in rank and dignity, is also the legal source of parliamentary authority. The Queen virtually appoints the Lords Spiritual, and all the peerages of the Lords Temporal have been created by herself or her predecessors. Thus the entire House of Lords is the creation of the crown. The Queen summons parliament to meet, and prescribes the time and place of its meeting, prorogues and dissolves it, and commands the issue of writs for the election of members of the House of Commons.

*Powers of the House of Lords.*—The House of Lords, which at present consists of about 520 members, is distinguished by peculiar dignities, privileges, and jurisdictions. Peers individually enjoy the rank and precedence of their several dignities, and are hereditary councilors of the crown. Collectively with the Lords Spiritual they form a permanent council of the crown; and, when assembled in parliament, they form the highest court of judicature in the realm, and are a coëqual branch of the legislature, without whose consent no laws can be made. Their judicature is of various kinds, viz., for the trial of peers; for determining claims of peerage and offices of honor, under references from the crown; for the trial of controverted elections of Scotch and Irish peers; for the final determination of appeals from courts in England, Scotland, and Ireland; and, lastly, for the trial of impeachments.

*Powers of the House of Commons.*—The House of Commons also has its own peculiar privileges and jurisdictions. Above all, it has the paramount right of originating the imposition of all taxes, and the granting of supplies for the service of the state. It has also enjoyed, from early times, the right of determining all matters concerning the election of its own members, and their right to sit and vote in parliament. This right, however, has been greatly abridged, as, in 1868, the trial of controverted elections was transferred to the courts of law; but its jurisdiction in matters of election not otherwise provided for by statute is still retained intact. As part of this jurisdiction, the House directs the Speaker to issue warrants to the clerk of the crown to make out new writs for the election of members to fill up such vacancies as occur during the sitting of parliament.

*Privileges of Parliament.*—Both Houses are in the enjoyment of certain privileges, designed to maintain their authority, independence, and dignity. Each House has its separate rights and jurisdictions; but privileges properly so-called, being founded upon the law custom of parliament, are common to both Houses. Each House adjudges whether any breach of privilege

has been committed, and punishes offenders by censure or commitment. The Lords may imprison for a fixed period, and impose fines; the Commons can only imprison generally, the commitment being concluded by the prorogation, and have long discontinued the imposition of fines.

*Freedom of Speech.*—Freedom of speech has been one of the most cherished privileges of parliament from early times. Constantly asserted, and often violated, it was finally declared by the Bill of Rights "that the freedom of speech, and debates and proceedings in parliament, ought not to be impeached or questioned in any court or place out of parliament."

*Freedom from Arrest.*—Freedom from arrest is a privilege of the highest antiquity. At present members are themselves free from arrest within forty days after prorogation, but otherwise they are liable to all the processes of the courts. If arrested, they will be immediately discharged, upon motion in court whence the process issued. Peers and peeresses are, by the privilege of peerage, free from arrest at all times. The privilege of freedom from arrest is limited to civil causes, and has not been suffered to exempt members from the operation of the criminal law, nor even from commitments for contempt by other courts. But, whenever the freedom of a member is so interfered with, the courts are required immediately to inform the House of the causes of his commitment. Witnesses, suitors, counsel, and agents in attendance upon parliament are protected from arrest and molestation, and from the consequences of statements made by them, or other proceedings in the conduct of their cases.

PARMA, one of the finest cities of northern Italy, is situated at thirty-five and one-half miles by rail south-east of Piacenza and thirty-two and one-quarter north-west of Modena, in a fertile tract of the Lombard plain within view of the Alps, and sheltered by the Apennines. The population in 1861 was 47,067 for the city and 47,428 for the commune; the removal of the military and civil functionaries of the old duchy caused a considerable decrease, and the figures for 1881 were only 44,492 and 45,217.

PARMENIDES OF ELEA, the most notable of the philosophers of the Eleatic succession, is said by Diogenes Laertius (presumably on the authority of Apollodorus) to have been "in his prime" in Olymp. 69 (=504-500 B.C.); whence it would appear that he was born about 539.

Parmenides embodied his tenets in a short poem called *Nature*, of which fragments, amounting in all to about a hundred and sixty lines, have been preserved in the writings of Sextus Empiricus, Simplicius, and others. *Nature* is traditionally divided into three parts—the "Proem," "Truth" (*τὰ πρὸς ἀλήθειαν*), and "Opinion" (*τὰ πρὸς δόξαν*). In "Truth," starting from the formula "the Ent (or existent) is, the Nonent (or non-existent) is not." Parmenides attempted to distinguish between unity or universal element of nature and its variety or particularity, insisting upon the reality of its unity, which is therefore the object of knowledge, and upon the unreality of its variety, which is therefore the object, not of knowledge, but of opinion. In "Opinion" he propounded a theory of the world of seeming and its development, pointing out, however, that, in accordance with the principles already laid down, these cosmological speculations do not pretend to anything more than probability.

PARMENIO, a distinguished Macedonian general, born about 400 B.C., was the son of Philotas, and first appears in history as a favorite counselor of Philip. He was stabbed by Cleander, at the instance of the king, in 330,



**PARMIGIANO.** The name of this celebrated painter of the Lombard school was, in full, Girolamo Francesco Maria Mazzuoli, or Mazzola. Francesco, born on January 11, 1504, was the son of a painter. A fever carried him off on August 24, 1540, before he had completed his thirty-seventh year. By his own desire, he was buried naked in the church of the Servites called La Fontana, near Casal Maggiore.

**PARNASSUS**, a mountain of Greece, in the south of Phocis, rising over the town of Delphi. It had two prominent peaks, Tithorea and Lycoreia, besides smaller ones, Hyampeia, Nauplia, etc. Parnassus was one of the most holy mountains in Greece, hallowed by the worship of Apollo, of the Muses, and of the Corycian nymphs, and by the orgies of the Bacchantes. The Delphic oracle, the Castalian fountain, and the Corycian cave were all situated among the clefts in its densely wooded sides.

**PARNELL, THOMAS**, has a place in literature among the minor Queen Anne poets. He was born in Dublin in 1679, and died in 1718.

**PARNY, ÉVARISTE DÉSIRE DE FORGES, VICOMTE DE**, minor French poet, was born in the Isle of Bourbon on February 6, 1753. He died in 1814.

**PARODY** (*παρωδία*, literally a song sung beside a comic parallel) may be defined as an imitation of the form or style of a serious writing in matter of a meaner kind so as to produce a ludicrous effect. By common consent, the most subtle and dexterous of metrical parodists is the late Mr. C. S. Calverley, who succeeded in reproducing not merely tricks of phrase and meter, but even manneristic turns of thought. Johnson's dictum about pastoral poetry, that most of it is "easy, vulgar, and therefore disgusting," might be applied to parody; but Calverley would escape the censure.

**PAROS**, or **PARO**, an island in the Ægean Sea, one of the largest of the group of the Cyclades, with a population of 8,000. It lies to the west of Naxos, from which it is separated by a channel about six miles broad, and with which it is now grouped together, in popular language, under the common name of Paronaxia. Its greatest length from northeast to southwest is thirteen miles, and its greatest breadth ten miles. It is formed of a single mountain about 2,400 feet high, sloping evenly down on all sides to a maritime plain, which is broadest on the northeast and northwest sides.

**PARQUETRY** is a kind of mosaic of wood used for ornamental flooring. Materials contrasting in color and grain, such as oak, walnut, cherry, lime, pine, etc., are employed; and in the more expensive kinds the richly-colored tropical woods are also used. The patterns of parquet flooring are entirely geometrical and angular (squares, triangles, lozenges, etc.), curved and irregular forms being avoided on account of the expense and difficulty of fitting. There are two classes of parquetry in use—veneers and solid parquet. The veneers are usually about a quarter of an inch in thickness, and are laid over already existing floors.

**PARR.** This name was originally applied to small Salmonoids which are abundant in British rivers, and were for a long time considered to constitute a distinct species (*Salmo salmulus*). They possess the broad head, short snout, and large eye characteristic of young Salmonoids, and are ornamented on the sides of the body and tail with about eleven or more broad dark cross-bars, the so-called parr-marks. However, these fishes represent merely the first stage of growth of the salmon, before it assumes, at an age of two years, and when about six inches long, the silvery smolt-dress preparatory to its first migration to the sea.

**PARR, SAMUEL**, English schoolman, and the most able educator of his day, the son of Samuel Parr,

surgeon at Harrow-on-the-Hill, was born there January 15, 1747. After a long term of service as the educator of youth, among his pupils being some of the most notable names of modern English history, Parr died at Hatton vicarage March 6, 1825, and was buried in the chancel of its church.

**PARRAMATTA**, a town of New South Wales, at the head of the navigation of the Parramatta river, and fourteen miles to the west of Sydney, with which it is connected by railway, was one of the earliest inland settlements, and the seat of many of the public establishments connected with the working of the convict system.

**PARRHASIUS**, of Ephesus, was one of the greatest painters of Greece. Seneca relates a tale that Parrhasius bought one of the Olynthians whom Philip sold into slavery, 346 B.C. (see **OLYNTHUS**), and tortured him in order to have a model for his picture of Prometheus; but the story, which is similar to one told of Michelangelo, is chronologically impossible. Another tale recorded of him describes his contest with Zeuxis. The latter painted some grapes so perfectly that birds came to peck at them. He then called on Parrhasius to draw aside the curtain and show his picture, but, finding that his rival's picture was the curtain itself, he acknowledged himself to be surpassed, for Zeuxis had deceived birds, but Parrhasius had deceived Zeuxis.

**PARROT**, according to Professor Skeat, from the French *Perrot* or *Pierrot*, a proper name and the diminutive of *Pierre*, the name given generally to a large and very natural group of birds, which for more than a score of centuries have attracted attention, not only from their gaudy plumage, but, at first and chiefly, it would seem, from the readiness with which many of them learn to imitate the sounds they hear, repeating the words and even phrases of human speech with a fidelity that is often astonishing.

The home of the vast majority of Parrot-forms is unquestionably within the tropics, but the popular belief that Parrots are tropical birds only is a great mistake. In North America the Carolina Parakeet, *Conurus carolinensis*, at the beginning of the present century used to range in summer as high as the shores of Lakes Erie and Ontario—a latitude equal to that of the south of France; and even within the last forty years it reached, according to trustworthy information, the junction of the Ohio and the Mississippi, though now its limits have been so much curtailed that its occurrence in any but the Gulf States is doubtful. In South America, at least four species of Parrots are found in Chili or La Plata, and one, *Conurus patagonus*, is pretty common on the bleak coast of the Strait of Magellan. In Africa, it is true that no species is known to extend to within some ten degrees of the Tropic of Cancer, but *Pionias robustus* inhabits territories lying quite as far to the southward of the Tropic of Capricorn. In India the northern range of the group is only bounded by the slopes of the Himalayas, and further to the eastward Parrots are not only abundant over the whole of the Malay Archipelago, as well as Australia and Tasmania, but two very well defined families are peculiar to New Zealand and its adjacent islands (see **KAKAPO** and **NESTOR**). No Parrot has recently inhabited the Palæarctic region, and but one (the *Conurus carolinensis*, just mentioned) probably belongs to the Nearctic; nor are Parrots represented by many different forms in either the Ethiopian or the Indian regions.

**PARROT-FISHES**, more correctly called **PARROT-WRASSES**, are marine fishes, belonging to the Wrasse family, and referred to four closely-allied genera, viz., *Scarus*, *Scarichthys*, *Callyodon* and *Pseudoscarus*. They are easily recognized by their large scales, of which there are from twenty-one to twenty-five in the lateral line, by

having invariably nine spines and ten rays in the dorsal fin and two spines with eight rays in the anal, and especially by their singular dentition, of jaws as well as pharynx. The teeth of the jaws are soldered together, and form a sharp-edged beak similar to that of a parrot, but without a middle projecting point, and the upper and lower beak are divided into two lateral halves by a median suture. Nearly one hundred species of Parrot-Fishes are known from the tropical and subtropical parts of the Indo-Pacific and Atlantic Oceans; like other coral-feeding fishes, they are absent on the Pacific coasts of tropical America and on the coasts of tropical West Africa.

PARRY, SIR WILLIAM EDWARD, arctic navigator, was the fourth son of Dr. Caleb Hillier Parry, a physician of some celebrity in Bath, and was born there December 19, 1790.

After eleven years' service in the British navy he obtained an appointment to the *Alexander* brig in the expedition of Sir John Ross to discover the probabilities of a Northwest Passage to the Pacific. Ross, mistaking clouds for the Croker mountains barring his way westward, returned to England in the belief that further perseverance was hopeless; but Parry, confident, as he expressed it, "that attempts at polar discovery had been hitherto relinquished just at a time when there was the greatest chance of succeeding," obtained the command of a new expedition, consisting of two ships, the *Griper* and *Hecla*, with which he sailed from the Thames in May, 1819. After wintering in Melville Island he made an effort to force a passage to Behring's Straits, but the state of the ice rendering this impossible, he returned to England, reëntering the Thames in November, 1820. A narrative of the expedition appeared in 1821. Shortly after his return he was promoted to the rank of commander, presented with the freedom of Bath and Norwich, and elected a member of the Royal Society. With the *Fury* and the *Hecla* he set sail on a second expedition in May, 1821, and after great hardships returned to England in November, 1823, without achieving his purpose. During his absence he had, in November, 1821, been promoted to post rank, and on December 1, 1823, he was chosen acting hydrographer of the navy. His *Journal of a Second Voyage for the Discovery of the Northwest Passage* appeared in 1824. With the same ships he, in May, 1824, set sail on a third expedition, which, however, was unsuccessful, and after the wreck of the *Fury* he returned home in October, 1825, with a double ship's company. Of this voyage he published an account in 1826. Having obtained the sanction of the Admiralty to journey to the North Pole from the northern shores of Spitzbergen in boats that could be fitted to sledges, he set sail with the *Hecla*, March 27, 1827, and in June set out for the Pole. He, however, failed to find the solid plain of ice he expected; and as, moreover, owing to the ice drift, he found his efforts at progress northward in great degree frustrated, he was compelled, after reaching 82° 45' N. latitude to retrace his steps, and arrived in England in October. Of his journey he published an account under the title of *Narrative of the Attempt to reach the North Pole in Boats*, 1827.

In 1853 he was appointed governor of Greenwich Hospital, which post he retained till his death, July 8, 1855.

PARSÎS, or PARSEES, are the followers of Zarathustra, and the descendants of the ancient Persians who emigrated to India on the conquest of their country by the Arabs, about the year 720 A.D.

The men are well formed, active, handsome, and intelligent. They have light olive complexions, a fine

aquiline nose, bright black eyes, a well-turned chin, heavy arched eyebrows, thick sensual lips, and usually wear a light curling mustache. The women are delicate in frame, with small hands and feet, fair complexion, beautiful black eyes, finely arched eyebrows, and a luxurious profusion of long black hair, which they dress to perfection, and ornament with pearls and gems.

The Parsîs are much more noble in their treatment of females than any other Asiatic race; they allow them to appear freely in public, and leave them the entire management of household affairs. They are proverbial for their benevolence, hospitality, and sociability. They are good scholars, and usually learn several languages—Gujarâtî, Hindûstânî, and English. The Parsîs are notoriously fond of good living, and do not hesitate to spend their money freely for the best the market affords. They indulge in wines, but do not reach the vice of intoxication.

The marriages of children engage the earliest attention of the parents. Though the majority of Parsî marriages are still celebrated while the children are very young, instances frequently occur of marriages of grown-up boys and girls.

The numerical strength of the followers of Zarathustra at the present day does not exceed 82,000 persons, including the Parsîs of Persia at Kermân, Yazd, and Teherân. The greater number is found in Bombay, and in some of the cities of Gujarât, as Nowsarî Surat, Bharoch, Ahmedâbâd, etc. Parsîs have also settled for the purpose of trade in Calcutta, Madras, and in other cities of British India, in Burmah, China, and in other parts of Asia. According to the census of 1881, there are in the Bombay presidency 72,065 Parsîs, and in Persia 8,499, according to Houtum-Schindler (see *Journal of the Oriental German Society*, vol. xxxvi. p. 54).

PARSON is a technical term of English law, and is a corruption of *persona*, the parson being, as it were, the *persona ecclesiæ*, or representative of the church in the parish. Parson imparsonnee (*persona impersonata*) is he that as rector is in possession of a church parochial, and of whom the church is full, whether it be presentative or improper. The word parson is properly used only of a rector, though it is sometimes loosely extended to anyone in holy orders. Though every parson is a rector, every rector is not a parson. A parson must be in holy orders; hence a lay rector could not be called a parson. The parson is tenant for life of the parsonage house, the glebe, the tithes, and other dues, so far as they are not appropriated.

PARSONS, or PERSONS, ROBERT, a celebrated Jesuit, son of a blacksmith, was born at Nether Stowey, near Bridgewater, England, in 1546, and died in 1610.

PARSONS, a post-town in Kansas, is located in Labette county, on the Neosho division of the Missouri, Kansas and Texas Railroad, and on the Memphis, Kansas and Colorado road, thirty-two miles northeast of Independence, fifty miles southwest of Fort Scott, and thirty-four miles southeast of Humboldt. It is a growing and prosperous place, having five churches, two school-buildings, two newspaper offices, two hotels, one bank, and other evidences of Western progress and development, including stores and warehouses, substantially constructed and well adapted to the uses to which they are devoted. The lines of manufacture conducted at Parsons are varied and valuable, embracing a foundry and machine-shop, furniture factory, plow factory, the machine-shops of the railroad, etc., etc., giving employment to a large force of men, and annually turning out productions valued at thousands of dollars. The population in 1890 was 6,736.

PARSONSTOWN, formerly BIRR, a market-town

of King's County, Ireland, is situated on an acclivity rising above the Birr, and on a branch of the Great Southern and Western Railway, twelve and a half miles north of Roscrea and seven and a half south of Banagher. The population was 5,401 in 1861, 4,939 in 1871, and 4,955 in 1881.

PARTÁBGARH, PRATÁBGARH, or PERTABGURH, a district of Oudh, India, is bounded on the north by Rái Bareli and Sultánpur, and on the east, south and west by Jaunpur and Allahábád districts. The Ganges forms the southwestern boundary line, while the Gumti marks the eastern boundary for a few miles. The area (1881) is 1,436 square miles. The population in 1881 was 847,047.

PARTÁBGARH, or PERTABGURH, a native state in Rájputána, India, lying between 23° 14' and 24° 14' N. latitude, and between 74° 27' and 75° E. longitude, and entirely surrounded by native territory, has an estimated area of 1,460 square miles, and an estimated population (1881) of 80,568, mostly Bhíls and other aboriginal tribes.

PARTHENIUS, a Bithynian poet, said to have been captured in the Mithridatic war and carried to Rome. He lived there for many years, as late as the time of Tiberius. His poems were on erotic subjects, and many of them treated of obscure mythological stories. The only work of his which is preserved is a collection of short love-tales in prose, dedicated to the poet Cornelius Gallus, but apparently not intended for publication.

PARTHENON. See ATHENS.

PARTHIA. See PERSIA.

PARTINICO, a town of Sicily, in the province of Palermo, and twenty-eight and a half miles west of Palermo by rail, has a good trade in wine and oil, and in 1881 had 21,000 inhabitants.

PARTITION, in law, is the division between several persons of land or goods belonging to them as co-proprietors. In English law the term partition applies only to the division of lands, tenements, and hereditaments, or of chattels real between coparceners, joint tenants, or tenants in common. It is to be noticed that not all hereditaments are capable of partition. There can be no partition of homage, fealty, or common of turbary, or of an inheritance of dignity, such as a peerage. Partition is either voluntary or compulsory. Voluntary partition is effected by mutual conveyances, and can only be made where all parties are *sui juris*. It must be made by deed, except in the case of copyholds. Compulsory partition is effected by private act of Parliament, by judicial process, or through the inclosure commissioners.

In the United States, in a large majority of the States, partition may be made by a summary method of petition to the courts of common law. In the other States the courts of equity have exclusive jurisdiction. As between heirs and devisees the probate courts may in some States award partition.

PARTNERSHIP, in law, is a voluntary association of two or more persons for the purpose of gain. This is, of course, not an exhaustive definition, but will serve to include most of the definitions of partnership which have been attempted. The word *partner* is a contracted form of *partitioner*.

There is no statutory or judicial definition of partnership in English law. It is defined as "the relation which subsists between persons who have agreed to share the profits of a business carried on by all or any of them on behalf of all of them." Sir N. Lindley declines to pledge himself to any definition, but lays down the following principles:—(1) Partnership is the result of an agreement to share profits and losses; (2) partner-

ship is *prima facie* the result of an agreement to share profits, although nothing may be said about losses, and although there may be no common stock; (3) partnership is *prima facie* the result of an agreement to share profits, although community of loss is stipulated against; (4) partnership is not the result of an agreement to share gross returns; (5) partnership is not the result of an agreement which is not concluded; (6) partnership is not the result of an agreement to share profits so long as anything remains to be done before the right to share them accrues.

In the United States the English common law is the basis of the law. Most States have, however, their own special legislation on the subject. Partnership is defined by Chancellor Kent to be "a contract of two or more competent persons to place their money, effects, labor, and skill, or some or all of them, in lawful commerce or business, and to divide the profit and bear the loss in certain proportions." The definition of the New York Civil Code, art. 1283, runs thus:—"Partnership is the association of two or more persons for the purpose of carrying on business together, and dividing its profits between them." The most striking feature of the law in the United States is the existence of limited partnerships, corresponding to the *sociétés en commandite* established in France by the ordinance of 1673. The State of New York was the first to introduce this kind of partnership by legislative enactment. The provisions of the New York act have been followed by most of the other States. In many States there can be no limited partnership in banking and insurance. In this form of partnership one or more persons responsible *in solido* are associated with one or more dormant partners liable only to the extent of the funds supplied by them. In Louisiana such partnerships are called partnerships *in commendam* (Civil Code, art. 2810). In New York the responsible partners are called *general* partners, the others *special* partners. Such partnerships must, by the law of most States, be registered. In Louisiana universal partnerships must be created in writing and registered (Civil Code, art. 2800). In some States nominal partners are not allowed. Thus in New York, where the words "and Company" or "and Co." are used, they must represent an actual partner or partners. A breach of this rule subjects offenders to penalties. In most States claims against the firm after the death of a partner must, in the first instance, be made to the survivors. The creditors cannot, as in England, proceed directly against the representatives of the deceased. The law as to the conversion of realty into personalty on the administration of the estate of a deceased partner in some States agrees with English law, in others does not.

PARTRIDGE, from the Latin *Perdrix*, which word in sound does not imitate badly the call-note of this bird, so well known throughout the British Islands and the greater part of Europe as to need no description or account of its habits here. The English name properly denotes the only species indigenous to Britain, often nowadays called the Gray Partridge. In Asia the English Partridge seems to be unknown, but in the temperate parts of Eastern Siberia its place is taken by a very nearly allied form, *P. barbata*, and in Tibet there is a bird, *P. hodgsoniæ*, which can hardly with justice be generically separated from it. The common Red-legged Partridge of Europe, generally called the French Partridge, *Caccabis rufa*, seems to be justifiably considered the type of a separate group. The French Partridge has several congeners, all with red legs and plumage of similar character. In Africa north of the Atlas there is the Barbary Partridge, *C. petrosa*; in southern Europe another, *C. saxatilis*, which extends eastward

till it is replaced by *C. chukar*, which reaches India, where it is a well-known bird. Two very interesting desert-forms, supposed to be allied to *Caccabis*, are the *Ammoperdrix heyi* of North Africa and Palestine and the *A. bonhami* of Persia; the groups of birds known as Francolins and Snow-Partridges are generally furnished with strong but blunt spurs, and therefore probably belong to the Caccabine group. Of the former, containing many species, there is only room here to mention the Francolin, which used to be found in many parts of the south of Europe, *Francolinus vulgaris*, which also extends to India, where it is known as the Black Partridge. By English colonists the name Partridge has been very loosely applied, and especially so in North America. Where a qualifying word is prefixed no confusion is caused, but without it there is sometimes a difficulty at first to know whether the Ruffed Grouse *Bonasa umbellus* (see GROUSE) or the Virginian Colin (*Ortyx virginianus*) is intended.

PASADENA, a city of Los Angeles county, Cal., in the San Gabriel valley, is one of the most popular health resorts of the Pacific coast. Within the past ten years its growth has been phenomenal and its population has increased in a greater ratio than that of almost any of its contemporaries, while the improvements made upon its site are of an attractive and substantial character. It contains churches, schools, banking facilities, etc.; an opera-house and two commodious and desirably-appointed public halls, five hotels, and other accommodations, for the convenience of the influx of visitors annually sojourning there to avail themselves of the benefits and health-giving properties of the climate. The raising of oranges and other fruits is the principal business interest of the vicinity, and large shipments of these productions are made yearly from Pasadena to the eastern States and elsewhere. Some manufacturing is carried on in the city, including grist and planing mills, electric-appliance and barbed-wire factories, a fruit-canning establishment and some other enterprises, embracing about 100 stores, shops, etc. The city is lighted with gas and electric lights, and its population, as at present (1890) estimated, is 15,000.

PASCAL, BLAISE, was born at Clermont Ferrand, France, on June 19, 1623. His father was Étienne Pascal, president of the Court of Aids at Clermont; his mother's name was Antoinette Bégon. The Pascal family were Auvergnats by extraction as well as residence, and they had for many generations held posts in the civil service. It does not appear that Blaise, who went to no school, but was taught by his father, was at all forced, but rather the contrary. Nevertheless he has a distinguished place in the story of precocious children, and in the much more limited chapter of children whose precocity has been followed by great performance at maturity, though he never became what is called a learned man, perhaps did not know Greek, and was pretty certainly indebted for most of his miscellaneous reading to Montaigne. How, purposely kept from books, he worked out the more elementary problems of geometry for himself; how at sixteen he wrote a treatise on conic sections which Descartes refused to believe in except as the work of a master and not of a student; how he wrote treatises on acoustics at twelve, and began elaborate calculating machines when he was still a boy, are things dwelt upon in all biographies of him.

His bodily health was in youth far from satisfactory, and he appears to have suffered, not merely from acute dyspepsia, but from a kind of paralysis. He was, however, except when physicians positively forbade study, and probably sometimes when they did so forbid, indefatigable in his mathematical work. In 1647 he pub-

lished his *Nouvelles Expériences sur le Vide*, and in the next year the famous experiment with the barometer on the Puy de Dome was carried out for him by his brother-in-law Perier, and repeated on a smaller scale by himself at Paris. As early as May, 1648, Jacqueline Pascal was strongly drawn to Port Royal, and her brother frequently accompanied her to its church. She desired, indeed, to join the convent, but her father, who at the date above mentioned returned to Paris with the dignity of counselor of state (his functions at Rouen having ceased), disapproved of the plan, and took both brother and sister to Clermont. Pascal staid in Auvergne for the greater part of two years, but next to nothing is known of what he did there. He, his sister, and their father returned to Paris in the late autumn of 1650, and in September of the next year Étienne Pascal died. Almost immediately afterward Jacqueline fulfilled her purpose of joining Port Royal—a proceeding which led to some soreness, finally healed, between herself and her brother and sister as to the disposal of her property. It has been supposed that Pascal, from 1651 or earlier to the famous accident of 1654, lived a dissipated, extravagant, worldly, luxurious (though admittedly not vicious) life with his friend the Duc de Roannez and others. His *Discours sur les Passions de l'Amour*, a striking and characteristic piece, only recently discovered and printed, has also been assigned to this period. As to Pascal's worldly life, it might be thought that only the completest ignorance of the usual dialect of the stricter religious sects and societies (and it may be added of Port Royal in particular) could induce anyone to lay much stress on that. A phrase of Jacqueline's about the "horribles attaches" which bound her brother to the world may pair off with hundreds of similar expressions from Bunyan downward. It is, however, certain that in the autumn of 1654 Pascal's second "conversion" took place, and that it was lasting. He betook himself at first to Port Royal, and began to live a recluse and austere life there. Madame Perier simply says that Jacqueline persuaded him to abandon the world. Jacqueline represents the retirement as the final result of a long course of dissatisfaction with mundane life.

From November 23, 1654, dates the singular document usually known as "Pascal's amulet," a parchment slip which he wore constantly about him, and which bears the date followed by some lines of incoherent and strongly mystical devotion.

But, whatever may have been the immediate cause of Pascal's conversion and (for a time) domestication at Port Royal, it certainly had no evil effect on his intellectual or literary powers. It must be noted that, though he lived much at Port Royal, and partly at least observed its rule, he never actually became one of its famous solitaries. At the end of 1655 Arnauld, the chief light of Port Royal, was condemned by the Sorbonne for a letter which he had published expressing doubt whether the famous five propositions were to be found in Jansen, and, as much was made of this condemnation, it was thought important by the Jansenist and Port Royal party that steps should be taken to disabuse the popular mind on the whole controversy. Arnauld would have undertaken the task himself, but his wiser friends knew that his style was anything but popular, and overruled him. It is said that he personally suggested to Pascal to try his hand, and that the first of the famous *Provincial Letters* (this familiar name, or rather misnomer, is an abbreviation from the proper title of *Lettres Écrites par Louis de Montalte à un Provincial de ses Amis*) was written in a few days, or, less probably, in a day. It was printed on

January 23, 1656, and, being immensely popular and successful, was followed by others to the number of eighteen, in which not merely the special points at issue but the whole ethical and doctrinal system of the Jesuits was pulled to pieces.

Shortly after the appearance of the *Provinciales*, on May 24, 1656, occurred the miracle of the Holy Thorn, a fragment of the crown of Christ preserved at Port Royal, which cured the little Marguerite Perier of a fistula lacrymalis. The Jesuits were much mortified by this Jansenist miracle, which, as it was officially recognized, they could not openly deny. Pascal and his friends rejoiced in proportion. What may be called his last illness began as early as 1658, after which year he never seems to have enjoyed even tolerable health, and as the disease progressed it was attended with more and more pain, chiefly in the head. In June, 1662, having given up his own house to a poor family who were suffering from smallpox, and being unwilling that his sister should expose herself to infection, he went to her house to be nursed, and never afterward left it. His state was, it seems, mistaken by his physicians, who to the last maintained that there was little danger—so much so that the offices of the church were long put off. He was able, however, to receive the eucharist, and soon afterward died in convulsions on August 19th. A *post-mortem* examination was held, which showed not only grave derangement in the stomach and other organs, but a serious lesion of the brain.

Eight years after Pascal's death appeared, in a small volume, the book which has given most trouble to all students of Pascal, and most pleasure to some of them. It purported to be Pascal's *Pensées*, and a preface by his nephew Perier gave the world to understand that these were fragments of a great projected apology for Christianity which the author had in conversation with his friends planned out years before.

PASCHAL I., pope from 817 to 824, a native of Rome, was raised to the pontificate by popular acclamation, shortly after the death of Stephen V, and before the sanction of the emperor (Louis the Pious) had been obtained. His relations with the imperial house never became cordial; and he was also unsuccessful in retaining in Rome itself the popularity to which he had owed his election. He died at Rome while the imperial commissioners were investigating the circumstances under which two important officers of Lothair, the eldest son of Louis, had been seized at the Lateran, blinded, and afterward beheaded; Paschal had shielded the murderers, but denied all personal complicity in their crime. The successor of Paschal I. was Eugenius II.

PASCHAL II., pope from 1099 to 1118, was the successor of Urban II. Of his early history nothing is known except that his proper name was Rainieri, that he was of Tuscan origin, and that in early life he became a monk, probably of Cluny. He was raised to the cardinalate by Gregory VII. about 1076, and was elected to the papal chair on August 13, 1099. In the long struggle with the imperial power about INVESTITURE (*q.v.*) he zealously carried on the Hildebrandine policy, but hardly with Hildebrandine success. The Lateran council, held in March, 1112, repudiated as void, under penalty of excommunication, the concessions that had been extorted by the violence of Henry V., and a council held at Vienne some months afterward actually excommunicated him, the pope himself ratifying the decree. On the death of the Countess Matilda of Tuscany, who had bequeathed her whole possessions to the church (1115), the emperor at once laid claim to them as imperial fiefs, and, descending into Italy, drove the pope first to Monte Casino and then to Benevento.

Paschal returned to Rome, after the emperor's withdrawal, in the beginning of 1118, but died within a few days (January 21, 1118). His successor was Gelasius II.

PASCHAL CONTROVERSY. See EASTER.

PASCO. See CERRO DE PASCO.

PAS DE CALAIS, a maritime department of northern France, formed in 1790 of nearly the whole of Artois and the northern maritime portion of Picardy, including the Boulonnais, Calaisis, Ardrésis, and the districts of Langle and Bredenarde, is bounded north by the Straits of Dover ("Pas de Calais"), east by the department of Nord, south by that of Somme, and west by the English Channel. The distance from England is only twenty-one miles. Nord, which separates Pas de Calais from Belgium, is at one place only three miles wide, and from Arras (the chief town) to Paris in a direct line is about 100 miles. Vast plains, open and monotonous, but extremely fertile and well cultivated, occupy most of the department. The greenest and most picturesque valleys are in the west. To the north of the hills running between St. Omer and Boulogne, to the south of Gravelines and the southeast of Calais, lies the district of the Wattergands, fens now drained by means of canals and dykes, and turned into highly productive land. The climate is free from extremes of heat and cold, but damp and changeable. At Arras the mean annual temperature is 47°; on the coast it is higher. The rainfall in the one case is twenty-two inches, in the other thirty-one.

With a total area of 2,550 square miles, the department has 1,899 square miles (more than two-thirds) of arable land, while woods and pasture-land each occupy only about a twentieth. No department except Somme breeds fowls so extensively. Wheat, beetroot, and oil seeds are the principal crops. Besides there are considerable quantities of poppy-seed, flax, hops, hemp, and tobacco. There are two great coal-fields, that of Pas de Calais proper, a continuation of the coal-field of Valenciennes and Hainault, and that of Boulonnais. The former contains a total area of 134,270 acres; the latter is about a tenth of that size. The national powder-mills of Esquerdes are among the largest in France. The port towns fit out a considerable number of vessels for the mackerel, cod, and herring fishing—a growing industry. Calais is emphatically a transit port. Boulogne has besides an export trade in local products, such as marble, freestone, minerals, and Boulogne horses, remarkable for size and strength. The roads of the department (national, departmental, etc.) make a length of 9,393 miles, the waterways 105½ miles, the railways 546 miles, and the industrial railways 60 miles. In 1881 Pas de Calais had 819,022 inhabitants (311 per square mile), ranking sixth among the departments in density of population. It forms the diocese of Arras, in the archbishopric of Cambrai, belongs to the district of the first (or Lille) *corps d'armée*, and is within the jurisdiction of the Douai court of appeal. There are six arrondissements bearing the names of their chief towns—Arras (27,041 inhabitants), Bethune (10,374), Boulogne (44,842), Montreuil (3,352), St. Omer (20,479), and St. Pol (3,664). Other places of importance are St. Pierre-lès-Calais (30,786 inhabitants), the industrial town of Calais (13,529), Lens (10,515), Lievin (8,281), Carvin (6,430)—the last three with important coal-mines, and Aire (5,000), formerly a fortified place.

PASIPHAE. See MINOS.

PASKEWITCH, IVAN FEDOROWITCH, prince of Warsaw, and general-in-chief of the Russian army, was born at Poltava May 8, 1782. His first active service was in 1805, in the auxiliary army sent to the assistance of Austria against France, when he took part in the battle of Austerlitz. From 1807 to 1812 he was engaged

in the campaigns against Turkey, and distinguished himself by many brilliant and daring exploits. During the French war of 1812-14 he was present, in command of the twenty-sixth division of infantry, at all the most important engagements; at the battle of Leipsic he took 4,000 prisoners. On the outbreak of war with Persia in 1826 he was appointed second in command. In reward of his services he was raised by the emperor to the rank of count of the empire, with the surname of Erivan, and received a million of rubles and a diamond-mounted sword. From Persia he was sent to Turkey in Asia, and, having captured in rapid succession the fortresses of Kars, Erzeroum, and Akalkalaki, he was at the end of the campaign made a field marshal. In 1831 he was intrusted with the command of the army sent to suppress the revolt of Poland, and after the fall of Warsaw, which gave the death-blow to Polish independence, he was raised to the dignity of prince of Warsaw, and created viceroy of the kingdom of Poland. On the outbreak of the insurrection of Hungary in 1848 he was appointed to the command of the Russian troops sent to the aid of Austria, and finally compelled the insurgents to lay down their arms at Vilagos. In April, 1854, he again took the field in command of the army of the Danube, but on June 9, at Silistria, where he suffered defeat, he received a contusion which compelled him to retire from active service. He died January 29, 1856.

PASQUIER, ÉTIENNE, one of the glories of the French bar, and one of not the least remarkable men of letters of the sixteenth century, was born at Paris on June 7, 1529. He studied law early, and in 1547 was a pupil of the famous Cujas at Toulouse. Thence, like many of his contemporaries, he went to finish his studies in Italy. In 1565 his fame was established by a great speech still extant, in which he pleaded the cause of the university of Paris against the Jesuits, and won it. He was thenceforward constantly employed in the most important cases of the day, and his speeches, many of which we possess, displayed a polished eloquence which was new in his time. For some years Pasquier lived at Tours, but he returned to Paris in Henry IV.'s train on March 22, 1594. He continued until 1604 at his work in the *Chambre des Comptes*; then he retired. He survived this retirement more than ten years, producing much literary work, and died after a few hours' illness on September 1, 1615, at the age of eighty-six.

PASQUINADE is a variety of libel or lampoon, of which it is not easy to give an exact definition, separating it from other kinds. It should, perhaps, more especially deal with public men and public things. According to the received tradition, Pasquino was a tailor (others say a cobbler) who had a biting tongue, and lived in the fifteenth century at Rome. His name, at the end of that century or the beginning of the next, was transferred to a statue which had been dug up in a mutilated condition and was set up at the corner of the Pallazzo Orsini. To this statue it became the custom to affix squibs on the papal government and on prominent persons.

PASSAIC, a city in Acquackanock township, Passaic county, N. J., is located on the Boonton Branch of the Delaware, Lackawanna and Western and on the Erie railroad, eleven miles north of Jersey City and five miles south of Paterson. It is also situated on the Passaic river, and contains a city-hall, ten churches, two schoolhouses, two newspaper offices, and a large number of stores. The manufactures carried on are numerous and extensive, being made up of planing and saw mills, worsted and woolen mills, foundries and machine-shops, chemical works, print and blanket manufactories, sash, door, and blind, belting and pack-

ing, hard-rubber, wire, brick, cigar factories, etc., also gas and electric-light works. The banking facilities and hotel accommodations are ample, and the transportation conveniences requisite and adaptive. The population in 1890 was 13,027.

PASSAU, an ancient town and episcopal see of Bavaria, in the district of Lower Bavaria, at the confluence of the Danube, the Inn, and the Ilz, ninety miles to the northeast of Munich, and close to the Austrian frontier. Passau is one of the most beautiful places on the Danube, a fine effect being produced by the way in which the houses are piled one above another on the heights rising from the river. The chief products of the insignificant industry of the town are tobacco, leather, and paper. The well-known Passau crucibles are made at the neighboring village of Oberzell. Trade is carried on in iron and timber, large quantities of the latter being floated down the Ilz. The inhabitants (15,365) are nearly all Roman Catholics.

PASSERAT, JEAN, a poet of merit and a contributor to the *Satire Ménippée*, was born at Paris in 1534. He was a scholar by natural taste, and became a teacher at the Collège de Plessis, and at the death of Ramus was made professor of Latin in the Collège de France. This, however, was not till 1572. In the meanwhile Passaret had studied law, and had composed much agreeable poetry in the Pléiade style, the best piece being his short ode *On the First of May*, and the charming villanelle, *J'ai perdu ma tourterelle*. He died at Paris in 1602, and his poems were not published completely till four years later.

PASSION-FLOWER (*Passiflora*) is the typical genus of the order to which it gives its name. The species are mostly natives of western tropical South America; others are found in various tropical and subtropical districts of both hemispheres. The tacsonias, by some considered to form part of this genus, inhabit the Andes at considerable elevations. They are mostly climbing plants having a woody stock and herbaceous or woody branches, from the sides of which tendrils are produced which enable the branches to support themselves at little expenditure of tissue. Some few form trees of considerable stature destitute of tendrils, and with broad magnolia-like leaves in place of the more or less palmately-lobed leaves which are most generally met with in the order. The flower itself consists of a calyx varying in form from that of a shallow saucer to that of a long cylindrical or trumpet-shaped tube, thin or fleshy in consistence, and giving off from its upper border the five sepals, the five petals (rarely these latter are absent), and the threads or membraneous processes constituting the "corona." This coronet forms the most conspicuous and beautiful part of the flower of many species, and consists of outgrowths from the tube formed subsequently to the other parts, and having little morphological significance, but being physiologically useful in favoring the cross-fertilization of the flower by means of insects. The name passion-flower—*flos passionis*—arose from the supposed resemblance of the corona to the crown of thorns, and of the other parts of the flower to the nails, or wounds, while the five sepals and five petals were taken to symbolize the ten apostles—Peter, who denied, and Judas, who betrayed, being left out of the reckoning. In some of the botanical books of the sixteenth and seventeenth centuries curious illustrations of these flowers are given, in which the artist's faith or imagination have been exercised at the expense of actual fact.

PASSION PLAYS. See DRAMA. On the Oberammergau Passion Play, see OBERAMMERGAU.

PASSION WEEK, the fifth week in Lent, begins with Passion Sunday (*Dominica Passionis* or *de Pas-*

*sione Domini*), so called from very early times because with it begins the more special commemoration of Christ's passion. In non-Catholic circles Passion Week is often identified with HOLY WEEK (*q.v.*), but incorrectly.

**PASSOVER AND FEAST OF UNLEAVENED BREAD.** It is explained in the article **PENTATEUCH** that the ancient Israelites were accustomed to open the harvest season by a religious feast. No one tasted the new grain, not even parched or fresh ears of corn, till the first sheaf had been presented to Jehovah, and then all hastened to enjoy the new blessings of divine goodness by eating unleavened cakes, without waiting for the tedious process of fermenting the dough. This natural usage became fixed in custom, and at a comparatively early date a new significance was added to it by a reference to the exodus from Egypt, when, as tradition ran, the people in their hasty departure had no time to leaven the dough already in their troughs. The two elements of a thankful recognition of God's goodness in the harvest, which everyone was eager to taste the moment that Jehovah had received His tribute at the sanctuary, and of grateful remembrance of the first proof of His kingship over Israel, went very fittingly together.

**PASSPORT.** A passport or safe-conduct in time of war is a document granted by a belligerent power to protect persons and property from the operation of hostilities. In the case of the ship of a neutral power, the passport is a requisition by the Government of the neutral state to suffer the vessel to pass freely with her crew, cargo, passengers, etc., without molestation by the belligerents. The violation of a passport, or safe-conduct, is a grave breach of international law. The offense in the United States is punishable by fine and imprisonment where the passport or safe-conduct is granted under the authority of the United States (act of Congress, April 30, 1790). In a time of peace a passport is still necessary for foreigners traveling in certain countries, and is always useful, even when not necessary, as a ready means of proving identity. It is usually granted by the foreign office of a state, or by its diplomatic agents abroad.

**PASTE, or STRASS.** See **GLASS**.

**PASTON LETTERS.** This collection of documents consists of the correspondence of the principal members of the Paston family in Norfolk between the years 1424 and 1506, including several state papers and other documents accidentally in their possession. The papers appear to have been sold by William Paston, second earl of Yarmouth, the last representative of the family, to the antiquary Le Neve early in the eighteenth century.

**PASTORAL** is the name given to a certain class of modern literature in which the "idyl" of the Greeks and the "eclogue" of the Latins are imitated. It was a growth of humanism at the Renaissance, and its first home was Italy.

**PASTORAL EPISTLES**, the name given to three epistles of the New Testament which bear the name of St. Paul, and of which two are addressed to Timothy and one to Titus. The reason of their being grouped together is that they are marked off from the other Pauline epistles by certain common characteristics of language and subject-matter; and the reason of their special name is that they consist almost exclusively of admonitions for the pastoral administration of Christian communities. None of the Pauline epistles have given greater ground for discussion, partly on account of the nature of their contents, partly on account of their philological peculiarities, and partly on account of their historical difficulties.

**PASTORAL LETTER**, a letter addressed, in his pastoral capacity, by a bishop to his clergy, or the laity of his diocese, or both. In the Church of Rome it is usual for every bishop to issue at least one pastoral annually, the Lenten Mandates or Instructions, containing exhortations relating to that fast, and enumerating the dispensations granted and devotions prescribed. Others are issued in connection with the principal solemnities of the church, or as occasion arises.

**PATAGONIA**, in the widest application of the name, is that portion of South America which, to the east of the Andes, lies south of Rio Negro, and to the west of the Andes, south of the Chilian province of Chiloe, with a total area of 322,550 square miles (306,475 continental, 16,075 insular). By the treaty of October 22, 1881, this vast region was divided between Chili and the Argentine Republic, whereby about 62,930 of the 322,550 square miles fell to Chili and 259,620 to the Argentine Republic.

The southern coast of Patagonia is bounded for 365 miles by Magellan's Strait, which separates the mainland from the countless islands of the Tierra del Fuego archipelago and breaks it up into a number of very irregular peninsulas. Of these the largest are King William IV. Land and Brunswick Peninsula, and between them lies the extensive inlet of Otway Water, which is further connected westward by Fitzroy Channel with Skyring Water. On the east coast of Brunswick Peninsula opposite the Broad Reach of the strait, and in the finest part of the straitward district, lies the Chilian military post and penal settlement of Punta Arenas or Sandy Point.

Patagonia east of the Andes is for the most part a region of vast steppe-like plains. Unlike the pampas of the Argentine Republic, with which it is conterminous on the north, it rises in a succession of abrupt steps or terraces about 300 feet at a time, and is covered, not with soft, stoneless soil, but with an enormous bed of shingle, which, instead of luxuriant grass, supports, where it is not absolutely bare, only a thin clothing of coarse and often thorny brushwood and herbage. So peculiar is this, the largest tract of shingle in the world, that from D'Orbigny downward geologists have generally characterized it simply as the Patagonian formation. The guanaco, the puma, the zorro or *Canis Azarae* (a kind of fox), the zorrino or *Mephitis patagonica* (a kind of skunk), and the tuco-tuco or *Ctenomys magellanicus* (a kind of rodent) are the most characteristic mammals of the Patagonian plains. Vast herds of the guanaco roam over the country, and form with the ostrich (*Rhea americana*, and more rarely *Rhea Darwinii*) the chief means of subsistence for the native tribes, who hunt them on horseback with dogs and bolas.

Eastern Patagonia is traversed from west to east by a considerable number of rivers, but few, if any, can ever be of much use as highways. In their passage seaward they are joined by comparatively few tributaries from the low country; rain falls seldom, and the water sinks away among the shingle and sand. The Rio Negro, which separates the pampas from Patagonia proper, is formed by the junction of the Neuquen and the Limay. For some distance the Rio Negro is navigable for steamers drawing twelve feet, but only vessels with powerful engines can make head against the current. The next great Andean river is the Chubut, which gives its name of Chubut Territory to the northern division of Argentine Patagonia, and is well known from the Welsh colonies established in its valley in 1865 by Mr. Lewis Jones. Patagonia was discovered in 1520 by Magellan, who called the country Tierra de Patagones, from the large footsteps observed near his winter quarters at San Julian. In the latter half of the eight-

eenth century our knowledge about Patagonia was considerably augmented by Byron (1764-65), Wallis (1766), Bougainville (1766); Thomas Falkner, a Jesuit who "resided near forty years in those parts," published his *Description of Patagonia* (Hereford, 1774); Francesco Viedma founded El Carmen, and Antonia advanced inland to the Andes (1782); and Villarino ascended the Rio Negro (1782). The *Beagle* and *Adventure* expeditions under King (1826-30) and Fitzroy (1832-36) were of first-rate importance, the latter especially from the participation of Charles Darwin; but of the interior of the country nothing was observed except 200 miles of the course of the Santa Cruz. Captain Musters wandered in company with a band of natives through the whole length of the country from the strait to the Manzaneros in the northwest, and collected a great deal of information about the people and their mode of life. Since that date explorations of a more scientific character have been carried on by Moreno (1873-80), Rogers (1877), Lista (1878-80), and Moyano (1880, etc.)

PATARENES, a name apparently first used in Milan about the middle of the eleventh century to denote the party most extremely opposed to the marriage of priests; besides Patareni, the forms Paterini, Patarelli, Pataræi occur among others.

PATENTS. By the means of patents inventors obtain a monopoly in their inventions for a certain span of time considered sufficient to remunerate the deviser. This monopoly is founded on exactly the same principle as the copyright enjoyed by authors and artists. There are persons who argue that no such privilege should be permitted; there are others who think that the most trifling exertions of the inventive faculties should be protected. The right course lies between these extremes. All civilized nations have in modern times considered it desirable to give inventors an exclusive right to their inventions for a limited period, not only as a matter of justice to individuals but as a piece of sound policy tending to the advantage of the whole community. The monopoly is granted in the expectation that the inventor will derive some profit from it; and the hope of profit is known to be a great stimulus to invention. When an author writes a book, or an artist designs a picture, the law allows a right of property to those persons in their productions, and accompanies the recognition of this right with the power to repress infringements. If this were not so, probably very few persons would employ their time in writing books or creating works of art; and hardly anyone will be bold enough to assert that the extinction of the race of authors and artists is to be desired. The same principle applies to inventors, who ought to have the works of their brain protected from piracy fully as much as the other classes of mental producers. By holding out to them the prospect of gain they are induced, at a present loss of time and money, to attempt to discover improvements in the useful arts, in machinery, in manufacturing processes, etc.; and thus the interests of the community are advanced more rapidly than if such exertions had not been brought into play. Just as the rule of rewarding inventors is in theory attended with some difficulty, so is the practical application of it. To grant a very long term of exclusive possession would be detrimental to the public, since it would tend to stop the progress of improvement. A limited property must therefore be allowed—large enough to give the inventor an opportunity of reaping a fair reward, but not barring the way for an unreasonable period. And, when this compromise has been decided on, it will be seen how difficult it may be to determine beforehand what is the real merit of an invention, and apportion the time

to that merit. Hence it has been found necessary to allot one fixed period for all kinds of inventions falling within the purview of the patent laws. This regulation appears to be open to the complaint that the least valuable and the most meritorious inventions are placed on the same footing. But it may be replied that in the result this is of little consequence, since meritorious inventions alone obtain the patronage of the public, those which are destitute of value being neglected. Besides, if the complaint were well founded, there is here no sound argument against the policy of privileges of this nature, seeing that it is impossible to weigh beforehand one invention against another in the scale of merit, or to obtain a true standard of comparison.

The inventions for which patents are obtained are chiefly either vendible articles formed by chemical or mechanical operations, such as cloth, alloys, vulcanized india-rubber, etc., or machinery and apparatus, or processes. It may be remarked here that a scientific principle cannot form the subject of a valid patent unless its application to a practical and useful end and object is shown. An abstract notion, a philosophical idea, may be extremely valuable in the realm of science, but before it is allowed to form a sound basis for a patent the world must be shown how to apply it so as to gain therefrom some immediate material advantage.

The principal classes of patentable inventions seem to be these: (1) new contrivances applied to new ends, (2) new contrivances applied to old ends, (3) new combinations of old parts, whether relating to material objects or to processes; (4) new methods of applying a well-known object.

With regard to a patent for the new application of a well-known object it may be remarked that there must be some display of ingenuity in making the application, otherwise the patent will be invalid on the ground that the subject-matter is destitute of novelty.

Whatever be the nature of the invention, it must possess the incidents of utility and novelty, else any patent obtained in respect of it will be invalid. The degree of utility need not, however, be great. As to novelty, this is the rock upon which most patents split, for, if it can be shown that other persons have used or published the invention before the date of the patent, it will fall to the ground, although the patentee was an independent inventor deriving his ideas from no one else.

The attributes of novelty and utility being possessed in due degree by an invention, the chief remaining difficulty with which a patent has to contend resides in the complete specification, the instrument by which the inventor describes the nature of the invention and the means by which it may be carried into effect. An inventor is bound, in return for the monopoly conceded to him, to instruct the public how to work the invention when the monopoly shall have expired, and to inform them in the meantime what it is they are shut out from using; and now the patent is not granted till the complete specification is filed. The patentee is bound to make by this instrument a full disclosure of his secret; he must not keep anything back either willfully or accidentally; he must render everything plain and clear, showing no attempt to mislead, and leaving nothing ambiguous; he must distinguish what is old from what is new; he must point out distinctly what it is that he claims as his own exclusive property, and he must take care that he claims no more than he is entitled to.

Patent privileges, like most other rights, can be made the subject of sale. Partial interests can also be carved out of them by means of licenses, instruments which



empower other persons to exercise the invention, either universally and for the full time of the patent (when they are tantamount to an assignment of the patentee's entire rights), or for a limited time, or within a limited district. By an exclusive license is meant one that restrains the patentee from granting other licenses to anyone else. By means of a license a patentee may derive benefit from his patent without entering into trade and without running the risks of a partnership.

Under an act passed in 1874 a patent must in all cases be applied for in the name of the original inventor, although he may contemporaneously execute an assignment of the invention, and the patent will thereupon be issued to the assignee. Every application is referred to an official examiner. The patent will be refused if any part of the invention is wanting in novelty, or if the application is not in proper form. The applicant may, however, make a re-application, and if the inventor is dissatisfied with the report of the examiner he can appeal. Patents are issued for the term of seventeen years, but expire with any earlier foreign patents for the same invention. A foreign inventor may obtain a patent if his invention has not been in public use or on sale in the United States for more than two years prior to his application.

**PATERCULUS, MARCUS VELLEIUS**, a Roman historian, was probably born about 19 B.C. His father, a cavalry officer, belonged to a good Capuan family, several members of which had risen to some military or magisterial distinction. The historian himself served as military tribune in Thrace, Macedonia, Greece, and the East, and in 2 A.D. was present at the interview on the Euphrates between C. Cæsar (grandson of Augustus) and the Parthian king. Afterward as præfect of cavalry and legatus he served for eight years (from 4 A.D. onward) in Germany and Pannonia under Tiberius, in whose triumph (12 A.D.) he and his brother bore a conspicuous part. For his services he was rewarded with the quæstorship in 7, and, along with his brother, with the prætorship in 15. He was still alive in 30, for his history contains many references to the consulship of M. Vinicius in that year. The date and manner of his death are unknown. It has been conjectured that he was put to death in 31 as a friend of Sejanus, whose praises he celebrates.

He wrote a compendium of Roman history in two books dedicated to M. Vinicius, from the dispersion of the Greeks after the siege of Troy down to the death of Livia in 29 A.D. The first book brings the history down to the destruction of Carthage, 146 B.C.; portions of it are wanting, including the beginning. The latter history, especially the period from the death of Cæsar, 44 B.C., to the death of Augustus, 14 A.D., is treated in much greater detail.

**PATERINES.** See **PATARENES.**

**PATERNÓ**, a town of Sicily, in the province of Catania, stands at the southwest foot of Mount Ætna, ten miles northwest of Catania, near the railway from that city to Leonforte. Population, 15,230.

**PATERSON**, capital of Passaic county, New Jersey, is situated on the Passaic river and the Morris Canal, seventeen miles northwest of New York. As the river which forms the boundary of the city for a distance of nine miles has at one place a sheer fall of fifty feet, it is an unfailing source of abundant water-power; and Paterson ranks second among the manufacturing cities of the State. Silk, iron, and cotton are the great industrial staples; silk-dyeing is also practiced. One of the chief industries is the making of locomotives. Further, fire-engines, "Whitney" sewing-machines, iron bridges, brass wares, flax, hemp, and jute goods, calico-prints, paper, and chemicals are all

manufactured. The population was 11,334 in 1850, 19,586 in 1860, 33,579 in 1870, and 51,031 in 1880, and is now (1890) 78,347. Founded in 1792 by a cotton company under the patronage of Alexander Hamilton and named after Gov. William Paterson, who signed its town charter, Paterson obtained the rank of a city in 1851.

The city contains a public library with 12,000 volumes, has a system of water-works and is lighted by gas and electricity. It has a police force of seventy-five men, costing \$70,000 per annum. The volunteer fire department consists of 636 men, with 9 steam fire-engines, 11 hose-carts etc., maintained at a cost of \$48,200. The annual expenditure for schools is \$144,353, and for public charities \$38,000. In 1889 the city treasury receipts were \$1,507,025, the expenditures \$1,343,100; total debt, \$1,513,490.

**PATERSON, WILLIAM**, founder of the Bank of England, projector of the Darien scheme, and a voluminous writer on subjects connected with finance, was born in April, 1658, in Scotland. About 1690 he was occupied in the formation of the Hampstead Water Company, and in 1694 he founded the Bank of England. The government of the day required money, and the country, rapidly increasing in wealth, required a bank. The subscribers lent their money to the nation, and this debt became the bank stock. The credit of having formulated the scheme and persuaded the government to adopt it is certainly due to Paterson. He was one of the original directors, but in less than a year, in consequence of some dispute with his colleagues, he withdrew from the management. He removed to Edinburgh, unfolded his Darien scheme, and soon had the whole nation in favor of it. He, it is supposed, drew up the act of 1695 which formed the "Company of Scotland trading to Africa and the Indies." This company, he arranged, should establish a settlement on the isthmus of Darien, and "thus hold the key of the commerce of the world." There was to be free trade, the ships of all nations were to find shelter in this harbor not yet erected, differences of race or religion were to be made nothing of; but a small tribute was to be paid to the company, and this and other advantages would so act that, at one supreme stroke, Scotland was to be changed from one of the poorest to one of the richest of nations.

On July 26, 1698, the first ships of the expedition set sail "amidst the tears and prayers and praises of relatives and friends and countrymen." Some financial transactions in which Paterson was concerned, and in which, though he had acted with perfect honesty, the company had lost, prevented his nomination to a post of importance. He accompanied the expedition as a private individual, and was obliged to look idly on while what his enemies called his "golden dream" faded away indeed like the "baseless fabric of a vision" before his eyes. Ill, weak, and helpless, and yet protesting to the last against the abandonment of Darien, he was carried on board ship, and, after a stormy and terrible voyage, he and the remnant of the ill-fated band reached home in December, 1699. In his native air Paterson soon recovered some of his strength, and immediately his fertile and eager mind was at work on new schemes. First he did all he could to prevent the Darien scheme already engaged in from being finally abandoned, then he prepared an elaborate plan for developing Scottish resources by means of a council of trade, and then he tried to induce King William to enter on a new Darien expedition. About the beginning of the century he removed to London, and here by conference with statesmen, by writing, and by personal persuasion helped on the Union. He died January 22, 1719.

**PATHOLOGY**, anatomy and histology investigate the naked-eye and microscopic structure of the healthy body; physiology examines the functions of the parts and elements revealed by them, and studies the chemical processes which constitute healthy life. To obtain a knowledge of disease parallel courses must be adopted. In post-mortem examinations we note all naked-eye departures from normal anatomy; next, the microscope is employed to show the finer changes to which these departures are due; and, lastly, we endeavor to find out the causes of the abnormal structure and function which constitute the disease, their mode of action, and the nature and sequence of the disturbances which they produce. We thus get pathological anatomy and histology, and pathology—the physiology of disease.

The guiding principle of modern pathology being that pathology has to deal with no new tissue-cell or function, but simply with disturbance of normal elements and functions, it is obvious that for the purpose of studying disease our acquaintance with the body in health cannot be too intimate. As causes, not products, of disease, new cells (bacteria) and even entire animals (parasitic worms, etc.) are frequently introduced into the tissues.

The complex human organism can be reduced to very simple elements—cells and the intercellular substances to which they give origin. These elements make up every tissue, the cells being sometimes in excess, as in epidermis, where they seem to be in absolute contact—sometimes the intercellular substance, as in the connective tissues. It is now universally accepted that the cell is the seat of nutrition and function. Health and disease must be considered as terms referring not to the body as a whole, but to the cells of which it consists.

Before treating of disease we will say a few words upon the constitution of cells in health, and upon their functions and the conditions under which they are physiologically discharged.

*Constitution of Cells.*—When Schwann established the analogy between the animal and vegetable cell, the former was held to be constructed, in all cases, upon the same principle as the latter, and to consist of a cell-wall inclosing a cavity in which were contained a nucleus and fluid contents. But the fact that no cell-wall can be demonstrated in embryonic cells, blood corpuscles, and the cells of many rapidly-growing new formations led Leydig and Max Schultze to believe that a little mass of matter, inclosing a nucleus, was all that was necessary to constitute a cell. Max Schultze established the identity of the cell substance with animal sarcode, a contractile substance existing in the lower animals, and showed that it also was capable of spontaneous movement. He called the substance of which all cell-bodies, animal or vegetable, are, at least at one period of their existence, composed, protoplasm, and pointed out that a distinct cell-wall resulted from a retrograde process occurring in its outer layers. Doctor Beale promulgated similar views.

The definition of a cell has been still further modified by the discovery that a nucleus is not essential; for none exists in the cryptogamia and in some of the lowest animal forms. In these exceptional cases the cell consists of a simple mass of protoplasm, but in the higher animals the nucleus is almost constant. The cell-wall is much less so, and must be regarded, in point of vitality, as inferior to the rest of the cell.

Protoplasm is a very complex body, of the molecular constitution of which we are ignorant. It contains a large quantity of water, and its solid residue is largely made up of albuminoid material; but with this there are always associated, apparently in an amalgam-like way, some carbohydrate, fat and inorganic salts; for they

are invisible, yet not in true combination. Some authorities regard the proteid element as alone essential to the manifestation of life. Protoplasm, as seen in the bodies of normal cells, is generally structureless, soft, and viscid, but varying much in fluidity. Granules are frequently present in it, often in one part and not in another, and these probably always differ chemically from true protoplasm. Small cavities, full of fluid, looking like clear spaces, are often seen; they are called vacuoles, and may either riddle the cell or one large one may occupy much of its body. They appear, disappear, and change their position.

In highly specialized cells protoplasm has acquired a distinct structure, *e.g.*, the fibrillation of muscle and nerve-cells and the striation of many ciliated cells and gland-cells. In many cells, after hardening in chromic acid, a fine network of fibers is seen in the cell-substances, a fact which has led Klein and others to believe that the protoplasm of cell-bodies is really arranged like a sponge, the interstices being occupied by fluid containing granules which are moved about by contractions of protoplasm. This view explains many phenomena of cell-life; but up to the present time has not been supported by the observation of living cells.

Under certain circumstances protoplasm undergoes metamorphoses into various substances, *e.g.*, mucin, globulin, keratin, pepsin, and other ferments, glycogen, celloid, and fat, which may form large portions of the bodies of cells. When glycogen and fat arise from a proteid, a nitrogenous molecule must also be formed.

This protoplasm is the essential constituent of the body of every cell. In comparison with the nucleus the body varies much in size, being sometimes large, sometimes quite insignificant. The cell-wall, when present, is of much firmer consistence than the rest of the body, and seems to be due to some metamorphosis of the protoplasm of the latter.

The nucleus is more constant than the body, in both size and form. It is usually spherical or oval, but may be quite rod-shaped; is generally placed near the center of the cell, and may be single or multiple. It resists destructive reagents more strongly than does the body, and in disease often remains after this has been destroyed; it is stained more deeply by carmine and logwood. Its presence may be concealed by fat, pigment or other substances in the cell body. The nucleus does not exist in red blood-corpuscles, and it is doubtful whether the nucleated red blood-corpuscles of the early embryo disappear or are converted into the non-nucleated disks which succeed them. Those formed endogenously in connective tissue-corpuscles in later foetal and extra-uterine life are apparently never nucleated; they have been likened to chlorophyll-granules. The nucleus of epidermic scales may finally be converted into keratin, and disappear.

The nucleus, which was formerly regarded as a spherical vesicle bounded by definite membrane which separated the nuclear fluid from the cell substance, is now known to possess with great constancy the following much more intricate structure:—(1) A membrane bounding it externally; (2) a network of fibers, probably contractile, and certainly capable of great changes in closeness and general form; (3) one or more nucleoli, said by some to be only nodal points in the network; (4) a clear, more or less fluid substance which fills the membrane and lies in the meshes of the network. The more solid portions, membrane, network, and nucleoli are spoken of as nucleoplasm; the less solid as nuclear matrix. Under **GENESIS OF CELLS** (*q. v.*) we shall describe the remarkable changes which occur in nuclei previous to the division of cells.

*Physiology of Cells.*—We will now give a short **sum-**

mary of the normal function of cells, and of the conditions under which they are physiologically discharged.

A unicellular organism, like the amœba, takes in food, grows and excretes, performs certain functions, of which motion is the most obvious, and reproduces its like. The whole of this may be regarded as work done, and implies the expenditure of force; and we may be quite sure, although we know nothing of the chemical processes going on in an amœba, that its excreta are simpler compounds than its ingesta, the difference in heat value between these two sets of compounds representing the force which is available to the organism. The ability to effect these chemical and physical processes, in which the "life" of the animal—as recognizable by us—consists, is inherited, and is spoken of as "vital activity," or "vital energy." The possession of this is naturally the first essential to living. The other requirements of the cell are a sufficient supply of suitable food and appropriate surrounding physical conditions, such as normal temperature and suitable density of the surrounding fluid.

In man, a multicellular being, the cells vary much in form and in the results of the chemical action which they effect. Although retaining more or less independence, varying with the kind of cell, they are bound together for the common good, and each has some special function to perform. Thus there are muscle-cells to produce motion, gland-cells to secrete and excrete, and nerve-cells to control the working of muscle, glands, and perhaps other tissues; certain cells are set apart for reproduction; and, finally, there are the connective tissues to unite and support the other structures, and surface epithelium to protect them. Thus each kind of work done by the one cell of the amœba is in man performed by a group of cells specialized for the purpose. If, then, we recognize the interdependences of the cells in the human organism upon each other, and the differences in their structure and purpose in the economy, all that has been said of the amœba will apply to each cell of the body; all the functions of the amœba are probably present in each cell; but one—*e.g.*, contractility of a muscle-cell—is often so highly developed as to be called the function of the cell.

*Vital Activities.*—The vital energy of each cell manifests itself in three channels; hence Virchow speaks of the nutritive, functional, and reproductive activities. Between the two former there is no line—the existence of the one implies that of the other; both are chemical and may be considered together. Food is taken into the body, digested and absorbed by lacteals and blood-vessels from the intestines; the various excretory organs give off urea, and, in small quantity, other nitrogenous bodies, carbonic acid and water. Supposing the body to be in nutritive equilibrium—neither gaining nor losing weight—the amounts excreted will account for the nitrogen, carbon, and hydrogen taken in as food. Putting aside water, certain salines, and oxygen, which are essential to life, the foodstuffs are albumen, carbohydrates, and fats—the materials of which the body consists. It is evident that a large amount of heat must be set free in the breaking down of these bodies to the excreta above mentioned; and this is the source of the force by which every act is performed. The blood carries the prepared foodstuffs to the capillaries, where they pass out with the lymph to come into actual contact with the cells—some in solution, others only in suspension. Certain or all of these bodies are now taken up (apparently actively, for albumen will not diffuse from a watery fluid), and become part of the substance of a cell, replacing some older material, which has been broken down to supply force for assimilation and all other actions of the cell. This breaking down

of cell substance consists in union of it with oxygen obtained from the blood and stored by the tissues in some unknown way. All such oxidation processes are believed to take place in the cells, not in the blood; and this almost necessitates that all food shall become part of a cell before it is oxidized; it is not oxidized directly. Although the tissues of the body and the foodstuffs have almost the same chemical composition, waste tissue is not repaired by a process of simple replacement from the food, if we except fat; when a fat of the same composition as human fat is contained in the food, it may be stored in the cells without undergoing previous change, but usually some slight addition or subtraction of hydrogen is necessary. It is probable that many changes, both analytical and synthetical, occur in the arrangement of the elements of foodstuffs before they form protoplasm, the real living tissue, and force is thus alternately liberated and rendered potential; but this does not affect the main fact that the body ultimately obtains the force equivalent to the difference in heat value between the ingesta and excreta.

We have enumerated the compounds presented to cells in lymph, and also those which leave the body as the ultimate products of cell-action; but in no instance do we know the connecting links between the end products. While the ingesta of cells must be tolerably uniform in character, their excreta are probably as various as are the uses of the cells in the body—witness the different compositions of the many secretions and the unequal distribution of the extractives such as kreatin, xanthin, etc. The breaking down of tissue, or waste, which is going on constantly on the one hand, and the building up or repair which in health keeps pace with it on the other, constitute the nutritive exchange of the cell or of the whole body. This process is constantly being disturbed from pathological causes; and, physiologically, formation exceeds waste during the period of growth, but the opposite obtains in old age, when the vital energy of all cells is failing and their functions are imperfectly discharged.

The excreta pass in two directions—into lymph and back into blood, or out into a mucous or cutaneous surface, whence part may be absorbed—*e.g.*, saliva, gastric juice, and part of the bile.

*Conditions of Health of a Cell.*—That the nutritive exchange of the cells of the body may be normal the same conditions must be present as those necessary for the healthy life of an amœba. These are—1, the possession of normal vital activity or ability to effect chemical change; 2, a sufficient supply of food of suitable quality, depending in man upon the circulation and blood constitution; and 3, the presence of appropriate surrounding physical conditions. To these must be added, in the case, at least, of nerve, muscle and certain gland-cells, 4, connection with a healthy nervous center.

*Influence of the Nervous System upon Nutrition.*—When motor nerve fibers are cut off from ganglion-cells of the anterior cornu, or when sensory are severed from those of the posterior spinal ganglion, they rapidly atrophy, the axis-cylinders being probably long processes of these cells. Section of a motor nerve causes atrophy of the muscles supplied by it, and section of the chorda tympani is followed by wasting of the submaxillary gland. Each of these tissues has an active function to perform, but physiologically this function is never performed except in response to nervous stimulus. Removal of this consequently checks or annuls their nutritive exchange and deprives them of the afflux of blood which accompanies their action. In the above instances the nervous system undoubtedly exercises a trophic influence, though not by means of any special

trophic nerves. It is said by some to have the same influence over all the cells of the body; but this is denied by others, who fully allow its power over nerves, muscle, and such glands as secrete physiologically only in response to stimulation of special secretory nerves. The question at issue is, whether the nervous system influences those chemical changes in which the life of cells, other than gland, muscle, and nerve, consists. The discussion is carried on mainly with reference to the "non-working cells"—connective tissues and epidermis. Can the nervous system increase the vital energy of a cell and cause it to assimilate more food, to grow and multiply? Can it exhibit the performance of these functions and produce atrophy? Or can it so change the metabolism of cells that their products become irritating and cause inflammation? The question is a very important one, and cannot at present be decided.

In the first place, a general objection has been raised to experiments having for their object to prove the presence of special trophic nerves, viz., that the influence of other kinds of nerves, especially vaso-motor, has not been eliminated. It is necessary to remember always that after section of the nerves of a limb the part beyond is insensitive, its muscles never contract, the afflux of blood which accompanies their action is lost to the part, and the venous circulation no longer receives help from them. Its vessels at first dilate when the central control is removed, and the part reddens and warms from flow of a larger quantity of blood through it; but soon the general increase of tonus compensatory to the local diminution dies away, the vessels of the part remain dilated, and the flow through them becomes slower than natural, consequently the part is cold and pale or bluish. After a time, however, the local vascular nerves gain power, and a certain amount of tonus, which is easily upset, is restored. These disturbances in the nutritive and physical conditions of a part may explain many changes in it without calling into existence a special set of nerves.

The facts which are held to prove the influence of the nervous system on the nutrition of cells in the non-working tissues are the following:—The fall of the carbonic acid discharge which occurs when the body is exposed to a high external temperature and the increase which results from opposite conditions, show that diminished and increased chemical changes share with vaso-motor changes the duty of maintaining an average temperature. It seems most probable that the alterations in metabolic activity are owing to nerve influence, but it has not been proved that this is exercised on non-working tissues. It has been stated above that the chemical decomposition which gives rise to muscular contraction occurs physiologically only in response to nervous stimuli, and part of the force liberated appears as heat. It is possible that the decomposition may be effected slowly under nerve influence without causing contraction, force being manifested as heat only. Perhaps this may be one way in which the rise of temperature in fever is raised.

The diabetes which results from head injuries and from puncture of the floor of the fourth ventricle seems certainly to be due to a too rapid conversion of glycogen into sugar in the liver cells; and Foster inclines to the view that this is due to the direct action of nerves on the cells. But others connect the abnormal metabolism with the dilation of the hepatic arteries and free supply of arterial blood which always results from puncture.

Many inflammations of the skin, mucous membranes, viscera, bones, and joints are described as due to section or irritation of trophic nerves.

In some cases of hemiplegia (especially from hemor-

rhage), and occasionally from saber-wounds of the brain, extremely acute bedsores form on the opposite buttock; and similar lesions appear over the sacrum in paraplegia from sudden extensive pathological or traumatic lesions of the cord. They are distinguished from ordinary bedsores by the early date (second or third day) and acuteness of their onset, and the uselessness of the usual precautionary measures. Cohnheim objects to these that they are but differences of degree, and that there is no constancy in their occurrence with apparently similar lesions of any particular part of the cerebro-spinal axis. It certainly is strange that trophic influence should be so marked just at pressure spots: doubtless the nerve lesion is merely predisposing. In this class of cases, too, cystitis and pyelitis may appear at about the same time as the bedsores; and Charcot thinks that these inflammations are due to irritation of trophic nerves; but as exceedingly foul urine, which invariably contains organism, is noted before or with the cystitis, others believe that the latter is due to organisms introduced from without (often by a septic catheter), or from within through the kidneys, which render the urine extremely irritant by putrefaction. Similar cases occasionally occur after the passage of a few catheters in cases of enlarged prostate.

*Trigeminal Keratitis, etc.*—Intracranial section of the fifth nerve causes cloudiness of the cornea twenty-four hours, and often destructive panophthalmitis; at the same time ulcers appear on insensitive parts of the mucous membrane of the mouth and nose. The ulcers in the mouth are probably due to unheeded injuries from the teeth, but ulcers from the nose cannot thus be accounted for.

It is said that keratitis can be prevented by most carefully protecting the eye from injury with the still sensitive ear. Ulcers on the foot, often progressive, after section of the sciatic are similarly accounted for.

Pneumonia after section of the vagi is due to entry of food, etc., through the insensitive glottis, but this will not account for pneumonia or pulmonary apoplexy on the side opposite to a cerebral hemorrhage. Acute fatty degeneration of the heart may follow section of the vagi; the *modus operandi* is unknown.

Erythema, Urticaria, Pemphigus, and especially Herpes, may appear in the distribution of nerves which are the seats of some irritant lesion, as after fractured spine, in locomotor ataxy and other scleroses of the cord, compression by an aneurism or tumor, or inflammation of the Glusserian or a posterior spinal ganglion. The nerves supplying the area of the rash have been found in a state of neuritis.

The rapid variations of erythemata and urticaria certainly seem to point to a nervous origin, but do they involve more than an acute vaso-constrictor paralysis?

*Glossy Skin (Paget).*—In some cases of irritative lesion of the sensory nerves of limbs (*e.g.*, from gunshot) the skin becomes smooth, shiny, hairless, sometimes hyperæmic, sometimes œdematous, often superficially inflamed or the seat of sores like chilblains; at the same time the part is often the seat of intense neuralgia. Less severe symptoms, but obviously similar, are seen after simple section, and may be due to disturbances of circulation and temperature and to anæsthesia.

*Pigmentation.*—More or less symmetrical patches of leucoderma and melanderma may occur all over the body with more or less anæsthesia; pallor with anæsthesia and localized grayness of hair may to some extent return between the attacks. Cases have been recorded in which the hair has within a short time of a fright become gray.

Serious synovitis and arthritis, with rapid, painless and great erosion of the articular ends of the bones

may occur in cases of hemiplegia and ataxia, and are supposed to be due to involvement of the cells of the anterior cornu by progressive sclerosis. The casual relationship between the nervous disease and the peripheral lesion cannot be yet said to be proved.

*Atrophy of Parts Cut Off from the Nervous System.*—Muscle and certain glands have been treated of above. In the case of muscle, it is to be noted that if it is regularly exercised by the galvanic current, atrophy may long be postponed. In a paralyzed limb all tissues ultimately waste; so also does the face when paralysis of the facial nerve is not recovered from. This is due to impaired blood-supply, for it occurs in limbs which are simply kept at rest. Atrophy of the cock's comb and turkey wattles results from section of their nerves, and is perhaps to be similarly explained. In cases of progressive atrophy of half the face there may be nothing to guide one to the nervous system as the cause; there may be no subjective symptoms, and sensation and motion remain normal. If due to nervous influence, this atrophy would seem to favor the existence of trophic nerves.

Hypertrophy of bone may follow section of the sciatic in young animals and is inflammatory; for it never occurs unless large ulcers form extending to the bone and even causing necrosis. Hypertrophy of the rabbit's ear after section of its nerves has been said to occur, but many observers have failed to produce it or have at most seen thickening of epidermis and hair upon it.

There is, then, no reliable evidence of the existence of special trophic nerves and no convincing proof of the interference of the nervous system and the chemical processes of cells which perform no special function. That these processes may go on undisturbed in the absence of nervous influence is shown by the perfect development of other parts which is found in anencephalous and amyelous embryos, by the growth of transplanted epithelium and connective tissue and by the union of completely severed parts. At the same time, as we cannot offer a perfect explanation of many of the above-mentioned cases, we cannot say that the nervous system has no direct influence upon connective tissues and epidermic cells: it seems most probable that it has. In the present state of our knowledge, however, it is dangerous to explain anything by such an influence; it is better to leave it doubtful.

*The Reproductive Activity.*—Having now dealt with the nutritive and functional activities, we must consider the reproductive. In early life at least all cells possess the power of reproducing their like and in the majority this power is retained, although it may not be exercised physiologically up to advanced age. Cessation of growth does not imply absence of ability to grow, for growth seems to cease when the supply of nutritive material to a part is only just sufficient to maintain its *status quo*. This is seen in a hair which will not grow beyond a certain length. Cut it short and a growth at once begins again, the supply of food being greater than the now shortened hair requires for simple nutrition. To cause cells which are capable of multiplying to do so the supply of food must be increased. Thus, exercise of a muscle causes increased blood supply and consequent growth, but increased blood supply to a working tissue without exercise will not have this effect. It is different with non-working tissues. The hyperæmia around an ulcer of the skin and even chronic congestion of the œdema of a part causes thickening of epidermis and connective tissues, and nothing is commoner than new formation of bone around a carious focus. For this effect the increased supply must be very frequent or long continued.

A non-working tissue apparently tends to grow also

when the resistance offered to its growth by neighboring tissues is diminished. Of this we shall find many examples in cirrhotic processes and in the etiology of malignancy.

The cells of the body inherit very different amounts of vital energy. The cells of the thymus are soon exhausted, those of the epiphyseal cartilages, later, and of the generative organs later still. In all cases probably the reproductive activity is the first of the vital manifestations to suffer, then the functional and nutritive. Inability to perform such chemical changes as are necessary to remove effete material and to repair waste is natural in old age. Death which may be termed natural then results from senile decay.

#### DISEASE.

Having thus dealt with the structure and functions of cells in health, we may now turn our attention to disease. The functions of an organ are really the functions of the cells of which it consists. If all these act normally we say that the organ is sound, and when all the functions of every organ and tissue of the body are normally performed we say the individual is in perfect health. A very little experience shows that the physiological functions of the body vary within certain, perhaps rather wide, limits, the perfect well-being of the individual being maintained; consequently our standard of health is no rigid one. Its maximum and minimum are widely separated, and the latter shades off imperceptibly into disease.

The tendency to inherit disease either exists in the ovum at the commencement of development or is acquired by the ovum in fertilization. Later than this any tendency appearing is obviously acquired. As in normal development certain organs manifest their inherited tendencies many years after birth—*e. g.*, the development and atrophy of the female generative system at puberty and menopause, the appearance and union epiphyses—so inherited tendencies to disease (although, like normal tendencies, they may appear *in utero*) may not show themselves until late in life, as is the case in cancer of the breast or uterus. It is possible that in many cases the same unrecognized conditions which induced in a parent the morbid tendency handed down continue to act on the offspring, until—with or without some obvious exciting cause—the disease becomes evident.

Starting with an organism or part, the vital energy of which is normal, disease, if it occur, must necessarily be the result of external conditions. The supply of food is faulty in either quantity or quality, or the physical conditions to which the part is or has been exposed are unsuitable. It is difficult to separate the two. If the blood supply to a part is abnormal in quantity the temperature of the part will be changed. If a portion of the body is mechanically injured its blood supply becomes abnormal. If a poison excites fever, the cells are exposed to a higher temperature than normal. A *circulus vitiosus* is established. Disease may be acquired during intra-uterine life, *e. g.*, acute specific syphilis.

Any change in the external conditions acting upon a unicellular organism would probably affect every particle of its substance and modify all its functions. All its disease would therefore be general, but multiplication of cells and specializations of functions enable abnormal conditions to act upon certain groups of cells and to disturb their functions without affecting, primarily, those of other groups. We thus get local disease, and the great majority of diseases belong to this class. Perhaps, indeed, we may say that every disease is primarily localized in a tissue or or-

gan, the blood being counted as a tissue of the connective type, of which the intercellular substance is fluid.

A disease is localized in an organ or tissue during life by its symptoms and by its physical signs, and after death we as a rule find the localization justified by the discovery in the part of some constant structural change. This is structural disease. In a large number of cases, however, there are no physical signs, only symptoms, for the signs are secondary to some primary abnormality of function in one or more organs. There may then be doubt as to the organ or system at fault, and often this doubt can be settled only by the discovery of the constant structural change associated by the symptoms in question. Diseases in which no such change has been found have been classed as functional, the belief being that in them the functions of certain cells are abnormally performed without any structural change. Modern research has greatly diminished the number of functional diseases. Organic disease probably in the first place meant that pathologists had been able to localize a disease in an organ by means of structural change in it. It is now come to be used as synonymous with structural.

The causes of diseases are divided into two—predisposing and exciting.

Any agency which tends to cause departure from the physiological state of the body must be regarded as predisposing to disease—*e. g.*, privation, frequent irritation. Many such agencies when acting more strongly become excitants of disease, that is, cause the step outside the physiological limit to be taken. The power of resisting certain causes of disease does not imply power to resist others of a different nature, nor does it necessarily go with muscular strength. It varies at different times in the same individual. The following predisposing causes are generally considered: Age, sex, heredity, exciting causes, which may be ranged under the headings of abnormal food-supply and abnormal physical conditions. The organs special to the sexes are or may be each liable to special diseases. We cannot explain the special liability of women to endemic and exophthalmic goiter and myxœdema or their comparative immunity from Addison's disease, ataxy and general paralysis. As to heredity, it may be noted that disease in the father is more likely to be transmitted to sons, and in the mother to daughters. The diseases which most obviously run in families are functional nervous disorders, as hysterics, neuralgia, epilepsy, insanity, carcinoma, some simple growths, gout, and tubercular disease.

Some diseases when once acquired tend to recur again and again. Catarrhal inflammations of mucous membranes, rheumatism and erysipelas are familiar examples. On the other hand, there are several diseases which are said to be protective against themselves. An individual who has had smallpox is for a time at least not liable to the disease. This has been explained by the theory that the smallpox produces such an effect upon the cells that they no longer produce the pabulum necessary to support the disease, and if smallpox be caught a second time it is regarded as proof that the organs have returned to their normal condition. It has been suggested on the other hand, that the growth of a specific poison produces some substance which is incompatible with the life of the virus, as carbolic acid and creosol are produced by putrefaction, and alcohol by fermentation. So we have no satisfactory explanation of acquired immunity. In addition to acquired immunity

we may mention the state of inherited immunity. The best examples we have are instances in which individuals resist the virus of the specific disease in spite of frequent and prolonged exposure to it. Example given: a fever nurse may not have had the scarlet fever, and may never catch it, in spite of long exposure to it.

Primary disease of an organ or tissue is frequently followed by secondary disease of other parts. This may happen in several ways—by direct spread of morbid process, as when inflammation extends from skin to subcutaneous tissue, or cancer of the mamma involves skin, by the carriage of causes of disease from a primary focus to parts at a distance by the lymphatics or by the blood-vessels, as in embolism of the most varied substances, mechanically, by so-called "back-telling." Thus stricture of the urethra causes hypertrophy of the bladder to overcome the obstacle to the outflow of urine, or dilation of the bladder if its efforts are futile. In either case the difficulty of entry of urine into the bladder is increased, and the ureters, pelvis, and kidneys dilate. Interstitial nephritis results from the pressure if the renal functions are imperfectly performed, and this is detrimental to the organism at large. The succession of changes which result from mitral incompetence is another familiar example of this mode of extension of disease.

*Failure of Any Part to Do Its Share of Work in the Economy.*—The result will depend upon the completeness with which its defection can be compensated. If the work can be done by other parts, as can that of a sweat or sebaceous gland, nothing is noticed; but after extirpation of a kidney which was doing work, a time of danger from diminished excretion of urinary products has to be gone through, the other kidney being at first unequal to the double duty. Failure of the cardiac or of the respiratory function will cause death, there being no power of compensation.

*Terminations of Disease.*—The possible terminations of disease are recovery, or return of the part to the discharge of its normal functions; partial recovery, and death, or complete cessation of function. Certain diseases can scarcely be said to have a termination; when once established, they remain stationary.

It will be useful here to give a list of the morbid processes to which all organs are more or less liable:—The results of mechanical or physical injury, displacement, hemorrhage, development errors, anæmia, hyperæmia, œdema, inflammation, atrophy, infiltration, metamorphosis, necrosis, regeneration, hypertrophy, tumor-formation, lodgment of parasites; stricture and its consequences may occur in every duct or canal, and calculi may develop in connection with all such.

We close this brief essay with a glance at the bacterial theory.

*The Vegetable Parasites (bacilli)—Parallel Between Fermentation and Infective Disease.*—It has long been thought that the group of acute specific diseases must have a very special cause. The characteristics of this group are, that they occur epidemically; that they are obviously contagious and infectious; that each member is absolutely distinct from its fellows and runs a very typical course, and that the poison which gives rise to each of them multiplies in a marvelous manner. A single case of one of these if introduced into a community may cause the death of even millions. Nothing could be discovered by science to account for the appearance of these diseases, yet they were obviously produced by something which multiplied in the sick, which clung about his clothing, etc., perhaps for long periods, and which could be carried through the air for considerable

distances. This something is called the "contagion" of the disease, and for many years science has been endeavoring to discover its nature. It early became obvious that no gas would meet the requirements of the case, for diffusion would soon put an end to its power for mischief. A fluid was not to be thought of; so "contagion" was necessarily regarded as a solid in a very fine state of division *particulate*. It has been shown to be insoluble in fluids in which it can live, by subsidence and by filtration, the poison not passing through the filter. These facts, taken with its power of multiplication, seem to show that the contagion was some living organism. Hence the origin of the contagium or germ theory of disease, which was promulgated in a very crude form even as far back as the Roman era. It had long been noticed that a close parallel might be drawn between an infective disease and fermentation. It may be presented thus:—Infection corresponds to addition of ferment; incubation, to the period during which nothing is noticed; fever outbreak and course of disease, to rise of temperature and active fermentation; decline of disease, to gradual cessation; period of protection from same disease, to the fact that addition of more ferment has no effect.

It may be further noticed, except in cases in which yeast was added to the saccharine liquid, the source of fermentation in the production of alcohol was as mysterious as was the source of the poison which gave rise to an epidemic of whooping-cough. The germ theory started by Astier, Spalanzani, Schwann, and Cagniard de Latour and perfected by Pasteur explained the matter, and is adopted by the great majority of scientific men at the present day. The physical theory started by Willis in 1659 and perfected by Liebig affirms that fermentation is a "molecular motion" transmitted to organic compounds by albuminoid particles which of themselves are the seat of "motor decay." It is very difficult to absolutely disprove the physical theory. The disputers of this theory take alcoholic fermentation as the type of all specific diseases. The supporters of it, on the other hand, admit the frequent presence of organisms in fermenting fluids, but regard them as accidents or spontaneously generated, and adduce in support of this proposition the fact that the same decompositions can in some instances be effected in their absence, thus dilute alcohol by being run over wood shavings so as to expose a large surface to the air can be changed into vinegar. The germ theorists have rendered it certain that the particles "in a state of motor decay" adhere very closely to the organism, which is constantly present, and are able to impart their molecular motion to such substances only as its organism will grow in, for if the organism dies no fermentation occurs. The particles in a state of motor decay have never been demonstrated apart from organism. Antiseptics, which are selected on account of their ability to destroy the low organisms, invariably check the molecular motions of the physical ferments, so also does heat sufficient to destroy organism. In fact, the properties of the physical ferments are those of organisms. We conclude, therefore, that while the physical theory may be possible, science has shown that its rival, the vital theory, is a true one, and that all the processes generally known as fermentations and putrefactions are due to the presence and action of countless vegetable organisms.

Where are these microscopic vegetable organisms to be found? A putrid wound swarms with them. Whence come they? They may enter from the world external to the body. They may exist in the healthy body existing under special circumstances. They

may be spontaneously generated under special circumstances from the elements of the tissues.

The investigations of Dr. Koch of Berlin, followed by those of the more advanced members of the medical profession all over the world, have produced a profound impression. Their researches prove that all disease is caused by poison. Some of the diseases are known absolutely to be caused by the poison of bacteria, and an unavoidable conclusion is that all, in the course of time and investigation, will be found to be so caused. These poisons are known under the general name of *ptomaines* and the results of investigation so far show that each species of microbe has its especial ptomaine. It is this that acts upon the living tissue, killing the tissue so that it may become food for the microbe. Disease is the occupation by a microbe of the tissues of the body which offer least resistance to it, the killing of its cells by its poison, ptomaines, and then consuming them as food. The ptomaines may be taken up by the general circulation, and more or less the whole body is poisoned. This causes fever by acting on the nerve centers. No other poison than a ptomaine causes a rise in the temperature of the body.

In these conditions moisture is always necessary. Bacteria do not live without water. There are several ways of preventing the action of bacteria, some of them verified by common facts. Heat beyond a certain point kills them. If we boil milk we kill the germs contained in it, and it will remain sweet until other germs come and occupy it. Canned goods, the germs being killed by heat before the can is closed, remain sweet by the germs being kept out mechanically. Antiseptics kill them, and dryness.

The treating of disease under the germ theory presents a difficulty that may be said to be mechanical. For the rule is that any poison, or germitoxic, or disinfectant, which can kill bacteria will also destroy tissue-cells. They can therefore only be used to a limited extent; to such an extent as does not endanger life. But nature provides a cure as the result of the disease. This is why in disease there is always noticeable a tendency to recovery, a prolonged struggle between death and life. If the sick person lives, immunity to the action of the disease-poison is the result of having been poisoned, because the tissue-cells acquire a tolerance to the poison. It is this result of the poisoning which accounts for the recovery of the sick man, and ends epidemics, and this is why persons who have had small-pox, or scarlet fever, or measles, or any one of a large number of diseases that could be named, are thereafter immune. The object of vaccination to prevent small-pox is to cause the tissue-cells to become immune by having been subjected to the action of the poison in a controllable form. The cure of rabies discovered by Dr. Koch is supported by the same law. But also by the action of this law the world may look forward to the time when there will be an end of all disease.

PATMOS (now pronounced by the natives "Patino"), an island in the east of the Ægean Sea, one of the group of the Sporades, about twenty-eight miles south-southwest of Samos. Its greatest length from north to south is about ten miles, its greatest breadth six, its circumference, owing to the winding nature of the coast, about thirty-seven. The island, which is volcanic, is bare and rocky throughout. The woods which once covered the island have disappeared; of the palms, from which it formerly received its Italian name of Palmessa, not more than one is left. Of the numerous bays and harbors the chief is that of La Scala, which, running far into the land on the eastern

side, divides the island into two nearly equal portions, a northern and a southern. A narrow isthmus separates La Scala from the Bay of Merika on the west coast. On the belt of land between the two bays, at the junction between the northern and southern half of the island, stood the ancient town. To judge from its traces, it may have contained 12,000 to 13,000 inhabitants. The town clusters at the foot of the monastery of St. John, which, crowning the hill with its towers and battlements, resembles a fortress rather than a monastery. Of the 600 MSS. once possessed by the library of the monastery only 240 are left, badly preserved, and none of them of value. Scattered over the island are about 300 chapels. Population, about 4,000.

Patmos is mentioned first by Thucydides (iii. 33) and afterward by Strabo and Pliny. From an inscription it has been inferred that the name was originally Patnos. There are some grounds for the conjecture that the island was first colonized by Carians. Another ancient inscription seems to show that the Ionians also settled there at an early date. The chief, indeed the only, title of the island to fame is that it was the place of banishment of St. John, the Evangelist, who, according to Jerome and others, was exiled thither under Domitian in 95 A.D., and released about eighteen months afterward under Nerva. Here he is said to have written the Apocalypse; to the left of the road from La Scala to the town, about half-way up the hill, a grotto is still shown in which the apostle is said to have received the heavenly vision.

PATNA, a district in the lieutenant-governorship of Bengal, and in the division or commissionership of Patna, is bounded on the north by the river Ganges, which separates it from Sáran, Muzaffarpur, and Darbhanga, on the east by Monghyr, on the south by Gayá, and on the west by the Son, which separates it from Sháhábád. Patna district, with an area of 2,079 square miles, is, throughout the greater part of its extent, a level plain; but toward the south the ground rises into hills. The soil is for the most part alluvial, and the country along the bank of the Ganges is peculiarly fertile. The general line of drainage is from west to east; and high ground along the south of the Ganges forces back the rivers flowing from the district of Gayá. The result is that, during the rains, nearly the whole interior of the district south of a line drawn parallel to the Ganges, and four or five miles from its bank, is flooded. There are no forests or jungles of any extent, but fine groups of trees are found in many places. Hot springs are common on the Rájágríhá Hills. The chief rivers are the Ganges and the Son. The only other river of any consequence is the Pún-pún, which is chiefly remarkable for the number of petty irrigation canals which it supplies. So much of the river is thus diverted that only a small portion of its water ever reaches the Ganges at Fatwá.

The census returned the population at 1,756,856 persons (males 858,783, and females 898,073). Hindus numbered 1,541,061, Mohammedans 213,141, Christians 2,588, and "others" 66. The following towns in the district contained a population exceeding 10,000:—Patna city (170,654); Behar (48,968); Dinápur, including the cantonment (37,893); Bárh (14,689); Khagaul (14,075); Mukáma (13,052); Fatwá (10,919).

Rice, which forms the staple of the district, is divided into two great crops—the *kartiká* or early rice, sown in June or July, and reaped in October or November; and the *aghání* or winter rice, sown after the commencement of the rains, and cut in November or December. Patna is one of the two places in British India where opium is manufactured. The climate of Patna is considered remarkably healthy.

PATNA, chief city of the above district, is situated on the right or south bank of the Ganges, and adjoining Bánkipur, the civil station and administrative headquarters of the district. Its central position at the junction of three great rivers, the Son, the Gandak, and the Ganges, where the traffic of the Northwestern Provinces meets that of Bengal, gives it great natural advantages. According to the census of 1881 its population was 170,654—Hindus 127,076, Mohammedans 43,086, "others" 492.

PATNA, a native state in the Central Provinces of India, has an estimated area of 2,399 square miles, of which 550 are under cultivation, and other 950 are returned as cultivable. The estimated population in 1881 was 257,959, nearly all of whom were Hindus.

PATRAS, or PATRÆ, a fortified city of Greece, the principal port of the Morea, and the chief town of the nomos of Achaia and Elis, lies on the north coast of the Morea, on the east side of the Patras, which opens into the Gulf of Corinth by the Little Dardanelles, marked by forts Kastro Moreas and Kastro Rumelias. Since the War of Independence Patras has been one of the most prosperous cities in the kingdom. The population, which had sunk to 8,000 at the time of the war, was 16,641 in 1870, and is now 28,000. Patras is the seat of one of the four courts of appeal in the kingdom, and the residence of the archbishop of Patras and Elis. The custom-house is the most important in all Greece. The commerce of Patras consists mainly in the export of currants, valonia, olive-oil, wine, and sheepskins, and the import of cotton and woolen goods, grain, flour, and colonial wares.

PATRIARCH (lit. the head or ruler of a tribe, family, or clan) occurs four times in the New Testament, being applied to Abraham, the twelve sons of Jacob collectively, and David, and several times in the LXX., where the word is used to denote the officials called by the chronicler "princes of the tribes of Israel," "princes of hundreds," "chiefs of the fathers." Under the late Roman empire the title was officially applied down to the fifth century to the chief rabbi in Palestine; the head of the synagogue at Babylon appears also to have been known as patriarch until 1038. The title at an early date passed over into the Christian church as an honorific though not official designation of all bishops. At the present day the heads of the various extant churches and sects in the East are very commonly called patriarchs, and in the West the Roman Church gives the honorary title to several dignitaries, such as the archbishops of Lisbon and Venice. In a strictly technical sense, however, that church recognizes only five patriarchates, those of Constantinople, Alexandria, Jerusalem, Antioch, and Rome.

PATRICIAN. The history, in the Roman state, of the hereditary patrician order (*patricii*, *patres*, house-fathers, goodmen), who originally constituted the entire *populus Romanus*, has been traced in the article NOBILITY. With the transference of the imperial capital to Byzantium under Constantine, the title *patricius* became a personal and not an hereditary distinction; the name was held to denote a fatherly relation to the emperor, and those who bore it stood first among the *illustres*, receiving such appellations as "magnificentia," "celsitudo," "eminentia," "magnitudo."

PATRICK, ST. In one of the incursions of the Scots and Picts upon the neighboring Roman province south of the wall of Severus, probably that of 411 A.D., the year after Honorius had refused aid to the Britons, a youth of about fifteen was carried off with many others from the district in the neighborhood of the wall at the head of the Solway, and sold as a slave on the opposite coast of Ireland, in the territory of the Irish Picts called



Dal Araide. This youth was the future apostle of the Irish. As his name implies, he was of noble birth, and he tells us so himself. He was the son of the deacon Calpurnius, who was the son of Potitus, a priest. His father was a decurio or magistrate, and, as Patrick, according to tradition, was born at Nemthur, he must have exercised his functions of magistrate at that place, but on the withdrawal of the Roman garrisons from Britain probably retired for safety south of the wall of Severus, where, as Patrick tells us, he had a small country place near the town of Bannavem Taberniæ, whence Patrick was carried off.

The youth Succat or Patrick remained in hard slavery for six years, tending cattle, probably on Slemish Mountain, in the county Antrim. He seems to have been of an enthusiastic temperament, and much given to prayer and meditation. After his escape he appears to have conceived the noble idea of devoting himself to the conversion of the Irish, and to have gone somewhere for a few years to prepare himself for the priesthood. His biographers take him to Tours to St. Martin, who was then dead several years, afterward to the island of Lerins in the Mediterranean, and lastly to Rome, where he received a mission from Pope Celestine. For all this there is no evidence whatever, the whole story being the result of the confusion of Palladius with the real Patrick. The tradition of some connection between the Irish apostle and St. Martin of Tours, the monastic type of the earliest Irish Church, the doubts as to Patrick's fitness for the work which led to his writing his *Confession*, and indeed all the difficulties that beset the question of the origin of the Irish Church, receive a simple and satisfactory explanation upon the hypothesis of Patrick having prepared himself for the priesthood at Candida Casa, the monastic institution founded by ST. NINIAN, (*q.v.*)

Patrick tells us that after a few years (*i.e.*, after his escape) he was among the Britons with his kindred, who received him as a son. He was evidently bent upon his mission, for they besought him after such tribulations not to part from them again. Full of it, he dreams that a man whose name was Victoricus came to him bearing innumerable epistles, one of which he received and read; the beginning of it contained the words, "The voice of the Irish;" while repeating these words he says, "I imagined that I heard in my mind the voice of those who were near the wood of Fochlad, which is near the western sea, and thus they cried: We pray thee, holy youth, to come and henceforward walk among us." This dream was followed by others, which shows how completely his mission occupied his mind. Patrick was about twenty-two years of age when he escaped from slavery, and, if we allow seven or eight years for the "few years'" preparation, he probably was not more than thirty years of age when he entered on his mission, about 425. There is a passage in his *Confession* which shows that he was still a young man when he commenced his work: "You know and God knows how I have lived among you from my youth up." Probus, the author of the fifth life published by Colgan, who has many claims upon our confidence, supports this view that Patrick began his mission while still a priest. We see in Patrick's own authentic acts that he must have sought among his friends in Britain to be made a bishop, for he complains in his *Confession* that a friend to whom he had communicated some fault he had committed when about fifteen years old had urged this thirty years after as a reason against his being consecrated to the higher office. This proves that he was only about forty-five years old when made bishop. If we assume that 411 was the year he was carried off as a slave, his consecration as bishop would fall in

about 441, the fifteenth year of his mission, a date which corresponds with the results of Doctor Todd's speculations based on a close analysis of all available chronological data.

The date of St. Patrick's death is as uncertain as that of every other event connected with him. *The Annals of the Four Masters* give 493, with which Ussher agrees; Tirechan's *Annotations*, on the other hand, state that Loegaire, son of Niall, king of Ireland, lived from two to five years after St. Patrick. According to this account the death of St. Patrick took place in 469, and that of Loegaire in 471 or 474, after a reign of thirty-six years, so that Loegaire's reign began either in 435 or 438. The *Annals of the Four Masters* record the death in 457 of Senn Patraicc, or Old Patrick, and of Loegaire in the following year, 458. The Patrick who died in 493 is a fiction due to the fusion of the acts of the two real Patricks, Palladius Patrick and Senn Patraicc, doubtless so called because he was the Patrick known as a priest before the arrival of the Roman bishop. Assuming Tirechan's statement as correct, and that St. Patrick died in 469, his mission as priest and bishop lasted about forty-four years.

PATRICK, ST., ORDER OF. See KNIGHTHOOD, *ante*.

PATRICK, SIMON, bishop of Chichester, and afterward of Ely, author of a number of works in practical divinity, was born at Gainsborough, Lincolnshire, England, on September 8, 1626, entered Queen's College, Cambridge, in 1644, and, after taking orders in 1651, became successively chaplain to Sir Walter St. John, and vicar of Battersea, Surrey. He was afterward (1662) preferred to the rectory of St. Paul's, Covent Garden, London, where he continued to labor during the year of the plague. Dean of Peterborough from 1678, he became bishop of Chichester in 1689, in which year he was employed, along with others of the new bishops, to settle the affairs of the church in Ireland. In 1691 he received the bishopric of Ely, which he held until his death, May 31, 1707.

PATRON AND CLIENT. Clientage appears to have been an institution of most of the Græco-Italian peoples in early stages of their history; but it is in Rome that we can most easily trace its origin, progress, and decay. Until the reforms of Servius Tullius, the only citizens proper were the members of the patrician or gentile houses; they alone could participate in the solemnities of the national religion, take part in the government and defense of the state, contract quiritarian marriage, hold property, and enjoy the protection of the laws. But alongside of them was a gradually increasing non-citizen population composed of slaves and clients. Some historians class among the latter, as clients of the state, those vanquished communities which, having made an unconditional submission, were allowed to retain a quasi-corporate existence under the protection of Rome. But the name (derived from *cluere*, to obey) was common before Rome had made any conquests, and was usually applied to individuals who had attached themselves in a condition of dependence to the head of the patrician houses as their patrons, in order thereby to secure a *de-facto* freedom. According to Dionysius and Plutarch, it was one of the early cares of Romulus to regulate the relationship, which, by their account of it, was esteemed a very intimate one, imposing upon the patron duties only less sacred than those he owed to his children and his ward, more urgent than any he could be called on to perform toward his kinsmen, and whose neglect entailed the penalty of death. The patron was bound to provide his client with the necessaries of life; and it was a common practice to make him a grant during pleasure of a small plot of land

to cultivate on his own account. Further, he had to advise him in all his affairs; to represent him in any transactions with third parties in which, as a non-citizen, he could not act with effect; and, above all things, to stand by him, or rather be his substitute, in any litigation in which he might become involved. The client in return had not only generally to render his patron the respect and obedience due by a dependent, but, when he was in a position to do so and the circumstances of the patron required it, to render him pecuniary assistance. As time advanced and clients amassed wealth, we find this duty insisted upon in a great variety of forms, as in contributions toward the dowries of a patron's daughters, toward the ransom of a patron or any of his family who had been taken captive, toward the payment of penalties or fines imposed upon a patron, even toward his maintenance when he had become reduced to poverty.

So matters remained during the fourth and fifth centuries. In the sixth a variety of events, social and political, contributed still further to modify the relationship. The rapacity of patrons was checked by the Cincian law, which prohibited their taking actual gifts of money from their clients; marriages between patron and client gradually ceased to be regarded as unlawful or as ineffectual to secure to the issue the status of the patron father; political changes opened to the clients the rural tribes and the higher centuries, and qualified them for the legion, the magistracy, and the senate; hereditary clientage ceased when a client attained to a curule dignity; and, in the case of the descendants of freedmen enfranchised in solemn form, it came to be limited to the first generation. Gradually but steadily one feature after another of the old institutions disappeared, till by the end of the seventh century it had resolved itself into the limited relationship between patron and freedman on the one hand, and the unlimited honorary relationship between the patron who gave gratuitous advice on questions of law and those who came to consult him on the other. To have a large following of clients of this class was a matter of ambition to every man of mark in the end of the republic; it increased his importance, and insured him a band of zealous agents in his political schemes. But amid the rivalries of parties and with the venality of the lower orders, baser methods had to be resorted to in order to maintain a patron's influence; the favor and support of his clients had to be purchased with something more substantial than mere advice. And so arose that wretched and degrading clientage of the early empire, of which Martial, who was not ashamed to confess himself a first-rate specimen of the breed, has given us such graphic descriptions; gatherings of miserable idlers, sycophants, and spendthrifts, at the levees and public appearances of those whom, in their fawning servility, they addressed as lords and masters, but whom they abused behind their backs as close-fisted upstarts—and all for the sake of the *sportula*, the daily dole of a dinner, or of a few pence wherewith to procure one. With the middle empire this disappeared; and, when a reference to patron and client occurs in later times, it is in the sense of counsel and client, the words patron and advocate being used almost synonymously.

PATTESON, JOHN COLERIDGE, bishop of Melanesia, was the eldest son of Justice Patteson and Frances Duke Coleridge, a near relation of Samuel Taylor Coleridge, and was born in London, England, April 2, 1827. He entered Balliol College, Oxford, in 1845, graduated B.A. in 1848, and in 1852 became a fellow of Merton College. In 1853 he became curate of Alington, Devon, and in the following year he was ordained priest and joined the mission to the Melanesian islands in the South Pacific. In 1861 he

was consecrated bishop of Melanesia, and in this capacity did much to promote the Christianization of the islands until his premature death by the hand of a native, September 20, 1871.

PAU, a city of France, formerly the capital of Béarn, and now the chief town of the department of Basses Pyrénées, and the seat of a court of appeal, is situated on the edge of a plateau 130 feet above the right bank of the Gave de Pau (a left-hand affluent of the Adour), at a height of about 620 feet above the sea. The modern importance of Pau is due to its climate, which makes it a great winter health-resort. The most striking characteristic is the stillness of the air, resulting from the peculiarly sheltered situation. The town is built on a sandy soil, and the line of the streets running east and west is favorable to ventilation. The average rainfall is about forty inches, and the mean winter temperature is 44°, the mean for the year being 62°.

Apart from an export flour-trade and some manufactures of chocolate and Béarn linen, the inhabitants of Pau depend entirely on their 4,000 winter-visitors. The castle is bounded on the north and west by the Hédas, on the south by a canal drawn from the Gave, and on the east by a moat thirty feet deep; access is obtained by three bridges, that across the Hédas being of ancient construction.

On the ground-floor is the old hall of the estates of Béarn, eighty-five feet long and thirty-six feet wide, adorned with a white marble statue of Henry IV., and magnificent Flemish tapestries ordered by Francis I. The most interesting room is that in which Henry IV. was born, still containing his mother's bed (from the castle of Richelieu) and his own cradle made of a tortoise-shell. In the keep is a library of 6,000 volumes, mainly of works relating to Henry IV. The population of Pau (about 6,000 at the close of the eighteenth century) was 27,300 in 1871, and 29,971 in 1881.

PAUL. "Saul, who is also (called) Paul," was a "Hebrew of the Hebrews," *i. e.*, of pure Jewish descent unmixed with Gentile blood, of the tribe of Benjamin. In the Acts of the Apostles it is stated that he was born at Tarsus in Cilicia; but in the fourth century there still lingered a tradition that his birthplace was Giscala, the last of the fortress-towns of Galilee which held out against Rome. The fact that he was called by two names has been accounted for in various ways. Saul was a natural name for a Benjamite to give to his son, in memory of the first of Jewish kings; Paul is more difficult of explanation. It is first found in the narrative of the conversion of Sergius Paulus, the proconsul of Cyprus, and it has sometimes been supposed either that Paul himself adopted the name in compliment to his first Gentile convert of distinction, or that the writer of the Acts intended to imply that it was so adopted. Others have thought that it was assumed by Paul himself after the beginning of his ministry, and that it is derived from the Latin *paulus* in the sense either of "least among the apostles" or "little of stature." But these and many similar conjectures may probably be set aside in favor of the supposition that he had a double name from the first, one Aramaic or Hebrew and the other Latin or Greek, like Simon Peter, John Mark, Simeon Niger, Joseph Justus. Whatever be its origin, Paul is the only name which he uses of himself, or which is used of him by others when once he entered into the Roman world outside of Palestine. The Acts speak of his having been a Roman citizen by birth, a statement which also has given rise to several conjectures, because there is no clue to the ground upon which his claim to citizenship is based. Some modern writers question the fact, considering the statement to be part of the general coloring which the writer

of the Acts is supposed to give to his narrative; and some also question the fact, which is generally considered to support it, of the appeal to the emperor. That he received part of his education at Tarsus, which was a great seat of learning, is a possible inference from his use of some of the technical terms which were current in the Greek schools of rhetoric and philosophy; but, since the cultivation of a correct grammatical and rhetorical style was one of the chief studies of those schools, Paul's imperfect command of Greek syntax seems to show that this education did not go very far. That he received the main part of his education from Jewish sources is not only probable from the fact that his family were Pharisees, but certain from the whole tone and character of his writings. According to the Acts, his teacher was Gamaliel, who, as the grandson of Hillel, took a natural place as the head of the moderate school of Jewish theologians; nor, in spite of the objection that the fanaticism of the disciple was at variance with the moderation of the master, does the statement seem in itself improbable. A more important difficulty in the way of accepting the statement that Jerusalem was the place of his education is the fact that in that case his education must have been going on at the time of the preaching and death of Jesus Christ. That he had not seen Jesus Christ during His ministry seems to be clear, for a comparison of 1 Cor. ix. 1, with xv. 8, appears to limit his sight of Christ to that which he had at his conversion, and the "knowing Christ after the flesh" of 2 Cor. v. 16, is used not of personal acquaintance but of "carnal" as opposed to "spiritual" understanding. Like all Jewish boys, he learned a trade, that of tent-making; this was a natural employment for one of Cilician origin, since the hair of the Cilician goat was used to make a canvas (*cilicia*) which was especially adapted for the tents used by travelers on the great routes of commerce or by soldiers on their campaigns. Whether he was married or not is a question which has been disputed from very early times; his expressions in 1 Cor. vii. 8, ix. 5, were taken by Tertullian to imply that he was not, and by Clement of Alexandria and Origen to imply that he had once been, but that he had become a widower.

The beginning of his active life was doubtless like its maturity; it was charged with emotion. He himself gives a graphic sketch of its inner history. His conversion to Christianity was not the first great change that he had undergone. He had lived in his youth a pure and guileless life. He had felt that which is at once the charm and force of such a life, the unconsciousness of wrong. But, while his fellow-disciples in the rabbinical schools had been content to dissect the text of the sacred code with a minute anatomy, the vision of a law of God which transcended both text and comment had loomed upon him like a new revelation. And with the sense of law had come the sense of sin. It was like the first dawn of conscience. He awoke as from a dream. In his outward life the sense of the law of God became to him an overpowering stimulus. The stronger the consciousness of his personal failure the greater the impulse of his zeal. The vindication of the honor of God by persecuting heretics, which was an obligation upon all pious Jews, was for him a supreme duty. He became not only a persecutor but a leader among persecutors. What he felt was a very frenzy of hate; he "breathed threatening and slaughter," like the snorting of a war-horse before a battle, against the renegade Jews who believed in a false Messiah. His enthusiasm had been known before the popular outbreak which led to Stephen's death, for the witnesses to the martyr's stoning "laid down their clothes" at his feet, and he took a prominent place in the persecution

which followed. He himself speaks of having "made havoc" of the community at Jerusalem, spoiling it like a captured city. In the more detailed account of the Acts he went from house to house to search out and drag forth to punishment the adherents of the new heresy. When his victims came before the Jewish courts he tried, probably by scourging, to force them to apostatize; in some cases he voted for their death. The persecution spread from Jerusalem to Judæa and Galilee; but Paul, with the same spirit of enterprise which afterward showed itself in his missionary journeys, was not content with the limits of Palestine. He sought and obtained from the ecclesiastical authorities at Jerusalem letters similar to those which, in the thirteenth century, the popes gave to the "militia Jesu Christi contra hæreticos." The ordinary jurisdiction of the synagogues was for the time set aside; the special commissioner was empowered to take as prisoners to Jerusalem any whom he found to belong to the sect known as "The Way." Of the great cities which lay near Palestine, Damascus was the most promising, if not the only field for such a commission. At Antioch and at Alexandria, though the Jews, who were very numerous, enjoyed a large amount of independence and had their own governor, the Roman authorities would probably have interfered to prevent the extreme measures which Paul demanded. At Damascus, where also the Jews were numerous and possibly had their own civil governor, the Arabian prince Aretas (Haritha), who then held the city, might naturally be disposed to let an influential section of the population deal as they pleased with their refractory members.

On Paul's way thither an event occurred which has proved to be of transcendent importance for the religious history of mankind. He became a Christian by what he believed to be the personal revelation of Jesus Christ. His own accounts of the event are brief, but they are at the same time emphatic and uniform. "It pleased God \* \* \* to reveal His Son in me;" "have I not seen Jesus Christ our Lord;" "last of all He was seen of me also as of one born out of due time." These accounts give no details of the circumstances.

But against all the difficulties and apparent incredibilities of the narratives there stand out the clear and indisputable facts that the persecutor was suddenly transformed into a believer, and that to his dying day he never ceased to believe and to preach that he had "seen Jesus Christ." Nor was it only that he had seen Him; the gospel which he preached, as well as the call to preach it, was due to this revelation.

Of his life immediately after his conversion he himself gives a clear account: "I conferred not with flesh and blood, neither went I up to Jerusalem to them which were apostles before me; but I went away into Arabia." The reason of his retirement, whether it was to the Haurán (Renan) or to the Sinaitic peninsula (Holsten), is not far to seek. A great mental no less than a great bodily convulsion naturally calls for a period of rest; and the consequences of his new position had to be drawn out and realized before he could properly enter upon the mission-work which lay before him. From Arabia he returned to Damascus, and there began not only his preaching of the gospel but also the long series of "perils from his own countrymen," which constitute so large a part of the circumstances of his subsequent history.

It was not until "after three years," though it is uncertain whether the reckoning begins from his conversion or from his return to Damascus, that he went up to Jerusalem; his purpose in going was to become acquainted with Peter, and he stayed with him fifteen days.

From Jerusalem he went "into the regions of Syria and Cilicia," preaching the gospel. How much that brief expression covers is uncertain; it may refer only to the first few months after his departure from Jerusalem, or it may be a summary of many travels, of which that which is commonly known as his "first missionary journey" is a type.

The chief features of these accounts are the formation of a new center of Christian life at Antioch, and a journey which Paul, Barnabas, and for part of the way John Mark took through Cyprus and Asia Minor.

The first of these facts has a significance which has sometimes been overlooked for the history not only of Paul himself but of Christianity in general. It is that the mingling together, in that splendid capital of the civilized East, of Jews and Syrians on the one hand with Greeks and Romans on the other, furnished the conditions which made a Gentile Christianity possible. The religion of Jesus Christ emerged from its obscurity into the full glare of contemporary life. Its adherents attracted enough attention to receive in the common talk and intercourse of men a distinctive name. They were treated, not as a Jewish sect, but as a political party. The narrative of the incidents of the single journey which is recorded in detail, and which possibly did not occupy more than one summer, has given rise to much controversy. Its general credibility is supported by the probability that in the first instance Paul would follow an ordinary commercial route, on which Jewish missionaries as well as Jewish merchants had been his pioneers; for his letters to his Gentile converts all presuppose their acquaintance with the elements of Judaism. They do not prove monotheism, but assume it.

According to the narrative, Paul and his companions went first to Cyprus, the native country of Barnabas, and traveled through the island from its eastern port, Salamis, to its capital, Paphos. At Paphos a Jewish sorcerer, Bar Jesus, was struck with blindness, and the proconsul, Sergius Paulus, was converted. From Cyprus, still following a common route of trade, they went into the southeast districts of Asia Minor, through Pamphylia to Antioch in Pisidia. At Antioch, on two successive Sabbaths, Paul spoke in the synagogue; the genuineness of the addresses which are recorded in the Acts has been disputed, chiefly because the second of them seems to imply that he "turned to the Gentiles," not as a primary and unconditional obligation, but owing to the rejection of the gospel by the Jews. Expelled from Antioch, they went on to Iconium (where the apocryphal "Acts of Paul and Thekla" place the scene of that improbable but not ungraceful romance), and thence to Lystra, where the healing of a cripple caused the simple and superstitious Lycaonians to take them for gods. Their farthest point was the neighboring town of Derbe, whence they returned by the route by which they had come to the seacoast, and thence to Antioch in Syria.

At the end of fourteen years, either from his conversion or from his visit to Peter at Jerusalem, the question of the relation of the communities which he had formed, and of the gospel which he preached, to the original Christian communities, and to the gospel of the Twelve, came to a crisis. His position was unique. He owed neither his knowledge of the gospel nor his commission to preach to any human authority. As Jesus Christ had taught and sent forth the Twelve, so had he taught and sent forth Paul. He was on equal terms with the Twelve. Until a revelation came to him he was apparently at no pains to cooperate with them. But between their respective disciples there was evidently a sharp contention. The Jewish party, the original disciples and first converts, maintained the continued obligation

of the Mosaic law and the limitation of the promises to those who observed it; the Pauline party asserted the abrogation of the law and the free justification of all who believed in Jesus Christ. The controversy narrowed itself to the one point of circumcision. If the Gentiles were without circumcision members of the kingdom of God, why was the law obligatory on the Jews? If, on the other hand, the Gentiles had to be circumcised, the gospel had but a secondary importance. It seemed for a time as though Christianity would be broken up into two sharply divided sects, and that between the Jewish Christianity, which had its seat at Jerusalem, and which insisted on circumcision, and the Gentile Christianity, which had its seat at Antioch, and which rejected circumcision, there would be an irreconcilable antagonism. It was consequently by "revelation" that Paul and Barnabas, with the Gentile convert Titus as their "minister" or secretary, went to confer with the leaders among the original disciples, the "pillars" or "them who were of repute," "James, and Cephas, and John." He put the question to them: Was it possible that he was spending or had spent his labor in vain? He laid before them the "gospel of the uncircumcision." They made no addition to it, but accepted it as Paul preached it, recognizing it as being a special work of God, and as being on the same level of authority with their own. The opposition was no doubt strong; there were "false brethren" who refused to emancipate the Gentile world from the bondage of the law; and there was also apparently a party of compromise which, admitting Paul's general contention, maintained the necessity of circumcision in certain cases, of which the case of Titus, for reasons which are no longer apparent, was typical. But Paul would have no compromise. From his point of view compromise was impossible. "Justification" was either "of faith" or "by the works of the law;" it was inconceivable that it could be partly by the one and partly by the other. And he succeeded in maintaining his position at all points. He received "the right hand of fellowship," and went back to Antioch the recognized head and preacher of the "gospel of the uncircumcision." Within his own sphere he had perfect freedom of action; the only tie between his converts and the original community at Jerusalem was the tie of benevolence. Jew and Gentile were so far "one body in Christ" that the wealthier Gentile communities should "remember the poor."

When Paul returned to Antioch Peter followed him, and for a time the two apostles worked in harmony. Peter "did eat with the Gentiles." He shared the common table at which the Jewish distinctions of meats were disregarded. He thereby accepted Paul's position. But when "certain came from James" he drew back. The position of James was probably that, even if the law had ceased to be valid as a means of justification, it was still valid as a rule of life. For reasons which are not apparent, possibly the wish not to break with the community at Jerusalem, not only Peter but Barnabas and the whole of the Jewish party at Antioch accepted that position, with its subsequent obligation of separation from the Gentile brethren, not only in social life, but probably also in the partaking of the Lord's Supper. Paul showed that the position of Peter was illogical, and that he was self convicted. His argument was that the freedom from the law was complete, and that to attach merit to obedience to the law was to make disobedience to the law a sin, and, by causing those who sought to be justified by faith only to be transgressors, to make Christ a "minister of sin." Obedience to any part of the law involved recognition of the whole of it as obligatory, and consequently "made void the grace of God."

The schism in the community at Antioch was probably never healed. It is not probable that Paul's contention was there victorious; for, while Paul never again speaks of that city, Peter seems to have remained there, and he was looked upon in later times as the founder of its church.

But this failure at Antioch served to Paul as the occasion for carrying out a bolder conception. The horizon of his mission widened before him. The "fullness of the Gentiles" had to be brought in. His diocese was no longer Antioch, but the whole of the Roman empire. The years that followed were almost wholly spent among its great cities, "preaching among the Gentiles the unsearchable riches of Christ." He became the spiritual father of many communities, and he watched over them with a father's constant care.

The first scene of his new activity, if indeed it be allowable to consider the conference at Jerusalem and the subsequent dispute at Antioch as having given occasion for a new departure, was probably the eastern part of Asia Minor, and more particularly Galatia. Some of it he had visited before; and from the fact that the Galatians, though they had been heathens, were evidently acquainted with the law, it may be inferred that he still went on the track of Jewish missionaries, and that here, as elsewhere, Judaism had prepared the way for Christianity. Of his preaching he himself gives a brief summary; it was the vivid setting forth before their eyes of Jesus as the crucified Messiah, and it was confirmed by evident signs of the working of the Spirit. The new converts received it with enthusiasm; he felt for them as a father; and an illness which came upon him (assuming this to have been his first visit) intensified their mutual affection. What we learn specially of the Galatians is probably true also of the other Gentiles who received him; some of them were baptized, they were formed into communities, and they were so far organized as to have a distinction between teachers and taught.

But an imperative call summoned him to Europe. The western part of Asia Minor, in which afterward were formed the important churches of Ephesus, Colossæ, Hierapolis, and Laodicea, was for the present left alone. He passed on into Macedonia.

In Europe, as in Asia, persecutions attended him. He was "shamefully entreated" at Philippi, and according to the Acts the ill-treatment came not from the Jews, but from the Gentile employers of a frenzied prophetess, who saw in Paul's preaching an element of danger to their craft. Consequently he left that city, and passing over Amphipolis, the political capital of the province, but the seat rather of the official classes than of trade, he went on to the great seaport and commercial city of Thessalonica. His converts there seem to have been chiefly among the Gentile workmen, and he himself became one of them. Knowing as he did the scanty wages of their toil, he "worked night and day that he might not burden any of them." But for all his working he does not seem to have earned enough to support his little company; he was constrained both once and again to accept help from Philippi. He was determined that, whatever he might have to endure, no sordid thought should enter into his relations with the Thessalonians; he would be to them only what a father is to his children, behaving himself "holily and righteously and unblamably," and exhorting them to walk worthily of God who had called them. But there, as elsewhere, his preaching was "in much conflict." The Jews were actively hostile. According to the account in the Acts, they at last hounded on the lazzaroni of the city, who were doubtless moved as easily as a Moslem crowd in modern times by any cry of treason or in-

fidelity, to attack the house of Jason, either because Paul himself was lodging there, or because it was the meeting-place of the community. Paul and Silas were not there, and so escaped; but it was thought prudent that they should go at once and secretly to the neighboring small town of Berea. Thither, however, the fanatical Jews of Thessalonica pursued them; and Paul, leaving his companions Silas and Timothy at Berea, gave up his preaching in Macedonia for a time and went southward to Athens.

The narrative which the Acts give of his stay at Athens is one of the most striking, and at the same time one of the most difficult, episodes in the book. What is the meaning of the inscription on the altar? What is the Areopagus? How far does the reported speech give Paul's actual words? What did the Athenians understand by the Resurrection? These are examples of questions on which it is easy to argue, but which, with our present knowledge, it is impossible to decide. One point seems to be clear, both from the absence of any further mention of the city in Paul's writings and from the absence of any permanent results of his visit, that his visit was a comparative failure.

From Athens he went to Corinth, the capital of the Roman province of Achaia, and the real center of the busy life of Greece. It was not the ancient Greek city with Greek inhabitants, but a new city which had grown up in Roman times, with a vast population of mingled races, who had added to the traditional worship of Aphrodite the still more sensuous cults of the East. Never before had Paul had so vast or so promising a field for his preaching; for alike the filthy sensuality of its wealthy classes and the intense wretchedness of its 500,000 paupers and slaves were prepared ground upon which his preaching could sow the seed, in the one case of moral reaction, and in the other of hope. At first the greatness of his task appalled him: "I was with you in weakness, and in fear, and in much trembling." But he laid down for himself from the first the fixed principle that he would preach nothing but "Jesus Christ, and him crucified," compromising with neither the Jews, to whom "the word of the cross," *i.e.*, the doctrine of a crucified Messiah, was "a stumbling-block," nor with the Gentile philosophers, to whom it was "foolishness." It is probable that there were other preachers of the gospel at Corinth, especially among the Jews, since soon afterward there was a Judaizing party; Paul's own converts seem to have been chiefly among the Gentiles.

After having lived probably about two years at Corinth Paul resolved, for reasons to which he himself gives no clue, to change the center of his activity from Corinth to Ephesus. Like Corinth, Ephesus was a great commercial city with a vast mixed population; it afforded a similar field for preaching, and it probably gave him increased facilities for communicating with the communities to which he was a spiritual father. It is clear from his epistles that his activity at Ephesus was on a much larger scale than the Acts of the Apostles indicate. He went about like one condemned to die, upon whom the sentence might at any moment be carried out. Once, at least, it seemed as though the end had actually come, for he had to fight with beasts in the arena; and once, if not on the same occasion, he was only saved by Prisca and Aquila, "who for his life laid down their own necks."

An émeute which took place at Ephesus was, according to the Acts, the occasion if not the cause of his leaving that city; "a great door and effectual had been opened unto him" there, and the growth of the new religion had caused an appreciable diminution in the trade of those who profited by the zeal of the worship-

ers at the temple. He went overland to Troas, where, as at Ephesus, "a door was opened unto him in the Lord," but the thought of Corinth was stronger than the wish to make a new community. He was eager to meet Titus, and to hear of the effect of his now lost letter; and he went on into Macedonia. It is at this point of his life more than at any other that he reveals to us his inner history. At Ephesus he had been hunted almost to death; he had carried his life in his hand; and, "even when we were come into Macedonia, our flesh had no relief, but we were afflicted on every side; without were fightings, within were fears." But, though the "outward man was decaying, yet the inward man was renewed day by day;" and the climax of splendid paradoxes which he wrote soon afterward to the Corinthians was not a rhetorical ideal, but the story of his actual life. But after a time Titus came with news which gladdened Paul's heart. He had been well received at Corinth. The letter had made a deep impression. The admonitions had been listened to. The Corinthians had repented of their conduct. They had rid themselves of "him that did the wrong," and Paul was "of good courage concerning them" (2 Cor. vii. 8-16). He then wrote the second of his extant letters to them, which was sent by Titus and the unknown "brother whose praise in the gospel is spread through all the churches," and who had been elected by the churches to travel with Paul and his company (2 Cor. viii. 18, 19). It was probably in the course of this journey that he went beyond the borders of Macedonia into the neighboring province of Illyricum (Rom. xv. 19); but his real goal was Corinth. For the third time he went there, and, overcoming the scruples of his earlier visits, he was the guest of Gaius, in whose house the meetings of the community took place.

Of the incidents of his visit no record remains; the Acts do not even mention it. But it was the culminating point of his intellectual activity. He resolved to go to Jerusalem and then to the new mission fields of Rome and the still farther West. His departure from Corinth, like that from Ephesus, was probably hastened by danger to his life; and, instead of going direct to Jerusalem, he and his companions took a circuitous route around the Ægean Sea. His course lay through Philippi, Troas, Mitylene, Chios, and Miletus, where he took farewell of the elders of the community at Ephesus. Thence he went, by what was probably an ordinary route of commerce, to the Syrian coast, and at last he reached the Holy City.

The narrative which the Acts give of the incidents of his life there is full of grave difficulties. It leaves altogether in the background that which Paul himself mentions as his chief reason for making the visit; and it relates that he accepted the advice which was given him to avail himself of the custom of vicarious vows, in order to show, by his conformity to prevalent usages, that "there was no truth" in the reports that he had told the Gentiles "not to circumcise their children, neither to walk after the customs."

What coloring of a later time, derived from later controversies, has been spread over the original outline of the history cannot now be told. But it is certain Paul went to Rome.

His life at Rome and all the rest of his history are enveloped in mists from which no single gleam of certain light emerges. Almost every writer, whether apologetic or skeptical, has some new hypothesis respecting it; and the number and variety of the hypotheses which have been already framed is a warning, until new evidence appears, against adding to their number. The chief of the preliminary questions is the genuineness of the epistles bearing Paul's name, which, if they be his, must be

assigned to the later period of his life, viz., those to the Philippians, Ephesians, and Colossians, to Philemon, to Timothy, and to Titus. As these epistles do not stand or fall together, but give rise in each case to separate discussion, the theories vary according as they are severally thought to be genuine or false. The least disputed is the Epistle to Philemon.

But, even if this preliminary question of the genuineness of the several epistles be decided in each instance in the affirmative, there remains the further question whether they or any of them belong to the period of Paul's imprisonment at Rome, and, if so, what they imply as to his history. It is held by many writers that they all belong to an earlier period of his life, especially to his stay at Cæsarea. It is held by other writers that they were all sent from Rome.

The place and manner and occasion of his death are not less uncertain than the facts of his later life. The only fragment of approximately contemporary evidence is a vague and rhetorical passage in the letter of Clement of Rome (c. 5): "Paul \* \* \* \* having taught the whole world righteousness, and having come to the goal of the West, and having borne witness before the rulers, so was released from the world and went to the Holy Place, having become the greatest example of patience." The two material points in this passage, (1) "the limit of the West," (2) "having borne witness," are fruitful sources of controversy. The one may mean either Rome or Spain, the other may mean either "having testified" or "having suffered martyrdom." It is not until toward the end of the second century, after many causes had operated both to create and to crush traditions, that mention is made of Paul as having suffered about the same time as Peter at Rome; but the credibility of the assertion is weakened by its connection in the same sentence with the erroneous statement that Peter and Paul went to Italy together after having founded the church at Corinth. A Roman presbyter named Gaius speaks, a few years later, of the martyrdoms of the two apostles being visible at Rome; but neither this testimony nor that of Tertullian is sufficient to establish more than the general probability that Paul suffered martyrdom. But there is no warrant for going beyond this, as almost all Paul's biographers have done, and finding an actual date for his martyrdom in the so-called Neronian persecution of 64 A.D.

The chronology of the rest of his life is as uncertain as the date of his death. We have no means of knowing when he was born, or how long he lived, or at what dates the several events of his life took place. The nearest approach to a fixed point from which the dates of some events may be calculated is that of the death of Festus, which may probably, though by no means certainly, be placed in 62 A.D.; even if this date were certainly known, new evidence would be required to determine the length of time during which he held office; all that can or could be said is that Paul was sent to Rome some time before the death of Festus in 62 A.D.

Of the writings which are ascribed to him in the current list of the canonical books of the New Testament, and also of the Epistle to the Hebrews, accounts will be found in separate articles under their respective titles. The writings which are ascribed to him outside the canon, and which are all unquestionably pseudonymous, are the following:—(1) *The Epistle to the Laodiceans*. This is supposed to be the letter mentioned in Col. iv. 16; it has been recognized as apocryphal from early times. (2) *A Third Epistle to the Corinthians*, i. e., the letter mentioned in 1 Cor. v. 9. This is found in an Armenian version, together with an equally apocryphal letter of the Corinthians to Paul. (3) *Letters between Paul and Seneca*. These are first mentioned by Jerome

and Augustine, *Epist. 54 (153), ad Macedonium*, and have given rise to interesting discussions as to the possibility of personal relations having actually existed between the two men. The letters will be found in most editions of Seneca. Besides these apocryphal letters there are several apocryphal works which profess to add to our information respecting his life.

PAUL THE DEACON. See PAULUS DIACONUS.

PAUL OF SAMOSATA, bishop of Antioch from about 260 A. D., famous in church history as the author of the last attempt to replace the doctrine of the essential (physical) divinity of Christ by the old view of the human personality of the Redeemer. The effort was not successful even within his own community. About the life of Paul we know scarcely anything. His enemies, indeed, describe him as an unspiritual prelate, an empty preacher, an arrogant man of the world, and a crafty sophist; but this portrait must not be too readily accepted.

PAUL, the name of five popes.

PAUL I., pope from 757 to 767, succeeded his brother Stephen III, on May 29, 757. His pontificate was chiefly remarkable for his close alliance with Pippin, king of France. He died on June 28, 767, and received the honor of canonization, which he seems to have merited by his piety and virtues. His successor was Stephen IV.

PAUL II., Pietro Barbo, pope from 1464 to 1471, was born at Venice, February 28, 1418. He was on the mother's side the great-nephew of Gregory XII. and the nephew of Eugenius IV., to whose favor he owed his elevation to the cardinalate at the early age of twenty-two. He seems, however, to have made no especial figure at the papal court until the death of Calixtus III. in 1458. Upon the death of Pius II. he was unanimously and unexpectedly elected his successor, August 31, 1464. He died very suddenly, probably of apoplexy, on July 28, 1471, and was succeeded by Sixtus IV.

PAUL III., Alessandro Farnese, pope from 1534 to 1549, was born February 28, 1468, of an ancient and noble Roman family. He received an excellent education, but his youth was dissolute and stormy, and he owed his promotion to the cardinalate (September, 1493) to the admiration of Alexander VI. for his beautiful sister Giulia, whence he was derisively nicknamed Cardinal Petticoat. He soon showed himself, however, to be a man of ability and character, and his reputation and influence went on steadily increasing until, upon the death of Clement VII., being at the time senior cardinal of the sacred college, he was unanimously elected pope after a conclave of only two days, having been in a manner nominated by his predecessor (October 13, 1534).

No pope has made so many distinguished cardinals, and his promotions included both men of evangelical piety inclined to the new doctrines like Contarini, and fanatical devotees of the old system like Caraffa. The latter group, though Paul had probably little personal inclination for them, triumphed in his councils. The bull instituting the order of the Jesuits (1540) marks the commencement of the Roman counter-reformation; two years afterward the Roman Inquisition was established. Another memorable measure extorted from Paul by the necessities of his position was the convocation of the council of Trent in 1545; but he soon found means to suspend its sittings, which were not resumed for many years. His brief condemning slavery (1537) ranks among the most honorable actions of his reign. Paul's contemporaries respected and courted him, Italy in general enjoyed tranquillity, and the monster who brought such disgrace upon him acquired the princi-

palities of Parma and Piacenza. After, however, the murder of this unworthy son, the ingratitude of his grandsons broke Paul's heart, and, overcome by a sudden fit of passion, he expired on November 10, 1549—enjoying the rare distinction of being one of the very few popes who have died lamented by their subjects. Julius III. was his successor.

PAUL IV., Giovanni Pietro Caraffa, pope from 1555 to 1559, born June 28, 1476, was the nephew of Cardinal Oliviero Caraffa, by whose interest he became at an early age chamberlain to Pope Alexander VI., and subsequently, though contrary to his own inclination, archbishop of Chieti. He was afterward nuncio in England and Spain, both of which missions he discharged with credit; but in 1524, under the influence of strong religious impressions, he resigned his archbishopric, distributed his goods among the poor, and retired from the world to direct the monastic order of Theatins, founded by himself. In 1536 the fame of his sanctity induced Paul III. to call him to his court and confer the dignity of cardinal upon him. He now became the head of the reactionary party at Rome, bent on crushing all tendencies to religious innovation, while insisting on reforms in discipline and moral deportment. Having taken an important part in two conclaves, he was himself unexpectedly elected pope on May 23, 1555, after the death of Marcellus II., notwithstanding his personal unpopularity and the positive veto of Charles V. Raised to the pontifical throne, Paul showed himself a man of extreme counsels in every respect. His open espousal of the cause of France brought upon him a Spanish invasion which would have destroyed his temporal sovereignty but for the superstition of Philip II. and his general Alva, who embraced the first opportunity of making peace. He called his nephews to court and trusted them with blind confidence, but unhesitatingly disgraced them when convinced of their unworthiness. He refused to acknowledge Ferdinand as emperor of Germany, maintaining that Charles had no right to abdicate or Ferdinand to succeed without his own permission. Amid all these agitations he never lost sight of the main purpose of his life—he struggled incessantly against heresy, and was the first pope to issue a full official *Index Librorum Prohibitorum*. He died on August 18, 1559. He was succeeded by Pius IV.

PAUL V., Camillo Borghese, pope from 1605 to 1621, was born in Rome, September 17, 1552, of a noble family. He followed the study of canon law, and after having filled various important offices was made a cardinal in 1596. He succeeded Leo XI. on May 16, 1605, after an unusually long and stormy conclave. No one, till the last moment, had thought of Borghese, who owed his election to his supposed inoffensiveness and the inability of the leaders of the factions to agree upon any other man. Scarcely had he been elected ere he gave convincing proof that his character had been very much mistaken. He showed himself harsh, domineering, impatient of advice, fanatical in his devotion to the secular as well as the spiritual prerogatives of the church, and inflexible in his resolution to uphold them. He began by successfully repressing numerous encroachments of the civil power in various Roman Catholic countries, and thus became tempted to embark in a contention with the republic of Venice, which inflicted a deeper wound on Rome than anything that had taken place since the Reformation. When the Venetians refused to yield, he launched (April, 1606) a bull of excommunication against them, and placed the whole republic under an interdict. The Venetians set him at defiance, forbidding their clergy to pay the least attention to the papal censures, and banishing those who

disobeyed from their dominions. Throughout the remainder of his long pontificate Paul acted with comparative moderation, maintaining, nevertheless, the character of a zealous pontiff intent on combating heresy, and especially active in his encouragement of foreign missions. He ranks among the popes who have contributed most to the embellishment of Rome; the nave, façade, and portico of St. Peter's were completed by him; he also erected the sumptuous Borghese chapel in Santa Maria Maggiore, and greatly benefited the city by improving streets and constructing public fountains. He died on January 28, 1621, and was succeeded by Gregory XV.

PAUL, emperor of Russia, son of Peter III. and of Catherine, was born on October 2, 1754. During the early part of his life he was treated with great harshness by his mother, who had usurped the throne and did not allow him to take any part in the government. His days were spent in retirement, with the exception of a tour which he made in the west of Europe in the year 1780. He was twice married, first, in 1773, to Augusta, princess of Hesse-Darmstadt, who died three years afterward, leaving no issue; secondly, in 1776, to Dorothea Sophia, princess of Würtemberg, who was received into the Greek Church as Maria Feodorovna. Paul Petrovich ascended the throne on the death of his mother Catherine, November 17, 1796. One of his first acts was to cause the body of his father to be exhumed from the Nevski monastery and buried with the empress his wife in the Petropavlovski church among the rest of the czars. Orloff and the other persons implicated in Peter's assassination were compelled to follow the coffins, and afterward banished the empire forever. The chief ministers of the new emperor were Rostopchin and Arakchéeff. Paul now gave signs of a benevolent disposition; among other acts of generosity he set at liberty Kosciusko, who had been detained a prisoner at St. Petersburg. He, however, revived many obsolete imperial privileges which were offensive to the nobility, and became unpopular by introducing German regulations into the army. Alarmed at the progress of the French Republic, he joined Turkey, England, Austria, and Naples in a coalition against Bonaparte. To command the Russians, the veteran Suwaroff was summoned from his rural retreat. For the campaigns of the Russian general, the article RUSSIA may be consulted. It may suffice to say here that he, triumphant at first, was eventually compelled to retreat, and was recalled by Paul. He died in disgrace in the year 1800. Soon afterward the capricious emperor completely changed his plans. Having been flattered by Bonaparte, he secretly made overtures to him and quarreled with England, seizing English vessels and goods which happened to be in the Russian ports. Bonaparte now entered into an agreement with Paul, whereby they should simultaneously invade the English possessions in India. But the coalition was broken up by the assassination of the Russian emperor in the night of March 23 to 24, 1801, which Bonaparte unjustly declared in the *Moniteur* had been planned by the English. The story of his death is well known: he was strangled in the Mikhailovski Palace by Zouboff, Pahlen, and other conspirators. Their original object appears to have been only to make him abdicate. The empress Maria survived till 1828.

PAUL, ST. VINCENT OF. See VINCENT OF PAUL, ST.

PAULDING, JAMES KIRKE, in his day a successful politician, and a writer of much merit and distinction, was born in Dutchess county, N. Y., on August 22, 1778, and removed to New York city in 1800, to reside with his brother-in-law, William Irving, a brother

of Washington Irving. In connection with the latter Paulding began in 1807 a series of brief, lightly humorous articles, which, under the title of "The Salmagundi Papers," soon became popular, and continued to appear until June 25, 1808, when they terminated with the twentieth number. Six years later he published a political pamphlet, *The United States and England*, which attracted the notice of President Madison, who in 1814 appointed the author secretary to the Board of Navy Commissioners. Subsequently Paulding was for twelve years navy agent in New York city, and from 1837 to 1841 secretary of the navy, under President Van Buren. His marriage in 1818, the death of his wife and his own withdrawal from public life in 1841, with his death on April 5, 1860, comprise the chief remaining facts of his useful, honorable, and uneventful career.

PAULI, REINHOLD, historian, was born at Berlin May 25, 1823. From his mother, who was of Huguenot descent, he derived a vivacious temperament; from his father, a minister of the Reformed Church, sprung of a family of clergymen and theological professors, he inherited strong religious convictions. He spent his boyhood in Bremen, and studied at the university of Berlin (1842-46), where he acquired a lifelong predilection for the Hohenzollerns and for the civil service and army of Prussia. Ranke was young Pauli's model historian, but he had far too much individuality to bind himself slavishly to any school. After having taken his degree and passed the public schoolmaster's examination, he became, in 1847, a private tutor in Great Britain. During 1849-52 he served as private secretary to the Prussian ambassador Bunsen in London. The roots of Great and Greater Britain appeared to him to lie in Anglo-Saxon, not in Celtic, institutions, and therefore his first book was *König Aelfred* (Berlin, 1851). Not without material privations Pauli continued his stay in England, and between 1853 and 1858 published three large volumes, comprising the period from Henry II. to Henry VII. In 1855 he became privat-docent at Bonn, and he obtained a professorship at Rostock in 1857. Thence he removed, in 1859, to Tübingen, where, in 1856, he offended the Würtemberg government by vehemently denouncing its Austrian policy in an essay which appeared during the Prussian war in the *Preussische Jahrbücher*. Exiled to a remote country seminary, he preferred to resign. He now returned to his native country and obtained, in 1867, a post in the university of Marburg, which he once represented in the Prussian Upper House. In 1870 he found an honorable position at Göttingen.

Pauli's later life was chiefly devoted to modern history, and the *Geschichte Englands 1814-52*, in 3 vols. (Leipsic, 1864-75), made his name widely known. He fulfilled his duties as a teacher and examiner and as a fellow of different learned societies with punctual accuracy; he became member of the academies of Göttingen, Munich, and Berlin, and honorary doctor of Oxford and Cambridge. He died June 3, 1882.

PAULICIANS, the name of a religious sect which sprang up in Armenia in the latter half of the seventh century. Their founder was Constantine, belonging to a village near Samosata called Mananalis, where a dualistic, perhaps Marcionite, community had long subsisted.

PAULINUS, ST., OF NOLA. Pontius Meropius Anicius Paulinus, who was successively a consul, a monk, and a bishop, was born at Bordeaux in 353 A. D. His father, præfectus prætorio in Gaul, was a man of great wealth. The literary education of the future saint was intrusted to his elder contemporary and townsman Ausonius, and how considerable was the degree of culture to which he attained as a writer in both



prose and verse can yet be seen from his extant works. In 378 he was raised to the rank of consul suffectus, and in the following year he appears to have been sent as consularis into Campania. From Campania Paulinus returned to his native place and came into correspondence or personal intimacy with men like Martin of Tours and Ambrose of Milan, whose example could not fail to keep before him the claims of Christianity as conceived by them; and ultimately (about 389) he was formally received into the church by Bishop Delphinus of Bordeaux, whence shortly afterward he withdrew with his wife beyond the Pyrenees. The personal asceticism of Paulinus and his liberality toward the poor soon brought him into great repute among all the devout of the region in which he had settled; and while he was spending Christmas at Barcelona the enthusiasm of the people rose to such a pitch that they insisted on his being forthwith ordained to the priesthood. At the next vacancy, not later than 409, he succeeded to the bishopric of Nola, and this office he held with ever-increasing honor until his death, which occurred shortly after that of Augustine in 431. He is commemorated by the Church of Rome on June 22d.

PAULUS, HEINRICH EBERHARD GOTTLOB, the distinguished representative of the rationalistic school of German theologians of the beginning of this century, was born at Leonberg, near Stuttgart, September 1, 1761. The chief exegetical works of Paulus are his *Philologisch-kritischer und historischer Commentar über das Neue Testament* (4 vols., 1800-1804), *Clavis über die Psalmen* (1791), and *Clavis über Jesaias* (1793), and particularly his *Exegetisches Handbuch über die drei ersten Evangelien* (3 vols., 1830-33; 2d ed., 1841-42). His *Life of Jesus* (2 vols., 1828) is a synoptical translation of the Gospels, prefaced by an account of the preparation for the Christ and a brief summary of His history, and accompanied by very short explanations interwoven in the translation. The form of the work was fatal to its success, and the subsequent *Exegetisches Handbuch* rendered it quite superfluous. He died, faithful to his first rationalistic position, a staunch friend of intellectual and political freedom and light, August 10, 1851, in his ninetieth year.

PAULUS, JULIUS. See ROMAN LAW.

PAULUS (or PAULLUS), LUCIUS ÆMILIUS, a distinguished Roman general, of the patrician family of the Æmilii, was born about 229 B.C. His first laurels were won in Further Spain, whither he was sent as prætor in 191. After a period of retirement from public life he was elected consul a second time, for 168, and intrusted with the command in the Macedonian war. Paulus brought the war to a speedy termination by the battle of Pydna, fought on June 22 (Julian calendar), 168. The battle decided the fate of Macedonia, which was henceforward a Roman province. But his public glory was closely attended by private misfortune; of the two sons borne him by his second wife one died a few days before, the other a few days after, his triumph. The veteran was thus left without a son to bear his name; for of his two sons by his first wife Papiria, the elder had been adopted by Quintus Fabius Maximus, Hannibal's great opponent, and the younger by the son of Scipio Africanus. The latter, known as P. Cornelius Scipio Æmilianus, was the conqueror of Carthage and Numantia. Paulus was censor in 164, and died in 160, B.C.

PAULUS ÆGINETA. See ÆGINETA and MEDICINE.

PAULUS DIACONUS, the historian of the Lombard dominion in Italy, flourished in the eighth century (see LOMBARDS). He was born in 720, and spent some years in a monastery, and later went to France. After some years' residence in France, Paulus returned

to Italy and to his convent, and died, probably between 790 and 800, at his beloved Monte Cassino.

PAUPERISM. See POOR LAWS.

PAUSANIAS, the general who led the Greeks to victory at Plataea, was a Spartan and a member of the Agid branch of the royal house. He commanded the united Greek army at the memorable battle of Plataea (479), which forever secured the freedom of Greece against the Persians. After the expulsion of the Persians from Greece Pausanias led a Greek fleet (478 or 477) to Cyprus and thence to Byzantium, which he captured from the Persians. He conceived the design of making himself master of all Greece, and to this end entered into treasonable correspondence with the enemy. Pausanias was recalled to Sparta and tried, but, though convicted and punished for minor offenses, the evidence was insufficient to substantiate the charge of treason, and he was acquitted. Having afterward the folly to return to Byzantium in a private capacity and reopen communications with Persia, he was again recalled and put on his trial. There was strong suspicion of his treason, but no positive evidence. It was known, too, that he had incited the Helots to revolt. But not until they had contrived to overhear a conversation between Pausanias and his messenger were the ephors satisfied of his guilt; and then they proceeded to arrest him. Foreseeing their intention, Pausanias took refuge in the temple of Athene of the Brazen House. The ephors took off the roof, blocked up the doors, and starved him. When on the point of death he was dragged out, that his corpse might not defile the sanctuary. This happened about 467.

PAUSANIAS, a prose writer of Greek traditions, mythical and historical, and a critic of Greek art. His important work, in ten books, usually known as *Pausaniæ Descriptio Græciæ*, has come down to us entire. It is strictly an itinerary through the Peloponnesus, including Attica, Bœotia, and Phocis, with a rather slight mention of the adjacent islands and some of the principal towns on the Asiatic coast. It was evidently compiled by one whose interest was mainly centered in making notes of art-collections as they existed in the Greek temples and public places in the time of the Antonines. Of the personal history of Pausanias nothing is recorded. He lived during the prosperous times of the Roman empire under Hadrian, whom he often mentions by name, and his successors Antoninus Pius and Marcus Aurelius, the latter of whom became emperor in 161 A. D.

PAUSILIPO, or POSILLIPO. See NAPLES.

PAVIA, a city of Italy, the chief town of a province, and a bishop's see, is situated twenty-two and one-half miles by rail south of Milan, on the left bank of the Ticino. The railway from Milan to Genoa, which is there joined by lines from Cremona, etc., crosses the river on a fine bridge constructed in 1865; and, farther down, the city is connected with the suburban village of Ticino by a remarkable brick-built covered bridge dating from the fourteenth century. Though it has lost its importance as a fortified town, and no longer deserves the designation of "City of the Hundred Towers," Pavia is still for the most part surrounded by its ramparts, which in a circuit of about three and one-half miles inclose an area of 400 acres. Several of its buildings are of great architectural interest. The basilica of San Michele is one of the finest specimens extant of the Lombard style, and as it was within its walls that the crown was placed on the head of the "kings of Italy," from whom the house of Savoy claims to be descended, it has received the legal title of Basilica Reale. The cathedral of San Stefano, of which the first stone was laid by Bishop Ascanio Sforza in 1488,

is still unfinished. In the interior is the tomb of St. Augustine, a remarkable specimen of fourteenth-century sculpture, which presents the saint life-size in pontifical robes.

The university of Pavia (formally constituted in 1361 by the emperor Charles IV., but claiming to have its first origin in a school founded by Charlemagne) has faculties of law, medicine, and science. The professors number between forty and fifty, but the students have decreased from 1,475 in 1860 to 604 in 1889. The university library was founded by Maria Theresa in 1754; the famous collection of books which Gian Galeazzo brought together by the aid of Petrarch was carried off to Blois by the French in 1500. The civil hospital of San Matteo is a large and flourishing institution, dating from 1449; like the Borromeo and Ghislieri colleges, it has large landed estates in the circondario. Comparatively few manufactures are prosecuted in Pavia, but there is considerable trade by water as well as by rail, barges being able to pass down the Po to the Adriatic and along the canal to Milan. The population of the city was 27,792 in 1881, or, including the suburbs Ticino, Calvenzano, and Borgorato, 29,836; that of the commune was 29,941 in 1881.

PAVLOGRAD, a town of European Russia, at the head of a district in the government of Ekaterinoslaff. It dates from the latter half of the eighteenth century, and was originally known as Luganskoe Selo. It was made a district town of Ekaterinoslaff in 1784. Its population is 13,000.

PAWPAW, (Malay *papaya*), the fruit of a small American tree (*carica papaya*). The fruit is eaten, but to some it is not palatable, while it is favorite with others. The root of the tree has not a pleasant odor, and the juice of the fruit, before ripening, contains an albuminous substance resembling fibrine. The plant is said to make meat tender. Meat newly killed and covered by the leaves becomes soft and delicate, and certain animals fed on these leaves have very tender flesh.

Pawpaw is the name also given to a North American tree (*Asimina triloba*) which varies in height from ten to twenty feet. There are several smaller species of *Asimina* to which the same term is applied. The roots and bark of these trees give forth an unpleasant odor. The ripe fruit, which is several inches long, is of a yellowish color and much more bulbous than the banana. The pulp is soft and tasteless and contains large seeds. The tree is found in the sandy regions of Georgia and Florida.

PAWTUCKET, a town in Providence county, R. I., four miles northeast of Providence, is situated on both sides of the navigable Pawtucket river (Blackstone river above the falls), which falls about fifty feet at this point, affording abundant water-power. At Pawtucket in 1790, Samuel Slater erected the first water-power cotton-factory in America. In the earlier part of the present century Pawtucket was the seat of shipbuilding and of considerable commerce. It is now a place with nearly 100 different industries, large manufactories of cotton and woolen cloths, steam-engines, fire-engines, etc. The exports and imports amount to several million dollars annually. In 1862 Pawtucket, originally belonging to Massachusetts, became part of Rhode Island. The population in 1880 was 19,030, and in 1890 was 27,633.

PAXO, or PAXOS, one of the IONIAN ISLANDS (*q. v.*) about eight miles south of the southern extremity of Corfu, is a hilly mass of limestone five miles long by two broad, and not more than 600 feet high. Though it has only a single stream and a few springs, and the inhabitants were often obliged, before the Russians and

English provided them with cisterns, to bring water from the mainland. Paxo is well clothed with olives, which produce oil of the very highest quality. Gaion (or, less correctly, Gaia), the principal village, lies on the east coast, and has a small harbor. Toward the center, on an eminence, stands Papandi, the residence of the bishop of Paxo, and throughout the island are scattered a large number of churches. On the west and southwest coasts are some extensive and remarkable caverns.

PAXTON, SIR JOSEPH, architect and ornamental gardener, was born at Milton Bryant, near Woburn, Bedfordshire, England, in 1803, and was educated at the grammar school of that town. Having served his apprenticeship as gardener, he obtained employment at Chiswick, the seat of the duke of Devonshire, and eventually became superintendent of the duke's gardens and grounds at Chatsworth, and manager of his Derbyshire estates. Here he built a grand conservatory, in which he introduced various improvements of great value in construction and arrangements. To this edifice there attaches a peculiar interest from the fact that it formed the model for the Great Exhibition building of 1851. The happy suggestion of Paxton solved a difficulty which threatened to render it impossible to hold the exhibition, and in recognition of his services he received the honor of knighthood. On the formation of the Crystal Palace Company he was invited to prepare the design for the building at Sydenham, and was also appointed director of the gardens and grounds. In 1854 he was chosen M. P. for Coventry, which he continued to represent till his death, which occurred at his residence near the Crystal Palace, June 8, 1865. Paxton was elected in 1826 a Fellow of the Horticultural Society, in 1833 a Fellow of the Linnæan Society, and in 1844 he was made a knight of the order of St. Vladimir by the emperor of Russia.

PAYMENT, in English law, is one of the modes of performance of an obligation, and consists in the discharge of a sum due in money or the equivalent of money. In order that payment may extinguish the obligation it is necessary that it should be made at a proper time and place, in a proper manner, and by and to a proper person. If the sum due be not paid at the appointed time, the creditor is entitled to sue the debtor at once, in spite of the readiness of the latter to pay at a later date, subject, in the case of bills and notes, to the allowance of days of grace. In the common case of sale of goods for ready money, a right to the goods vests at once upon sale in the purchaser, a right to the price in the seller; but the seller need not part with the goods till payment of the price.

Payment may be made at any time of the day upon which it falls due, except in the case of mercantile contracts, where the creditor is not bound to wait for payment beyond the usual hours of mercantile business. If no place be fixed for payment, the debtor is bound to find, or to use reasonable means to find, the creditor, unless the latter be abroad. Payment must be made in money which is a legal tender, unless the creditor waive his right to payment in money by accepting some other mode of payment, as a negotiable instrument or a transfer of credit. If the payment be by negotiable instrument, the instrument may operate either as an absolute or as a conditional discharge. In the ordinary case of payment by check the creditor accepts the check conditionally upon its being honored; if it be dishonored, he is remitted to his original rights. The creditor has a right to payment in full, and is not bound to accept part payment unless by special agreement. Part payment is sufficient to take the debt out of the Statute of Limitations. It is a technical rule of English

law that payment of a smaller sum, even though accepted by the creditor in full satisfaction, is no defense to a subsequent action for the debt. The reason of this rule seems to be that there is no consideration for the creditor foregoing his right to full payment. In order that payment of a smaller sum may satisfy the debt, it must be made by a person other than the person originally liable, or at an earlier date, or at another place, or in another manner than the date, place, or manner contracted for. Payment must in general be made by the debtor or his agent, or by a stranger to the contract with the assent of the debtor. If payment be made by a stranger without the assent of the debtor, it seems uncertain how far English law regards such payment as a satisfaction of the debt. If the debtor ratify the payment, it then undoubtedly becomes a satisfaction. Payment must be made to the creditor or his agent. A *bona fide* payment to an apparent agent may be good, though he has in fact no authority to receive it. Such payment will usually be good where the authority of the agent has been countermanded without notice to the debtor. The fact of payment may be presumed, as from lapse of time. Thus payment of a testator's debts is generally presumed after twenty years. A written receipt is only presumptive and not conclusive evidence of payment. If payment be made under a mistake of fact, it may be recovered, but it is otherwise if it be made under a mistake of law, for it is a maxim of law that *ignorantia legis neminem excusat*. Money paid under compulsion of law, even though not due, cannot generally be recovered where there has been no fraud or extortion.

In the United States the law, as a rule, does not materially differ from English law. In some States, however, money may be recovered, even when it has been paid under a mistake of law. The question of legal tender has been an important one. In 1862 Congress passed an act making treasury notes legal tender. After much litigation, the Supreme Court of the United States finally decided, in 1870, in favor of the constitutionality of this act, both as to contracts made before and after it was passed. These notes are legal tender for all purposes except duties on imports and interest on the public debt. All gold coins, silver dollars, and silver coins below the value of a dollar coined before 1854 are legal tender to any amount. Silver coins below the value of a dollar of 1854 and subsequent years are legal tender for sums not exceeding five dollars. Silver three-cent pieces of the dates 1851 to 1853 are legal tenders for sums not exceeding thirty cents, those of subsequent years for sums not exceeding five dollars. Foreign coins are not legal tender. Postal currency is not legal tender for private debts. It falls exclusively within the jurisdiction of Congress to declare paper or copper money a legal tender. By the constitution of the United States, "no State \* \* \* shall make anything but gold and silver coin a tender in payment of debts."

PAYSANDU, formerly SAN BENITO, a port and departmental town of Uruguay, is situated on the left bank of the river Uruguay, 270 miles by river from Montevideo, and 120 miles by road from Durazno. The long streets run east and west at right angles to the river, and the slope of the ground makes drainage easy. Paysandu has been a great battle-ground: in 1846, for instance, it was held by Oribe and bombarded by Rivera, and in 1865 it was captured by the Brazilians after a twenty-eight days' siege. In 1868 the population was about 9,000, and it has since considerably increased.

PAYTA, or PAITA, a town of Peru, in the province of Piura, with only 2,390 inhabitants, but of importance as the northernmost harbor of the Peruvian coast, the

port of the city of Piara (San Miguel de), with which it is connected by rail, a regular calling-place for steamers, and a great rendezvous for whaling-vessels.

PAZ DE AYACUCHO, LA. See LA PAZ.

PEA (*Pisum*), a genus of *Leguminosæ*, consisting of herbs with compound pinnate leaves ending in tendrils, by means of which the weak stems are enabled to support themselves, and with large leafy stipules at the base. The flowers are typically "papilionaceous," with a "standard" or large petal above, two side petals or wings, and two front petals below forming the keel. The stamens are ten—nine united, the tenth usually free or only slightly joined to the others. The ovary is prolonged into a long, thick, bent style, compressed from side to side at the tip and fringed with hairs. The fruit is a characteristic "legume" or pod, bursting when ripe into two valves, which bear the large globular seeds (peas) on their edges. These seeds are on short stalks, the upper extremity of which is dilated into a shallow cup or aril; the two cotyledons are thick and fleshy, with a radicle bent along their edges on one side. The genus is exceedingly close to *Lathyrus*, being only distinguished technically by the style, which in the latter genus is compressed from above downward and not thick. It is not surprising, therefore, that under the general name "pea" species both of *Pisum* and of *Lathyrus* are included. The common field or gray pea with compressed mottled seeds and two to four leaflets is *Pisum arvense*, which is cultivated in all temperate parts of the globe, but which, according to the Italian botanists, is truly a native of central and southern Italy. The garden pea, *P. sativum*, is more tender than the preceding, and its origin is not known. It has not been found in a wild state anywhere, and it is considered that it may be a form of *P. arvense*, having, however, from four to six leaflets to each leaf and globular seeds of uniform color.

PEABODY, a town in Essex county, Mass., five miles northwest of Salem. Incorporated as South Danvers in 1855, it adopted its present name in 1868 in honor of the philanthropist George Peabody, who was born in the township, and in 1852 erected there the Peabody Institute, which now contains various memorials of its founder, the portrait of herself presented by Queen Victoria, the Congress medal, etc. Peabody contains a large number of leather and morocco factories, and several glueworks, printworks, etc. Its inhabitants numbered 9,028 in 1880, and 10,158 in 1890.

PEABODY, GEORGE, philanthropist, was descended from an old yeoman family of Hertfordshire, England, named Pabody or Pebody, who, six generations before his birth, had emigrated to New England. He was born at Danvers (now Peabody), Mass., February 18, 1795. The only regular education he received was at the district school, and when only eleven years of age he became apprentice at a grocery store. After serving as a volunteer at Fort Warburton in the short war between Great Britain and the United States, in 1812, he became partner with Elisha Riggs in a dry-goods store, Riggs furnishing the capital, while Peabody had the practical management. Through his energy and skill the business increased with rapidity, and on the retirement of Riggs about 1830, Peabody found himself at the head of one of the largest mercantile concerns in the world. About 1837 he established himself in London, England, as merchant and money-broker, and in 1843 he withdrew from the concern in America. It is, however, as a philanthropist that Peabody has made his name a household word. While holding aloof from the strife of politics in the United States, he was ready to give his native country the benefit of his business skill and the aid of his wealth in its financial difficulties. The num-

ber of his great benefactions to public objects is too great for bare mention here. It must suffice to name among the more important a gift of \$125,000 for educational purposes at Danvers; \$500,000 to found and endow an institution for science in Baltimore, a sum afterward increased by a second donation of \$500,000; of various sums to Harvard University; and of \$1,750,000 for the erection of dwelling-houses for the working-classes in London, which sum was increased by his will to \$2,500,000. If this last benefaction has failed to produce the good results anticipated, this has been due to causes for which Peabody was not responsible, and which do not at all detract from the wise beneficence of the gift. He received from the Queen the offer of a baronetcy, but declined it. In 1867 the United States Congress awarded him a special vote of thanks for his many large gifts to public institutions in America. He died at Eaton Square, London, November 14, 1869.

**PEACH.** By Bentham and Hooker the peach is included under the genus *Prunus* (*Prunus persica*), and its resemblance to the plum is indeed obvious; others have classed it with the almond, *Amygdalus*; while others again have considered it sufficiently distinct to constitute a genus of its own under the name *Persica*.

In general terms the peach may be said to be a medium sized tree, with lanceolate, stipulate leaves, borne on long, slender, relatively unbranched shoots, and with the flowers arranged singly, or in groups of two or more, at intervals along the shoots. The flowers have a hollow tube at the base bearing at its free edge five sepals, an equal number of petals, usually concave or spoon-shaped, pink or white, and a great number of stamens. The pistil consists of a single carpel with its ovary, style, stigma, and solitary ovule or twin ovules. This carpel is, in the first instance, free within the flower-tube, but, as growth goes on, the flower-tube and the carpel become fused together into one mass, the flesh of the peach, the inner layers of the carpel, becoming woody to form the stone, while the ovule ripens into the kernel or seed. This is exactly the structure of the plum or apricot, and differs from that of the almond, which is identical in the first instance, only in the circumstance that the fleshy part of the latter eventually becomes dry and leathery and cracks open along a line called the suture.

The nectarine is a variation from the peach, mainly characterized by the circumstance that, while the skin of the ripe fruit is downy in the peach, it is shining and destitute of hairs in the nectarine. That there is no essential difference between the two is, however, shown by the facts that the seeds of the peach will produce nectarines, and *vice versa*, and that it is not very uncommon, though still exceptional, to see peaches and nectarines on the same branch, and fruits which combine in themselves the characteristics of both nectarines and peaches. The blossoms of the peach are formed the autumn previous to their expansion, and this fact, together with the peculiarities of their form and position, requires to be borne in mind by the gardener in his pruning and training operations. The only point of practical interest requiring mention here is the very singular fact attested by all peach-growers, that, while certain peaches are liable to the attacks of a parasitic fungus known as mildew, others are not, showing a difference in constitution analogous to that observed in the case of human beings, some of whom will readily succumb to particular diseases, while others seem proof against their attacks. In the case of the peach this peculiarity is in some way connected with the presence of small glandular outgrowths on the stalk, or at the base of the leaf. Some peaches have globular, others reniform glands, others none at all, and these latter

trees are much more subject to mildew than are those provided with glands.

**PEACOCK** (the first syllable from the Latin *Pavo*), the bird so well known from the splendid plumage of the male, and as the proverbial personification of pride. A native of the Indian peninsula and Ceylon, in some parts of which it is very abundant, its domestication dates from times so remote that nothing can be positively stated on that score. Setting aside its importation to Palestine by Solomon, its assignment in classical mythology as the favorite bird of Hera or Juno testifies to the early acquaintance the Greeks must have had with it; but, though it is mentioned by Aristophanes and other older writers, their knowledge of it was probably very slight until after the conquests of Alexander. Throughout all succeeding time, however, it has never very freely rendered itself to domestication, and, retaining much of its wild character, can hardly be accounted an inhabitant of the poultry-yard, but rather an ornamental denizen of the pleasure-ground or shrubbery; while, even in this condition, it is seldom kept in large numbers, for it has a bad reputation for doing mischief in gardens, it is not very prolific, and, though in earlier days highly esteemed for the table, it is no longer considered the delicacy it was once thought.

As in most cases of domestic animals, pied or white varieties of the ordinary Peacock, *Pavo cristatus*, are not unfrequently to be seen; and, though lacking in proportion the gorgeous resplendence for which the common fowl stands unsurpassed, they are valued as curiosities. Greater interest, however, attends what is known as the "japanned" Peacock, often erroneously named the Japanese or Japan Peacock, a form which has received the name of *P. nigripennis*, as though it were a distinct species. In this form the cock, besides other less conspicuous differences, has all the upper wing-coverts of a deep lustrous blue instead of being mottled with brown and white, while the hen is of a more or less grayish-white, deeply tinged with dull yellowish-brown near the base of the neck and shoulders. It "breeds true;" but occasionally a presumably pure stock of birds of the usual coloration throws out one or more having the "japanned" plumage, leading to the conclusion that the latter may be due to "reversion to a primordial and otherwise extinct condition of the species," and it is to be observed that the "japanned" male has in the coloration of the parts mentioned no little resemblance to that of the second indubitably good species, the *P. muticus* (or *P. spicifer* of some writers) of Burma and Java, though the character of the latter's crest—the feathers of which are barbed along their whole length instead of at the tip only—and its golden-green neck and breast furnish a ready means of distinction.

The Peafowls belong to the group *Gallinæ*, from the normal members of which they do not materially differ in structure; and, though by some systematists they are raised to the rank of a Family, *Pavonidæ*, most are content to regard them as a Subfamily of *Phasianidæ* (PHEASANT), (*q.v.*)

**PEACOCK, GEORGE**, mathematician, was born at Thornton Hall, Denton, near Darlington, April 9, 1791. He was educated at Richmond, Yorkshire, and entered Trinity College, Cambridge, in 1809. He was second wrangler in the mathematical tripos of 1812 (Sir J. F. W. Herschel being senior), was elected fellow of his college in 1814, and became assistant tutor and lecturer in 1815, full tutor in 1823, and sole tutor of "his side" in 1835. Peacock distinguished himself by his business capacity, and by his broad views of the duties and functions of the educational institution in whose management he had so large a share.

In 1837 he was appointed Lowndean professor of astronomy. In 1839 he took the degree of D.D., and the same year was appointed by Lord Melbourne to the deanery of Ely. He improved the sanitation of Ely, published in 1840 *Observations on Plans for Cathedral Reform*, and carried out extensive works of restoration in his own cathedral.

This list by no means exhausts the sphere of Peacock's activity. He was a prime mover in the establishment of the Cambridge Astronomical Observatory, and in the founding of the Cambridge Philosophical Society. He was a fellow of the Royal, Royal Astronomical, Geological, and other scientific societies. In 1838, and again in 1843, he was one of the commissioners for standards of weights and measures; and he also furnished valuable information to the commissioners on decimal coinage, a matter in which he took great interest. He died on November 8, 1858.

PEACOCK, THOMAS LOVE, novelist and poet, was born at Weymouth, England, October 18, 1785. After a brief experience of business he elected to devote himself to study and the pursuit of literature, living with his mother on their private means. His first books were poetical, *The Monks of St. Mark* (1804), *Palmyra* (1806), *The Genius of the Thames* (1810), *The Philosophy of Melancholy* (1812)—works of no great merit. He also made several dramatic attempts, which did not find their way to the stage. In 1812 he became acquainted with Shelley, who made him his executor together with Lord Byron. In 1815 he evinced his peculiar power by writing *Headlong Hall*, the prototype of all his subsequent novels. It was published in 1816, and *Melincourt* followed in the ensuing year. During 1817 he lived at Great Marlow, enjoying the almost daily society of Shelley, and writing *Nightmare Abbey* and *Rhododaphne*, by far the best of his long poems. In 1819 he received the appointment of assistant examiner at the India House. He also contributed to the *Westminster Review* and the *Examiner*. His services to the East India Company, outside the official routine, were considerable. In 1836 he succeeded Mill as chief examiner, and in 1856 he retired upon a pension. During his later years he contributed several papers to *Fraser's Magazine*, including reminiscences of Shelley. He also wrote in the same magazine his last novel *Gryll Grange* (1860), inferior to his earlier writings in humor and vigor, but still a surprising effort for a man of his age. He died January 23, 1866.

PEAR (*Pyrus communis*). The pear has essentially the same floral structure as the apple. In both cases the so-called fruit is composed of the flower-tube or upper end of the flower-stalk greatly dilated, and inclosing within its cellular flesh the five cartilaginous carpels which constitute the "core" and are really the true fruit. From the upper rim of the flower-tube or receptacle are given off the five sepals, the five petals, and the very numerous stamens. The form of the pear and of the apple, respectively, although usually characteristic enough, is not by itself sufficient to distinguish them, for there are pears which cannot by form alone be distinguished from apples, and apples which cannot by superficial appearance be recognized from pears. The main distinction is the occurrence in the tissue of the fruit, or beneath the rind, of clusters of cells, filled with hard woody deposit in the case of the pear, constituting the "grit," while in the apple no such formation of woody cells takes place. The appearance of the tree—the bark, the foliage, the flowers—is, however, usually quite characteristic in the two species. Cultivated pears, whose number is enormous, are without doubt derived from one or two wild species widely distributed throughout Europe and western Asia, and

sometimes forming part of the natural vegetation of the forests. In England, where the pear is sometimes considered wild, there is always the doubt that it may not really be so, but the produce of some seed of a cultivated tree deposited by birds or otherwise, which has degenerated into the wild spine-bearing tree known as *Pyrus communis*.

The cultivation of the pear extends to the remotest antiquity. Traces of it have been found in the Swiss lake dwellings; it is mentioned in the oldest Greek writings, and was cultivated by the Romans. The word "pear" or its equivalent occurs in all the Celtic languages, while in Slavonic and other dialects different appellations, but still referring to the same thing, are found—a diversity and multiplicity of nomenclature which leads De Candolle to infer a very ancient cultivation of the tree from the shores of the Caspian to those of the Atlantic. A certain race of pears, with white down on the under surface of their leaves, is supposed to have originated from *P. nivalis*, and their fruit is chiefly used in France in the manufacture of PERRY (*q.v.*).

PEARL. Pearls are calcareous concretions of peculiar luster, produced by certain molluscs, and valued as objects of personal ornament. It is believed that most pearls are formed by the intrusion of some foreign substance between the mantle of the mollusc and its shell, which, becoming a source of irritation, determines the deposition of nacreous matter in concentric layers until the substance is completely encysted. The popular notion that the disturbing object is commonly a grain of sand seems untenable; according to Dr. Gwyn Jeffreys and some other conchologists, it is in most cases a minute parasite. The experience of pearl-fishers shows that those shells which are irregular in shape and stunted in growth, or which bear excrescences, or are honeycombed by boring parasites, are those most likely to yield pearls.

The substance of a pearl is essentially the same as that which lines the interior of many shells, and is known as "mother-of-pearl."

Although a large number of molluscs secrete MOTHER-OF-PEARL (*q.v.*), only a few of them yield true pearls. The finest are obtained from the so-called "pearl oyster," the *Avicula (Meleagrina) margaritifera*, Linnaeus, while fresh-water pearls are procured chiefly from the "pearl mussel," *Unio (Margaritana) margaritifera*, L. These river-pearls are generally of dull leaden hue, and inferior in beauty to those of marine origin.

It is obvious that if a pearl presents a perfectly spherical form it must have remained loose in the substance of the muscles or other soft tissues of the mollusc. Frequently, however, the pearl becomes cemented to the interior of the shell, the point of attachment thus interfering with its symmetry. In this position it may receive successive nacreous deposits, which ultimately form a pearl of hemispherical shape, so that when cut from the shell it may be flat on one side and convex on the other, forming what jewelers know as a "perle bouton." In the course of growth the pearl may become involved in the general deposit of mother-of-pearl, and be ultimately buried in the substance of the shell. It has thus happened that fine pearls have occasionally been unexpectedly brought to light in cutting up mother-of-pearl in the workshop.

A pearl of the first water should possess, in jewelers' language, a perfect "skin" and a fine "orient;" that is to say, it must be of a delicate texture, free from speck or flaw, and of clear almost translucent white color, with a subdued iridescent sheen. It should also be perfectly spherical, or, if not, of a symmetrical pear-shape. The most perfect pearl in existence is said to be one,

known as "La Pellegrina," in the museum of Zosima in Moscow; it is a perfectly globular Indian pearl of singular beauty, weighing twenty-eight carats. The largest known pearl is one of irregular shape in the South Kensington museum. This magnificent pearl weighs three ounces, has a circumference of four and a half inches, and is surmounted by an enameled and jeweled gold crown, forming a pendant of great value.

The ancients obtained their pearls chiefly from India and the Persian Gulf, but at the present time they are also procured from the Sulu seas, the coast of Australia, the shores of Central America, and some of the South Pacific islands. The ancient fisheries of Ceylon (Taprobane) are situated in the Gulf of Manaar, the fishing banks lying from six to eight miles off the western shore, a little to the south of the isle of Manaar. The Tinnevely fishery is on the Madras side of the strait, near Tuticorin. These Indian fishing-grounds are under the control of government inspectors, who regulate the fisheries, and permit fishing only when they consider the banks to be in a satisfactory condition. The oysters yield the best pearls at about four years of age. Fishing, generally commences in the second week in March, and lasts for from four to six weeks, according to the season. The boats are grouped in fleets of from sixty to seventy, and start usually at midnight so as to reach the oyster-banks at sunrise. Each boat generally carries ten divers.

To facilitate the descent of the diver, a stone of granite weighing about forty pounds is attached to the cord by which he is let down. The divers work in pairs, one man diving while the other watches the signal-cord, drawing up the sink-stone first, then hauling up the baskets of oysters, and finally raising the diver himself. On an average the divers remain under water from fifty to eighty seconds, though some can endure a much longer submergence, and exceptional instances are cited of men remaining below for as long as six minutes. After resting for a minute or two at the surface, the diver descends again; and so on, until exhausted, when he comes on board and watches the rope, while his comrade relieves him as diver.

Since the days of the Macedonians pearl-fishing has been carried on in the Persian Gulf. It is said that the oyster-beds extend along the entire Arabian coast of the gulf, but the most important are on sandbanks off the islands of Bahrein. According to Colonel Polly's report, there are 1,500 boats belonging to Bahrein alone, and the annual profit from the pearl-fishery was about \$2,000,000. There is a small pearl-fishery near Kurrahee on the coast of Bombay.

From the time of the Ptolemies pearl-fishing has been prosecuted along the coast of the Red Sea, especially in the neighborhood of Jiddah and Koseir.

Very fine pearls are obtained from the Sulu Archipelago, on the northeast of Borneo. The pearl-oyster occurs throughout the Pacific, mostly in the clear water of the lagoons within the atolls, though fine shells are also found in deep water outside the coral reefs. The Polynesian divers do not employ sink-stones, and the women are said to be more skillful than the men. Fine pearl-shells are obtained from Navigators' Islands, the Society Islands, the Low Archipelago or Paumotu Isles, and the Gambier Islands.

Pearl-fishing is actively prosecuted along the western coast of Central America, especially in the Gulf of California, and to a less extent around the Pearl Islands in the Bay of Panama. These pearls are obtained from the *Maleagrina californica*, Cpr., and the mother-of-pearl shell is known in commerce as "Panama" or "bullock" shell. Some pearls of rare beauty have been obtained from the Bay of Mulege, near Los Coytes, in

the Gulf of California; and in 1882 a pearl of seventy-five carats, the largest on record from this district, was found near La Paz in California. The coast of Guayaquil also yields pearls. Columbus found that pearl-fishing was carried on in his time in the Gulf of Mexico, and pearls are still obtained from the Caribbean Sea. In the West Indies the best pearls are obtained from St. Thomas and from the island of Margarita, off the coast of Venezuela. From Margarita Philip II. of Spain is said to have obtained, in 1579, a famous pearl of 250 carats.

Of late years pearl-fishing has been started with considerable success in the Australian seas.

River pearls are produced by the fresh-water mussels inhabiting the mountain streams of temperate climates in the northern hemisphere—especially in Scotland, Wales, Ireland, Saxony, Bohemia, Bavaria, Lapland and Canada. They are found in many parts of the United States, and have been systematically worked in the Little Miami river, Warren county, Ohio. The season extends from June to October. Japan produces freshwater pearls, found especially in the *Anodonta japonica*. But it is in China that the culture of the pearl-mussel is carried to the greatest perfection. The Chinese also obtain marine pearls, and use a large quantity of mother-of-pearl for decorative purposes.

Pink pearls are occasionally found in the great conch or fountain shell of the West Indies, *Strombus gigas*, L.; but these, though much prized, are not nacreous, and their tint is apt to fade. Black pearls, which are very highly valued, are obtained chiefly from the pearl-oyster of the Gulf of Mexico.

*Artificial pearls* were first made in western Europe in 1680 by a rosary-maker in Paris, and the trade is now largely carried on in France, Germany, and Italy. Spheres of thin glass are filled with a preparation known as "essence d'orient," made from the silvery scales of the bleak or "ablette," which is caused to adhere to the inner wall of the globe, and the cavity is then filled with white wax. The scales are in some cases incorporated with celluloid. Many imitation pearls are now formed of an opaline glass of nacreous luster, and the soft appearance of the pearl obtained by the judicious use of hydrofluoric acid. Pink pearls are imitated by turning small spheres out of the rosy part of the conch shell, or even out of pink coral.

PEARSON, JOHN, a learned English bishop, was born on February 28, 1612. After attending Eton, he entered Queens' College, Cambridge, June 10, 1631, and was elected a scholar of King's in April following and fellow in 1634. Entering holy orders in 1639, he was collated to the prebend of Nether-Avon, in the church of Sarum. In 1640 he was appointed chaplain to the lord-keeper Finch, by whom he was presented to the living of Thorington in Suffolk during the same year. In 1650 he was made preacher of St. Clement's, Eastcheap, in London. In 1659 Pearson published at London his celebrated *Exposition of the Creed*. The same year he likewise published the *Golden Remains of the Ever-memorable Mr. John Hales of Eton*, to which he prefixed a preface containing a character of that eminent man, with whom he had been acquainted for many years, drawn up with great elegance and force. Pearson had also a principal share in the editing of the *Critici Sacri*, first published in 1660. Soon after the Restoration he was presented by Juxon, then bishop of London, to the rectory of St. Christopher's in that city; and he was also in 1660 created doctor of divinity at Cambridge, in pursuance of the king's letters mandatory, installed prebendary of Ely, archdeacon of Surrey, and made master of Jesus College, Cambridge. In 1661 he was appointed Lady Margaret professor of

divinity in that university; and on the first day of the ensuing year he was nominated one of the commissioners for the review of the liturgy in the conference held at the Savoy. On April 14, 1662, he was elected master of Trinity College, Cambridge, and in August resigned his rectory of St. Christopher's and his prebend of Ely. In 1667 he was admitted a Fellow of the Royal Society. Upon the death of Doctor Wilkins in 1672, Pearson was appointed his successor in the see of Chester. In 1682 his *Annales Cyprianici* were published at Oxford, with Fell's edition of that father's works. Pearson was disabled from all public service by ill health a considerable time before his death at Chester on July 16, 1686.

PEAT. See FUEL.

PECCARY. Under this name are included two species of small pig-like animals forming the genus *Dicotyles* of Cuvier, belonging to the section *Suina* of the Artiodactyle Ungulates. They are peculiar to the New World, and in it are the only surviving members of the large group now represented in the Old World by the various species of swine, babirussas, wart-hogs, and hippopotami.

The teeth of the peccaries differ from those of the true pigs (genus *Sus*) numerically, in wanting the upper outer incisor and the anterior premolar on each side of each jaw, the dental formula being  $i \frac{2}{3}, c \frac{1}{1}, p \frac{3}{3}, m \frac{2}{3}$ , total 38. The upper canines have their points directed downward, not outward or upward as in the boars, and they are very sharp, with cutting hinder edges, and completely covered with enamel until worn. The lower canines are large and directed upward and outward, and slightly curved backward. The stomach is much more complex than in the true pigs, almost approaching that of a ruminant. As in the pigs, the snout is truncated, and the nostrils are situated in its flat, expanded, disk-like termination. The ears are rather small, ovate, and erect; and there is no external appearance of a tail. The surface is well covered with thick bristly hair, and rather behind the middle of the back is a large and peculiar gland, which secretes an oleaginous substance with a powerful musky odor. This was mistaken by the old travelers for a second navel, a popular error which suggested to Cuvier the name of *Dicotyles*. When the animal is killed for food, it is necessary speedily to remove this gland, otherwise it will taint the whole flesh so as to render it uneatable.

There are two species, so nearly allied that they will breed together freely in captivity. Unlike the true pigs, they never appear to produce more than two young ones at a birth. The collared peccary (*D. tajacu*, Linn., *torquatus*, Cuvier) ranges from the Red river of Arkansas through the forest districts of Central and South America as far as the Rio Negro of Patagonia. Generally it is found singly or in pairs, or at most in small herds of from eight to ten, and is a comparatively harmless creature, not being inclined to attack other animals or human beings. Its color is dark gray, with a white or whitish band passing across the chest from shoulder to shoulder. The length of the head and body is about thirty-six inches. The white-lipped peccary or warree (*D. labiatus*, Cuvier) is rather larger, being about forty inches in length, of a blackish color, with the lips and lower jaw white. Its range is less extensive; it is not found farther north than British Honduras or south of Paraguay. It is generally met with in large droves of from fifty to a hundred or more individuals, and is of a more pugnacious disposition than the former species, and capable of inflicting severe wounds with its sharp tusks. A hunter who encounters a herd of them in a forest has often to climb a tree as his only chance for safety. Both species are omnivor-

ous, living on roots, fallen fruits, worms, and carrion; and when they approach the neighbourhood of villages and cultivated lands they often inflict great devastation upon the crops of the inhabitants.

PECS. See FÜNFKIRCHEN.

PEDOMETER is an apparatus in the form of a watch, which, carried on the person of a traveller, indicates the number of paces made, and thereby approximately the distance traveled. The ordinary form has a dial-plate with chapters for yards and miles respectively, but in some, miles and their fractions only are indicated, while others are divided for kilometers, etc. The registration is effected by the fall of a heavy pendulum, caused by the percussion of each step. The pendulum is forced back to a horizontal position by a delicate spring, and with each stroke a fine-toothed ratchet-wheel attached to it is moved round a certain length. The ratchet communicates with a train of wheels which govern the dial-hands. In using the apparatus a measured mile or other known distance is walked, and the indication thereby made on the dial-plate observed.

PEDRO (PETER), the name borne by several sovereigns of Aragon, Castile, and Portugal. Three of them were contemporaries, and, to add to the confusion to which this has given rise, each of them was the son and successor of an Alphonso.

*Aragon.*—PEDRO IV., born in 1317, surnamed "the Ceremonious," succeeded his father Alfonso IV. in 1336, and died at Barcelona on January 5, 1387, and was succeeded by his son John I.

Three other kings of Aragon bore this name. PEDRO I. succeeded his father Sancho Ramirez on the throne of Aragon and Navarre in 1094, and died in 1104. The leading event of his reign was the conquest of Huesca (1096). PEDRO II., born in 1174, succeeded his father Alfonso II. in 1196. He was slain in the disastrous battle of Muret (September 12, 1213). PEDRO III., born in 1236, son of Jayme I. and grandson of Pedro II., succeeded to the crowns of Aragon, Catalonia, and Valencia in 1276. He died in 1285.

*Castile and Leon.*—PEDRO I., commonly surnamed "the Cruel," was born at Burgos on August 30, 1333. He was raised to the throne at Seville by his father's premature death before Gibraltar (March 20, 1350). He was killed in a struggle with his brother in 1369, after a life of debauchery during which he was held in utter detestation for his many vices and cruelties.

*Portugal.*—PEDRO I. born in 1320, was the son of Alfonso IV. and Beatrice of Castile, and in 1339 married Constance, daughter of the duke of Peñafiel and marquis of Villena. The story of his passion for Inez de Castro, of his supposed marriage with her, of her cruel murder in 1355, and of the exhumation and coronation of her dead body, has been told elsewhere (see CASTRO, INEZ DE). He succeeded to the throne in 1357, and died in 1367, after a peaceful and comparatively uneventful reign of ten years. (For other sovereigns bearing this name see BRAZIL and PORTUGAL.)

PEEBLES, a midland county of Scotland, is bounded north and northeast by Midlothian, east and southeast by Selkirk, south by Dumfries and west by Lanark. Its outline is somewhat irregular, the greatest length from north to south being about thirty miles, the greatest breadth about twenty, and the smallest about ten. The area is 226,899 acres, or about 355 square miles. From the fact that the county lies within the upper valley of the Tweed, it is sometimes known as Tweeddale. The surface consists of a succession of hills broken by the vale of the Tweed, which in some parts attains considerable breadth, and by the narrow valleys forming the courses of numerous "waters" and smaller streams. The highest summits are Broad Law (2,754

feet), Cramalt Craig (2,723 feet), and Dollar Law (2,680 feet).

The Tweed has its source in a small fountain named Tweed's Well at the base of a hill on the southwestern border called Tweed's Cross, from the farther side of which flow the Annan and the Clyde.

In the uplands the climate, though colder than that of the Lothians, is generally pure and dry, and remarkably healthy. The annual rainfall is about twenty-nine inches. As may be supposed from its hilly character, the country is pastoral rather than agricultural. Although the county has the advantage of convenient railway communication both by the North British and Caledonian systems, and possesses also abundant water-power, the only textile industries are the weaving of tweeds and shawls at Peebles and Innerleithen. The other manufactures are connected with the immediate wants of an agricultural population. The county includes sixteen parishes, and one royal burgh, the county town. Along with the neighboring county of Selkirk it forms a parliamentary county, which returns one member to parliament. In 1861 the population amounted to 11,408, in 1871 to 12,330, and in 1881 to 13,822, of whom 6,626 were males and 7,196 females. The county includes two towns, Peebles (3,495) and Innerleithen (2,313), and two villages, Walkerburn (1,026) and West Linton (434). The town population in 1881 numbered 5,808, the village 1,460, and the rural 6,554.

PEEBLES, the county town of Peebleshire, is finely situated at the junction of the Eddlestone Water and the Tweed, and on the North British and Caledonian Railways, twenty-two miles south of Edinburgh. The population of the royal burgh in 1881 was 2,609.

PEEKSKILL, a manufacturing village in Cortlandt township, Westchester county, N. Y., lies on the east bank of the Hudson, forty-three miles above New York city, with which it has communication by rail and (in summer) by river. Besides iron-smelting, it carries on the manufacture of railings, stoves, and fire-bricks. A church, dating from 1767, and the Van Cortlandt mansion are among its principal buildings. Incorporated in 1816, Peekskill had 6,560 inhabitants in 1870, and has now (1890) 9,676.

PEEL, SIR ROBERT, twice prime minister and for many years the leading statesman of England, was born February 5, 1788, in a cottage near Bury (Lancashire). He was a scion of that new aristocracy of wealth which sprang from the rapid progress of mechanical discovery and manufactures in the latter part of the eighteenth century. His grandfather, Robert Peel, first of Peel-fold, and afterward of Brookside, near Blackburn, was a calico-printer, who, appreciating the discovery of his townsman Hargreaves, took to cotton-spinning with the spinning-jenny and grew a wealthy man. His father, Robert Peel, third son of the last-named, carried on the same business at Bury with greater success, made a princely fortune, became the owner of Drayton Manor and member of parliament for the neighboring borough of Tamworth, was a trusted and honored, as well as ardent, supporter of Pitt, contributed toward the support of that leader's war policy, was rewarded with a baronetcy, and founded a rich and powerful house, on whose arms he emblazoned, and in whose motto he commemorated, the prosperous industry from which it sprang. The example and precepts of the father took early effect upon his eldest son, whom from the first he destined and prepared to serve his country in public life. At Harrow, according to the accounts of his contemporaries, Peel was a steady, industrious boy, the best scholar in the school. At Christ Church, where he entered as a gentleman commoner, he studied hard, and was the first who, under the new examination statutes, took a first class both in

classics and in mathematics. From his classical studies Robert Peel derived not only the classical, though somewhat pompous, character of his speeches and the Latin quotations with which they were often happily interspersed, but something of his lofty ideal of political ambition. Nor did he ever cease to love these pursuits of his youth; and in 1837, when elected lord rector of Glasgow university, in his inaugural speech he passed a glowing eulogy on classical education.

In 1809, being then in his twenty-second year, he was brought into parliament for the close borough of Cashel, which he afterward exchanged for Chippenham, and commenced his parliamentary career under the eye of his father, then member for Tamworth, who fondly saw in him the future leader of the Tory party. The Tory party was then all-powerful at home; while abroad Europe was at the feet of Napoleon. But Napoleon's fortune was about to turn; and, with the close of the struggle against revolutionary France, political progress in England was soon to resume the march which that struggle had arrested. Young Peel's lot, however, was cast, through his father, with the Tory party. He began official life as Lord Liverpool's private secretary, and shortly afterward, in 1811, was made under-secretary for the colonies by Perceval. In 1812 he was transferred by Lord Liverpool to the more important post of secretary for Ireland. There he was engaged till 1817 in maintaining, by insurrection Acts and other repressive measures, English and Protestant ascendancy over a country heaving with discontent, teeming with conspiracy, and ever ready to burst into rebellion. Peel became, by the necessity of his situation, "Orange Peel," and plied the established engines of coercion and patronage with a vigorous hand. His moderation of tone did not save him from the violent abuse of O'Connell, whom he, young, hot-tempered (though his temper was generally under control), and sensitive on the point of honor, was ill advised enough to challenge—an affair which covered them both with ridicule. In 1817 he obtained the highest parliamentary distinction of the Tory party by being elected member for the university of Oxford—an honor for which he was chosen in preference to Canning on account of his hostility to Catholic emancipation, Lord Eldon lending him his best support. In the following year he resigned the Irish secretaryship, of the odious work of which he had long been very weary, and remained out of office till 1822. But he still supported the ministers with official zeal, even in the question of the "Peterloo massacre." In the affair of Queen Caroline, however, he stood somewhat aloof, disapproving some steps taken by the government, and sensitive to popular opinion; and when Canning retired on account of this affair Peel declined Lord Liverpool's invitation to take the vacant place in the cabinet. During this break in his tenure of office he had some time for reflection, which there was enough in the aspect of the political world to move. At this period he was made chairman of the bullion committee on the death of Horner. He was chosen for this important office by Huskisson, Ricardo, and their fellow-economists, who saw in him a mind open to conviction. Peel was converted to the currency doctrines of the economists, and proclaimed his conversion in a great speech on May 24, 1819, in which he moved and carried four resolutions embodying the recommendations of the bullion committee in favor of a return to cash payments. This laid the foundation of his financial reputation, and his coöperation with the economists tended to give a liberal turn to his commercial principles.

In 1820 Peel married Julia, daughter of General Sir John Floyd, who bore him five sons and two daughters.



Three of his sons, Robert, Frederick, and Arthur, have followed him in holding parliamentary office, the youngest being now (1890) speaker of the House of Commons; while another, William, the sailor, has run a bright course in another sphere, and found a glorious grave.

In 1822 he became home secretary; and in that capacity he had again to undertake the office of coercing the growing discontent in Ireland, of which he remained the real administrator, and had again to lead in the House of Commons the opposition to the rising cause of Catholic emancipation. In 1825, being defeated on the Catholic question in the House of Commons, he wished to resign office, but Lord Liverpool pleaded that his resignation would break up the government. He found a more congenial task in reforming and humanizing the criminal law, especially those parts of it which relate to offenses against property and offenses punishable by death. The five Acts in which Peel accomplished this great work, the first step toward a complete and civilized code, as well as the great speech of March 9, 1826, in which he opened the subject to the House, will form one of the most solid and enduring monuments of his fame.

In 1827 the Liverpool ministry was broken up by the fatal illness of its chief, and under the new premier, George Canning, Peel, like the duke of Wellington and other high Tory members of Lord Liverpool's cabinet, refused to serve.

In January 1828, after Canning's death, the duke of Wellington formed a Tory government, in which Peel was home secretary and leader of the House of Commons. This cabinet, Tory as it was, did not include the impracticable Lord Eldon, and did include Huskisson and three more friends of Canning. Its policy was to endeavor to stave off the growing demand for organic change by administrative reform, and by lightening the burdens of the people. Peel also introduced into London the improved system of police which he had previously established with so much success in Ireland. But the tide ran too strong to be thus headed. First the government were compelled, after a defeat in the House of Commons, to acquiesce in the repeal of the Test and Corporation Acts, Peel bringing over their High Church supporters, as far as he could. Immediately afterward the question of Catholic emancipation was brought to a crisis by the menacing power of the Catholic Association and the election of O'Connell for the county of Clare. Peel expressed to the duke of Wellington his conviction that the Catholic question must be settled; and on March 5, 1829, Peel proposed Catholic emancipation in a speech of more than four hours, which was listened to with unflinching attention, and concluded amid cheers which were heard in Westminster Hall. The apostate was overwhelmed with obloquy. Having been elected for the university of Oxford as a leading opponent of the Catholics, he had thought it right to resign his seat on being converted to emancipation. His friends put him again in nomination, but he was defeated by Sir R. H. Inglis. He took refuge in the close borough of Westbury, whence he afterward removed to Tamworth, for which he sat till his death. This great concession did not save the Tory Government. The French Revolution of July, 1830, gave fresh strength to the movement against them, though, schooled by the past, they promptly recognized King Louis Philippe. The parliamentary reform movement was joined by some of their offended Protestant supporters. The duke of Wellington committed them fatally against all reform, first by cashiering Huskisson for voting in favor of giving the forfeited franchise of East Retford to Birmingham, and then by a violent anti-

reform declaration in the House of Lords. The elections went against them on the demise of the crown; they were compelled, by popular feeling, to put off the king's visit to the city; they were beaten on Sir H. Parnell's motion for a committee on the civil list, and resigned. While in office, Peel succeeded to the baronetcy, Drayton Manor, and a great estate by the death of his father May 3, 1830.

The ability and obstinacy of Sir Robert Peel's resistance to the Reform Bill won back for him the allegiance of his party. His opposition was resolute, but it was temperate. He refused to join the duke of Wellington in the desperate enterprise of forming a Tory Government at the height of the storm, when the Grey ministry had gone out on the refusal of the king to promise them an unlimited creation of peers. By this conduct he secured for his party the full benefit of the reaction which he no doubt knew was sure to ensue. He frankly accepted the Reform Act, stamped it as final, taught his party to register instead of despairing, appealed to the intelligence of the middle classes, whose new-born power he appreciated, steadily supported the Whig ministers against the Radicals and O'Connell, and gained every moral advantage which the most dignified and constitutional tactics could afford.

In 1834, on the dismissal of the Melbourne ministry, power came to Sir Robert Peel before he expected or desired it. He hurried from Rome at the call of the duke of Wellington, whose sagacious modesty knew his superior in politics and yielded him the first place, and became prime minister, holding the two offices of first lord of the treasury and chancellor of the exchequer. He was outvoted on the election of the speaker at the opening of the session of 1835, and, after struggling on for six weeks longer, was finally beaten, and resigned on the question of appropriating the surplus revenues of the church in Ireland to national education.

From 1835 to 1840 he pursued the same course of patient and far-sighted opposition, the end of which, sure though distant, was not only office but power. In 1837 the Conservative members of the House of Commons, with victory now in sight, gave their leader a grand banquet at Merchant Taylors' Hall, where he proclaimed in a great speech the creed and objects of his party. In 1839, the Whigs having resigned on the Jamaica Bill, he was called on to form a government, but failed, through the refusal of the queen, by advice of Lords John Russell and Palmerston, to part with the ladies of her bed-chamber, whom he deemed it necessary to replace by ladies not connected with his political opponents. His time was not even yet fully come. In 1840 he was hurried, it is believed by the ardor of his followers, into a premature motion of want of confidence, which was brought forward by Sir John Yarde Buller and failed. But in the following year a similar motion was carried by a majority of one, and the Whigs were compelled to appeal to the country. The result was a majority of ninety-one against them on a motion of want of confidence in the autumn of 1841, upon which they resigned, and Sir Robert Peel, becoming first lord of the treasury, with a commanding majority in both Houses of Parliament, the country in his favor, and many colleagues of the highest ability and distinction, grasped with no doubtful hold the reins of power.

The great financier took till the spring of 1842 to mature his plans. The result was, in place of a deficit of upward of two millions, a surplus of five millions in 1845, and the removal of seven millions and a half of taxes up to 1847, not only without loss, but with gain to the ordinary revenue of the country. In 1844 another great financial measure, the Bank Charter Act, was

passed and, though severely controverted and thrice suspended at a desperate crisis, has ever since regulated the currency of the country. In Ireland O'Connell's agitation for the repeal of the Union had now assumed threatening proportions, and verged upon rebellion, but the troubles here, as elsewhere, were minimized by Peel's wise policy. The weakest part of the conduct of this great government, perhaps, was its failure to control the railway mania by promptly laying down the lines on a government plan. Abroad it was as prosperous as at home.

Yet there was a canker in all this greatness. There were malcontents in Sir Robert Peel's party whose presence often caused embarrassment and twice collision and scandal. But the fatal question was protection. That question was being fast brought to a crisis by public opinion and the Anti-Corn-Law League. Sir Robert Peel had become in principle a free-trader. The approach of the Irish famine in 1845 decisively turned the wavering balance. The ports must be opened, and, being opened, they could not again be closed upon the same conditions. The Clare election and Catholic emancipation were played over again. Sir Robert proposed to his cabinet the repeal of the corn laws. Lord Stanley and the Duke of Buccleuch dissented, and Sir Robert resigned. But Lord John Russell failed to form a new government. Sir Robert again came into office; and now with the consent of all the cabinet but Lord Stanley, who retired, he in a great speech on January 27, 1846, brought the repeal of the corn laws before the House of Commons. In the long and fierce debate that ensued he was overwhelmed, both by political and by personal enemies, with the most virulent invective, which he bore with his wonted calmness, and to which he made no retorts. His measure was carried; but immediately afterward the offended protectionists, goaded by Lord George Bentinck and Disraeli, coalesced with the Whigs and threw him out on the Irish Coercion bill. He went home from his defeat, escorted by a great crowd, who uncovered as he passed, and he immediately resigned. So fell a Conservative Government which would otherwise have probably ended only with the life of its chief.

Though out of office he was not out of power. He had "lost a party, but won a nation." The Whig ministry which succeeded him leant much on his support, with which he never taxed them. In 1849, in a speech on the Irish Poor Laws, he first suggested, and in the next year he aided in establishing, a commission to facilitate the sale of estates in a hopeless state of encumbrance. The Encumbered Estates Act made no attempt, like later legislation, to secure by law the uncertain customary rights of Irish tenants, but it transferred the land from ruined landlords to solvent owners capable of performing the duties of property toward the people. On June 28, 1850, Sir Robert Peel made a great speech on the Greek question against Lord Palmerston's foreign policy of interference. This speech, being against the Government, was thought to show that he was ready to return to office. It was his last. On the following day he was thrown from his horse on Constitution Hill, and mortally injured by the fall. Three days he lingered in all the pain which the quick nerves of genius can endure. On the fourth (July 2, 1850), he took the sacrament, bade a calm farewell to his family and friends, and died; and a great sorrow fell on the whole land.

PEELE, GEORGE, was one of the group of university poets with whom Shakespeare entered into competition at the beginning of his career. It appears from a deposition made by him at Oxford that he was twenty-five years old in 1583. He took his bachelor's degree

at Oxford in 1577, and his master's degree two years afterward. He died in 1598.

PEERAGE. It was remarked in the article NOBILITY that the existence of the peerage, as that word is understood in the three British kingdoms, is something altogether peculiar to those kingdoms, and that it has actually hindered them from possessing a nobility of the Continental type. In its historical use it takes in all the members or possible members of the House of Lords and no other persons. But modern usage and modern decisions seem to limit the use of the name on one side, and to extend it on another. There is no kind of doubt that, according to the earliest precedents—precedents reaching up to the earliest official use of the word *peer*—the spiritual lords are equally peer with the temporal. But it has been held, at least from the seventeenth century, that the spiritual lords, though lords of parliament equally with the temporal lords, are not, like them, peers.

The special character of the British peerage, as distinguished from privileged orders in any other time or place, springs directly from the fact that the essence of the peerage is the hereditary right of a personal summons to parliament. To determine the origin of the peerage is thus to determine how a certain body of men came to possess this hereditary right of summons.

It has been said above that the holder of a peerage as defined is a lord of parliament *in esse* or *in posse*. It has become necessary during the present and last centuries to add these last words to the definition. For it is plain that, since the successive unions of England and Scotland and of Great Britain and Ireland, an hereditary peerage has not always in practice carried with it a seat in the House of Lords. For since those unions certain persons, namely those peers of Scotland and Ireland who are not representative peers and who do not hold peerages of England, of Great Britain, or of the United Kingdom, have been undoubted peers, they have enjoyed some or all of the personal privileges of peerage, but they have had no seats in the House of Lords. But this is a modern accident and anomaly. The persons spoken of held peerages which entitled their holders to seats in the parliaments of Scotland and Ireland as long as those parliaments were distinct bodies. And their present holders, if not members of the House of Lords *in esse*, are such *in posse*. They have a capacity for being chosen to seats in that House which is not shared by other persons. Their membership of the House is rather suspended than altogether taken away.

The use of the word peers ( *pares*) to denote the members of the House of Lords first appears in the fourteenth century, and it was fully established before the end of that century. The name seems to be rather a direct importation from France than anything of natural English or even Norman growth.

But the thing is more important than the name. Whatever view may be taken of the constitution of the ancient Witenagemót, we may safely assume that that assembly, with whatever change in its constitution, is personally continued in the House of Lords. That house consists of two classes of men who have never lost their right to a personal summons, together with certain other classes who have acquired that right in later times. Two classes of men, namely earls and bishops, have, with a certain interval in the seventeenth century, sat continuously in the councils of the nation from the earliest times. These two classes are those whose presence connects the earliest and the latest English assemblies. From the time when the House of Lords began to take anything like its present shape, other classes of men, spiritual and temporal, were sum-

moned as well as the bishops and earls, but not with the same regularity as they were. Some abbots were always summoned from the beginning, and a few other churchmen afterward obtained the same right. But, while every bishop—except in a few cases of personal enmity on the part of the king—was summoned as a matter of course, there was great irregularity in summoning of abbots. So some barons were always summoned as well as the earls; but, while every earl was—with a few such exceptions as in the case of the bishops—summoned as a matter of course, there was great irregularity in summoning the barons. The bishops and earls in short were personages too great to be left out; so were a few of the greatest abbots. Lesser men, spiritual or temporal, might be summoned or not according to a hundred reasons of convenience, caprice, or accident. But it is only the common tendency of things that the occasional summons should grow into the perpetual summons, and that the perpetual summons should, wherever it was possible, that is, in the case of the temporal lords, grow into the hereditary summons. In other words, the doctrine was gradually established that, when a man was once summoned, a right of summons was created for him and his heirs forever. The establishment of this doctrine called into being a new order of men, of lower rank than the bishops and earls but of equal parliamentary power, namely the class of barons having an hereditary right to seats in parliament. Presently, in the course of the fourteenth and fifteenth centuries, the ranks of the temporal peerage were increased by the invention of new orders, those of duke, marquess, and viscount, the two former classes taking precedence of the ancient earls.

The peerage of the temporal lords came to be looked on as something inherent in the blood, something which could not, like the official seat of the churchman, be resigned or lost by any means except by such legal processes as involved "corruption of blood." The parliamentary powers, the formal precedence, of the spiritual lords were not touched, but the idea silently grew that they were not the peers of the hereditary members of the House. In short, the doctrine grew that the temporal lords alone were peers, as alone having their blood "ennobled," which is the herald's way of saying that they held their seats by hereditary right. The extinction of so many temporal peerages in the Wars of the Roses, the creation of so many new peerages under the Tudors, while in one way they lowered the strength and dignity of the order, in another way helped more and more to mark it out a separate order, distinct from all others.

The growth of the hereditary doctrine pressed hardly, we must allow, on both bishops and judges. But its working on either of those classes has been of small moment indeed compared with the effect on the nation at large. There is no institution for which England has greater reason to be thankful than for her hereditary peerage; for, as we began by saying, it has saved her from the curse of a nobility. Or rather to speak more accurately, the growth of the peerage with its comparatively harmless privileges hindered the real nobility from keeping or winning privileges which would have been anything but harmless.

But, while the growth of the peerage thus hindered the growth of a nobility of which every gentleman should be a member, it was still possible that a real nobility might have grown up out of the peerage itself. That is to say, it might have come about that, while none but the descendants of peers were privileged, all the descendants of peers should be privileged. A nobility might thus have been formed, much smaller than a nobility taking in all lawful bearers of coat-ar-

mor, but still a nobility by no means small. But in England no such nobility has ever grown up. No one has any substantial privilege except the peer himself. No one in short is noble but the peer himself. Even in common speech, though we speak of a noble family, we do not personally apply the word *noble* to any other member of that family, unless, in the case of the higher ranks of the peerage, to a few immediate descendants of the peer. In short, while the blood of the peer is said to be ennobled, it is ennobled with a nobility so high and rare that it cannot pass to more than one at a time even of his own descendants. The oldest son of a duke is legally a commoner; the children of his youngest sons are not only legally but socially undistinguishable from other commoners. That is to say, the hereditary possession of the peer is not nobility at all in the sense which that word bears in other lands. It is a fiction to say that the peer's blood is ennobled, when the inheritors of his blood are not inheritors of his nobility. In short, as there is no nobility outside the families whose heads are peers, neither is there any real nobility within those families. It was then in this way that the peerage, growing out of the hereditary summons to parliament, hindered the growth of any nobility outside the families of peers and by the same means hindered the growth of any real nobility within their families.

PEGASUS, a famous horse of Greek fable, was said to have sprung from the trunk of the Gorgon Medusa when her head was cut off by Perseus. Bellerophon caught him as he drank of the spring Peirene on the Acrocorinthus at Corinth, or (according to another version) received him tamed and bridled at the hands of Athene. Mounted on Pegasus, Bellerophon slew the Chimæra and overcame the Solymi and the Amazons, but when he tried to fly to heaven on his back the horse threw him and continued his heavenward course. Arrived in heaven, Pegasus served Zeus, fetching for him his thunder and lightning. Hence some have thought that Pegasus is a symbol of the thunder-cloud. In later legend he is the horse of Eos, the Morning Pindar and later poets represent him as winged. From his connection with Hippocrene Pegasus has come to be regarded as the horse of the Muses and hence as a symbol of poetry. But this is a modern attribute of Pegasus, not known to the ancients, and dating only from the *Orlando Innamorato* of the Italian poet Boiardo.

PEGU, a division of British Burmah, comprising the districts of Rangoon, Hanthawaddy, Tharawadi, and Prome, has an area of 9,159 square miles, with a population (in 1881) of 1,162,393.

PEGU, an ancient town in the Rangoon district of British Burmah, is situated on the Pegu river, twenty miles west of the Tsit-toung.

PEHLEVI. See PAHLAVÍ.

PEIRCE, BENJAMIN, mathematician and astronomer, was born at Salem, Mass., April 4, 1809. Graduating at Harvard College in 1829, he became mathematical tutor there in 1831 and professor in 1833. After Bowditch's death in 1838 Peirce stood at the head of American mathematicians; but the first work that gave him a wider fame was his computation of the general perturbations of Uranus and Neptune. In 1849 he became consulting astronomer to the American Nautical Almanac, and for this work he prepared new tables of the moon (1852). Another piece of important astronomical work was his discussion of the equilibrium of Saturn's ring, in which he showed that a fluid ring was necessarily unstable as well as a solid one. From 1867 to 1874 he was superintendent of the coast survey; in 1857 he published his largest and most characteristic work, the *System of Analytical Mechanics*. He him-

self, however, seems to have thought most of his *Linear Associative Algebra*. His death took place at Cambridge, on October 6, 1880.

PEKIN, a city of Illinois, capital of Tazewell county, is located on the left bank of the Illinois river, 160 miles southwest of Chicago, fifty-six miles north of Springfield, and a dozen miles below Peoria. It is a prominent railroad center, being the terminus of the Wabash railroad by which it is connected with Decatur, and is an important station on the Chicago and St. Louis; the Ohio, Indiana and Western; Peoria, Decatur and Evansville, and Peoria, Pekin and Union roads, all of which have made large and costly improvements, including depots, warehouses, etc., and add greatly to the amount of business annually transacted there. The city has 9 churches, 2 national banks, 1 daily and 3 weekly papers, 5 hotels, a courthouse and jail, a high school and several school buildings for subordinate grades, electric light works, and a large number of stores. It also contains foundries and machine shops, cigar manufactories, hominy mills, saw mills, sash, door and blind factories, carriage factories and farming implement manufactories, also distilleries, etc. Large invoices of high-wines, grain, and other products are shipped to Pekin, thence to the south and southwest by rail and river, and to other points in the United States. The present population of the city (1890), is 8,000.

PEKING or PEKIN, the capital of the Chinese empire, stands on the northern extremity of the great alluvial delta which extends southward from its walls for 700 miles. For the last nine centuries Peking, under various names and under the dominion of successive dynasties, has, with some short intervals, remained an imperial city.

During different periods the extent and boundaries of the city varied considerably. Under the Kin dynasty the walls extended to the southwest of the Tartar portion of the present city, and the foundations of the northern ramparts of the Khan-balik of Kublai Khan are still to be traced at a distance of about two miles in a northerly direction beyond the existing walls. The modern city consists of two parts, the *nui ch'ing*, or inner city, commonly known to foreigners as the "Tartar city," and the *wai ch'ing*, or outer city, known in the same way as the "Chinese city." These names are somewhat misleading, as the inner city is not inclosed within the outer city, but adjoins its northern wall, which, being longer than the *nui ch'ing* is wide, outflanks it considerably at both ends. The outer walls of the double city contain an area of about twenty-five square miles, and measure thirty miles in circumference. Unlike the walls of most Chinese cities, those of Peking are kept in perfect order. Those of the Tartar portion, which is the oldest part of the city, are fifty feet high, with a width of sixty feet at the base and forty feet at the top, while those of the Chinese city which were built by the emperor Kea-tsing in 1543, measure thirty feet in height, and have a width of twenty-five feet at the base and fifteen feet at the top.

The population of Peking is reckoned to be about 1,000,000, a number which is out of all proportion to the immense area inclosed within its walls. This disparity is partly accounted for by the facts that large spaces, notably in the Chinese city, are not built over, and that the grounds surrounding the imperial palace, private residences, and temples are very extensive.

Viewed from the wall Pekin looks like a city of gardens. Few crowded neighborhoods are visible, and a characteristic feature is the many-patterned roofs of temples, palaces, and mansions, with their blue, green, and yellow tiles scattered among the groves of trees. Among

the striking features of the city are the Drum and Bell towers. The great bell is one of the largest in existence, weighs 120,000 pounds, is fourteen feet high, thirty-four feet in circumference, and nine inches thick. It is struck by a wooden beam, and only at night.

The Purple or "Forbidden city," the central portion of which forms the Imperial Palace, is in the southern division of Pekin. Its halls are probably not to be surpassed anywhere in the magnificence of their proportions and the barbaric splendor of their adornment. It was this beautiful palace, known as the "Summer Palace," that was looted by the French troops in 1860. Just outside the "Forbidden city" is the Temple of Heaven, where every year the emperor offers a sacrifice to the god, Shangkti. The altars of the sun and moon and those of the earth and agriculture are situated in the Chinese city. Next to these in religious importance comes the temple of Confucius. In the southeastern portion of the Tartar city is the observatory built by the order of Kublha Khan in 1296. The streets are wide, but not paved, and are impassable, by reason of mud, in wet weather, and covered with dust in summer. The city has no manufactories, and thus trade is very small. It is essentially the seat of the government and home of the emperor, and aside from its architectural features and antiquarian associations, calls for little comment.

Its situation near the northern frontier recommended it to the Tartar invaders as a convenient center for their power, and its peculiarly fortunate position inclined the Chinese dynasty to accept it as the seat of their force. In the year 986 it was taken by an invading force of Tartars, who named it "Nanking."

PELAGIA, ST. An Antiochene saint of this name, a virgin of fifteen years, who chose death by a leap from the housetop rather than dishonor, is mentioned by Ambrose, and is the subject of two sermons by Chrysostom.

PELAGIUS. Of the origin of Pelagius almost nothing is known. He seems to have been one of the earliest, if not the very earliest, of that remarkable series of men who issued from the monasteries of Scotland and Ireland and carried back to the Continent in a purified form the religion they had received from it. Coming to Rome in the beginning of the fifth century (his earliest known writing is of date 405), he found a scandalously low tone of morality prevalent. From his extant *Commentaries on the Epistles of St. Paul* it may be gathered that men were encouraged to rely on a profession of the Christian creed, and on the magical efficacy of the sacraments, while they entirely neglected to cultivate a Christian character. This state of things Pelagius denounced.

The peculiar tenets of Pelagius, though indicated in the commentaries which he published at Rome previous to 409, might not so speedily have attracted attention had they not been adopted by Cœlestius, a much younger and bolder man than his teacher. When Rome was sacked by the Goths (410) the two friends crossed to Africa. There Pelagius once or twice met with Augustine, but very shortly sailed for Palestine.

An imperial edict was issued at Ravenna April 30, 418, peremptorily determining the theological question and enacting that only Pelagius and Cœlestius but all who accept their opinions shall suffer confiscation of goods and irrevocable banishment. The date of his death is uncertain.

PELAGIUS I., pope from 555 to 560, was a Roman by birth, and first appears in history at Constantinople in the rank of deacon, and as apocrisiarius of Pope Silverius, whose overthrow in favor of Vigilius his intrigues promoted. Pelagius died on March 3, 560, and was succeeded by John III.

PELAGIUS II., a native of Rome, but of Gothic descent, was pope from 578 to 590, having been consecrated successor to Benedict I., without awaiting the sanction of the emperor, on November 27th of the former year. He died in January, 590, and was succeeded by Gregory I.

PELARGONIUM. See GERANIUM.

PELASGI. See GREECE and ITALY.

PELEW ISLANDS, a group in the western Pacific, which is often considered part of the Caroline Archipelago. The name *Islas Palaos*, by which the islands are first designated, is of doubtful but certainly not of native origin, and was originally applied by the Spaniards in an indefinite way to all the islands east of Mindanao (Philippines). The English form "Pelew" may be a corruption either of Palao or of Pelelin (*Pellelew*), the proper name of one of the southern islands.

PELHAM, HENRY, prime minister of England, was the younger brother of Thomas Holles Pelham, duke of Newcastle, and was born in 1696. Through strong family influence and the recommendation of Walpole he was chosen in 1721 a lord of the treasury. The following year he was returned for Sussex county. In 1724 he entered the cabinet as secretary of war, but this office he exchanged in 1730 for the more lucrative one of paymaster of the forces. He became prime minister in 1743. He died March 6, 1754.

PELIAS, PELIADES. Pelias, a celebrated character in Greek fable, was the son of Poseidon and Tyro, daughter of Salmoneus.

The tragic death of Pelias was the subject of Sophocles' drama *Rhizotomoi* (Root-cutters), and in the *Tyro* he treated another portion of legend. *Peliades* was the name of Euripides' first play.

PELICAN, a large fish-eating water-fowl, remarkable for the enormous pouch formed by the extensible skin between the lower jaws of its long, and apparently formidable but in reality very weak, bill. The ordinary Pelican, the *Onocrotalus* of the ancients, to whom it was well known, and the *Pelecanus onocrotalus* of ornithologists, is a very abundant bird in some districts of South-eastern Europe, South-western Asia, and North-eastern Africa, occasionally straying, it is believed, into the northern parts of Germany and France; but the possibility of such wanderers having escaped from confinement is always to be regarded, since few zoological gardens are without examples which are often in the finest condition. Its usual haunts are the shallow margins of the larger lakes and rivers, where fishes are plentiful, since it requires for its sustenance a vast supply of them, pursuing them under water, and rising to the surface to swallow those that it has captured in its capacious pouch. The nest is formed among the reeds that border the waters it frequents, placed on the ground and lined with grass. Therein two eggs, with white, chalky shells, are commonly laid. The young during the first twelvemonth are of a grayish-brown, but this dress is slowly superseded by the growth of white feathers, until when mature almost the whole plumage, except the black primaries, is white, deeply suffused by a rich blush of rose or salmon-color, passing into yellow on the crest and lower part of the neck in front. A second and somewhat larger species, *Pelecanus crispus*, also inhabits Europe, but in smaller numbers. North America has one, *P. erythrorhynchus*, very similar to *P. onocrotalus* both in appearance and in habits, but remarkable for a triangular, compressed, horny excrescence which is developed on the ridge of the male's bill in the breeding season, and falls off without leaving trace of its existence when that is over. Australia has *P. conspicillatus*, easily distinguished by

its black tail and wing-coverts. Of more marine habit are *P. philippensis* and *P. fuscus*, the former having a wide range in Southern Asia, and, it is said, reaching Madagascar, and the latter common on the coasts of the warmer parts of both North and South America.

PELIGNI. See ITALY.

PÉLISSIER, JEAN JACQUES AMABLE, duke of Malakhoff, marshal of France, was born November 6, 1794 at Maromme (Seine Inférieure). He served as aid-de-camp in the Spanish campaign of 1823, and in the expedition to the Morea in 1828-29, at the conclusion of which he received the grand cross. In 1830 he took part in an expedition to Algeria, and on his return was promoted to the rank of major. Nine years later he was again sent to Algeria. On the declaration of war with Russia Péliissier was sent to the Crimea, where on May 16, 1855 he succeeded Marshal Canrobert as commander-in-chief of the French forces before Sebastopol. After the capture of the fortress he was, on September 12th, promoted to be marshal. On his return to Paris he was named senator, created duke of Malakhoff (July 22, 1856), and rewarded with a grant of 100,000 francs per annum. From March 1858 to May 1859 he acted as French ambassador in London, whence he was recalled to take command of the army of observation on the Rhine. In 1860 he was appointed governor-general of Algeria; and he died there May 22, 1864.

PELL, JOHN, mathematician, was born on March 1, 1610, at Southwick, in Sussex, England. He died in 1685.

PELLA. See MACEDONIA.

PELLAGRA (Ital. *pelle agra*, smarting skin) is the name given, from one of its early symptoms, to a peculiar disease, of comparatively modern origin, occurring among the peasantry in Lombardy and other provinces of northern Italy, and in the Asturias (*mal de la rosa*), Gascony, Roumania, and Corfu. It is a progressive disease of nutrition tending toward profound paralytic and mental disorders, and is associated to a very significant extent, if not even invariably, with a staple diet of damaged maize, along with other peculiarly wretched and hopeless conditions of living.

The indications of pellagra usually begin in the spring of the year, declining toward autumn, and recurring with increasing intensity and permanence in the spring seasons following. A peasant who is acquiring the malady feels unfit for work, suffers from headaches, giddiness, singing in the ears, a burning of the skin, especially in the hands and feet, and diarrhoea. At the same time a red rash appears on the skin, of the nature of erysipelas, the red or livid spots being tense and painful, especially where they are directly exposed to the sun. About July or August of the first season these symptoms disappear, the spots on the skin remaining rough and dry. The spring attack of the year following will probably be more severe and more likely to leave traces behind it; with each successive year the patient becomes more like a mummy, his skin shriveled and sallow, or even black at certain spots, as in Addison's disease, his angles protruding, his muscles wasted, his movements slow and languid, and his sensibility diminished. Meanwhile there are more special symptoms relating to the nervous system, including drooping of the eyelid, dilatation of the pupil, and other disorders of vision, together with symptoms relating to the digestive system, such as a red and dry tongue, a burning feeling in the mouth, pain on swallowing, and diarrhoea. A large number of pellagrous peasants end their days in lunatic asylums in a state of driveling wretchedness or raving madness; many more drag out a miserable existence in the communes where their

working years had been spent, sometimes receiving the communal relief to which the law entitles them; while the cases that are reckoned curable are in Italy received into the various endowed hospitals, of which there are a large number. Cases that are rapidly fatal end in delirium or a state of typhoid stupor; the more protracted cases are cut off at last by rapid wasting, colliquative and ill-smelling sweats, profuse diarrhoea and dropsy.

There is hardly any doubt as to the remedy for pelagra, just as there is hardly any doubt as to its cause. The question is mainly one of the social condition of the peasantry, of their food and wages; it is partly, also, a question of growing Indian corn on a soil or in a climate where it will not mature unless with high farming. There is nothing in the resources of medicine proper to cure this disease; as the cause is, so must the remedy be.

PELLICANUS, CONRAD, one of the most interesting minor figures in German theology and scholarship in the great age of the Reformation, was born at Ruffach in Alsace in the winter of 1478. He died in 1556.

PELLICO, SILVIO, Italian dramatist, was born at Saluzzo in Piedmont on June 24, 1788. He died January 31, 1854, and was buried in the Campo Santo at Turin. His writings, whether in prose or verse, are chaste and graceful, but defective in virility and breadth of thought, and his tragedies display neither the insight into character nor the constructive power of a great dramatist.

PELOPIDAS, a distinguished Greek general, who, in conjunction with Epaminondas, raised his native city Thebes to a pitch of power such as she never attained to before or afterward. He was the son of Hippoclus and member of an illustrious Theban family. The large property to which he succeeded in his youth, and which he seems to have increased by a brilliant marriage, was liberally employed by him in the relief of the destitute. When he could not persuade his friend Epaminondas to share his wealth, he imitated that great man in the stern simplicity and frugality of his life and in his cheerful endurance of hardships. Their friendship continued unbroken till death. In 364 the Thessalian towns appealed to Pelopidas for help against their old enemy Alexander of Pheræ. Disregarding an ominous eclipse of the sun, Pelopidas pushed on with a handful of troops, leaving the main body to follow. At the heights of Cynoscephalæ, near Pharsalus, he came up with the tyrant Alexander at the head of a much superior force. The valor of Pelopidas secured another victory, but it was his last—catching sight of his hated foe he rushed on him single-handed and fell covered with wounds. His friend did not long survive him. He too was to die fighting his country's battles in a foreign land. The preëminence of Thebes was the work of these two men alone, and with them it passed away.

PELOPONNESUS. See GREECE.

PELOPS, a hero of Greek mythology, was the grandson of Zeus, son of Tantalus and Dione, and brother of Niobe. His father's home was on Mount Sipylus in Asia Minor, whence Pelops is spoken of as a Lydian or a Phrygian, or even as a Paphlagonian. Tantalus was a friend and companion of the gods, and one day he served up to them his own son boiled and cut in pieces. The gods detected the crime, and none of them would partake except Demeter (according to others Thetis), who, distracted by the loss of her daughter Persephone, ate of the shoulder. The gods restored Pelops to life, and the shoulder consumed by Demeter was replaced by one of ivory. Wherefore the

descendants of Pelops had a white mark on their shoulder ever after.

PELOUZE. THÉOPHILE JULES, French chemist, was born on February 26, 1807, at Valognes in Normandy. He was appointed in 1831 professor of chemistry at the École Polytechnique and at the Collège de France, in 1833 assayer to the mint, and in 1848 president of the Mint Commission. In 1850 he succeeded Gay-Lussac as chemical adviser to the glass-works of St. Gobain. He was elected a member of the Institute of France in 1837. He died, after a short illness, on May 31, 1867.

PELTIER, JEAN CHARLES ATHANASE, was originally a watchmaker, but retired from business about the age of thirty, and devoted himself to experimental and observational science. He was born at Ham (Somme) in February, 1785; his death took place at Paris in October, 1845. His great experimental discovery was the heating or *cooling* of the junctions in a heterogeneous circuit of metals according to the direction in which an electric current is made to pass round the circuit (1834).

PELUSIUM, an ancient city of Egypt, at the mouth of the most easterly (Pelusiac) branch of the Nile, was the key of the land toward Syria and a strong fortress, which, from the Persian invasion at least, played a great part in wars between Egypt and the East. It has not, however, been satisfactorily identified with any place mentioned in the hieroglyphic monuments.

PEMBERTON, an urban sanitary district of Lancashire, England, situated on the Lancashire and Yorkshire Railway, two and a half miles west from Wigan. The population of the urban sanitary district (area 2,894 acres) in 1871 was 10,374, and in 1881 it was 13,762.

PEMBROKE, the most westerly county of South Wales, lies to the west of the counties of Cardigan and Carmarthen, and is bounded on three sides by the ocean—on the south by Bristol Channel, on the west by St. George's Channel, and on the north by Cardigan Bay. Its length from Strumble Head to St. Gowan's Head is about thirty miles, and its average breadth a little over twenty. The area is 393,682 acres, or about 615 square miles.

Flannels are woven in various towns and are the principal textile manufacture of the county; there are also rope and sail works, and hat-making is practiced.

The county includes seven hundreds; the municipal boroughs of Haverfordwest (6,398), Pembroke (14,156) and Tenby (4,750), and part (2,058) of the municipal borough of Cardigan, the remainder of which is in Cardiganshire. In addition to Haverfordwest, Pembroke and Tenby, there are four other market towns—Fishguard (2,009), Milford (3,812), Narberth (2,334) and Newport (1,504). From 56,280 in 1801 the population had increased in 1821 to 74,009, in 1851 to 94,140, but in 1871 it had diminished to 91,998, and in 1881 to 91,824, of whom 43,449 were males and 48,375 females.

PEMBROKE, a municipal and parliamentary borough of South Wales, is picturesquely situated on an elevated ridge at the head of Pennar Mouth Creek, on the south side. The population of the parliamentary borough (area, 6,298 acres) in 1881 was 16,339.

PEMPHIGUS. See SKIN, DISEASES OF.

PEN, an instrument for writing or for forming lines with an ink or other colored fluid. The English word, as well as its equivalents in French (*plume*) and in German (*Feder*), originally means a wing-feather, but in ancient times the implements used for producing written characters were not quills. The earliest writing implement was probably the stylus, a pointed bodkin of metal, bone, or ivory, which, however, was only used

for producing incised or engraved letters. The calamus or arundo, the hollow tubular stalk of grasses growing in marshy lands, was the true ancient representative of the modern pen; hollow joints of bamboo were similarly employed. The use of such pens can be traced to a remote antiquity among the civilized nations of the East, where reeds and canes are to this day in common use as writing instruments.

The quills, formerly in exclusive use, and still largely employed among Western communities as writing instruments, are obtained principally from the wings of the goose. Swan-quills are also highly prized, and for special purposes crow-quills and the wing-feathers of certain other birds are adopted.

Metallic pens, though perhaps not altogether unknown even in classical times, did not come into use till the present century, and indeed did not become common till near the middle of the century.

Fountain pens and penholders in which considerable reservoirs of ink could be carried ready for use were introduced by a patented invention of the ingenious Joseph Bramah. A highly original and comparatively successful form of fountain pen of recent introduction is known as the stylograph, in which the ordinary form of nib is dispensed with, and connected with the barrel or reservoir is a finely-tapered point tipped with iridium pierced with a fine aperture. Into the aperture is fitted an iridium needle or plug attached internally to a delicate gold spring, and the act of writing sufficiently pushes back the needle to allow the escape of the requisite flow of ink by the aperture.

The metal used in the manufacture of the common steel pen consists of rolled sheets of cast steel of the finest quality, made from Swedish charcoal iron. These sheets are cut into strips of suitable width, annealed in a muffle furnace, and pickled in a bath of dilute sulphuric acid to remove the oxidized scale from the surface. The strips so cleaned are next rolled between steel rollers till they are reduced to ribbons the thickness of the pens to be made. At this stage the raw material is ready for the series of manufacturing operations, most of which are performed with the aid of hand fly-presses, moving suitable cutting, stamping and embossing attachments. The pen blanks are first cut out of the ribbon so as to leave as little scrap as possible. These blanks are next pierced, that is, the central perforation and the side or shoulder slits by which flexibility is secured are made at one operation. After again annealing, they are marked and embossed with maker's name, trade-mark, or any of the endless variety of marks by which pens are distinguished from each other. Up to this point the blanks are flat; they are now raised or rounded into the semi-cylindrical form in which pens are used. At this stage the pens are tempered by heating in iron boxes in a muffle, plunging in oil, and heating over a fire in a rotating cylindrical vessel till their surfaces attain the dull blue color characteristic of spring steel elasticity. They are then scoured and polished by being revolved in large tin cylinders, in which they are mixed with sand, pounded crucibles, or such substances. The grinding of the points next follows, an operation performed by small rapidly revolving emery-wheels, on which the points are first ground lengthwise and then across the nib, the object of the process being to increase the elasticity of the point. The slitting process which follows—that is, the cutting of the pen-slit from the perforation to the point—is effected with a chisel-cutter worked by a hand screw-press. On the precision with which the slit divides the point depends the perfection of the pen, to finish which it now only remains to color the surface in a revolving cylinder over a charcoal fire, and to varnish it in a solution of shellac.

**PENANCE.** The word "penance" (*pœnitentia*) has a double signification—its strict legal meaning of a penalty inflicted by the formal sentence of a spiritual authority in punishment of an offense, and with the primary object of amending and so benefiting the offender; and its wider and more popular sense of any ascetic practice adopted, whether voluntarily or under compulsion, for the expiation of sin or for advance in spiritual attainment. Broadly speaking, no trace of such a theory is visible in classical paganism, from which the idea of sin as a moral defilement is almost absent. There are faint marks discernible in the Greek heroic legends of something analogous to penance, when we read of a hero being driven into exile for some crime (most usually unpremeditated homicide), and not permitted to return till he had found some one able and willing to purify him with certain lustral sacrifices. The Oriental religions, contrariwise, teem with the ascetic principle, and personal austerities form a large part of the Zoroastrian, Buddhist and Brahman systems. Islam had originally nothing even remotely like the practices in question, save in so far as the annual fast of Ramadan and the hajj to Mecca and other sacred places necessitated self-denial; and it is even on record that Mohammed himself directly discouraged an ascetic spirit which displayed itself in some of his trustiest companions and disciples, such as 'Omar, 'Alí, Abú-Dharr, and Abú-Horeirah. Nor has the principle of penance ever formed an important integer of the Jewish religion. The Levitical code enjoins the performance of various lustral sacrifices in expiation of certain sins; but the cost of the victims is the only element of penalty, being virtually a money fine on the offender.

The Christian theory of penance ultimately rests on the view that the Christian church is the precise analogue of the Jewish people under the elder dispensation. As the Jews were the one family on earth in direct covenant with God, so that it became necessary for all Gentiles who desired to be brought into the like relation to abandon their own proper nationality and to become Jews by adoption, forsaking their former habits and associations together with their creed; and as various offenses against the law of Moses were punished with temporary or final exclusion from fellowship in the Hebrew polity; so was it from a very early period in the Christian church. One marked difference between the Rabbinical and the Christian discipline is indeed visible from the first, that the former involved the suspension or deprivation of civil rights, whereas the latter, in all the earlier centuries at any rate, was a purely spiritual penalty. And, as it soon came to be accepted that the inward sorrow for sin would be attended with an outward token of that sorrow, involving pain or humiliation in some form or other, there are four distinct stages in the ecclesiastical use of the word "pœnitentia"—first, as denoting the change of mind due to sorrow for sin; next, the external penalty attached to each offense; thirdly, the discipline of the church in dealing with all spiritual offenses; and lastly, any piece of austerity practiced with a religious motive; and the fact of the Latin language having no doublets like the English "penitence" and "penance" to express the distinct though allied ideas of the mental attitude and the outward action has powerfully conditioned Latin theology and practice.

There is naturally but little to be found in the New Testament on the subject of discipline; but the whole principle is provided for and anticipated in one saying of Christ—that which directs that he who neglects to hear the church as arbiter in a dispute shall be regarded as a heathen and a publican, and which goes on to confer upon the apostles the power of binding and

loosing (Matt. xviii. 17, 18)—words which they, with their Jewish experience and associations, must needs have interpreted as authorizing, and even enjoining, the infliction of penalties, and notably that of excommunication, upon members of the new society. The penalties seem at first to have been very simple and lenient, leaving out of account the difficult problem of the phrase “delivering to Satan,” twice found in this connection, which may mean merely relegating to heathen fellowship by exclusion from the society of Christians, but may also cover much more ground.

The main difference between the earlier and later systems lies in the fact that penance was for some centuries restricted to certain very grave sins, to wit, idolatry, adultery, and murder, with such lesser offenses as were closely allied (as, for instance, the delivery of the sacred books to pagan inquisitors, that *traditio* which has given the words “treason” and “traitor” to modern diction); nor does it appear that any distinction was made between the treatment of those penitents whose guilt was notorious and those whose own voluntary confession alone made it manifest. Minor offenses were punished with suspension of communion and with refusal of oblations at the hands of the offender, and many were left wholly to the individual conscience. But the catalogue of canonical offenses was much enlarged at the time when the penitential system was developed and codified— theft, usury, false witness, polygamy, habitual drunkenness, and some others being included among those which had to be publicly expiated. Yet it was this increased severity which led to the almost total abrogation of public penance, because of the scandal given by the publication of the offenses on the new list, whereas the cases under the older rule were necessarily few, however serious.

It is time to speak of the position occupied by penance in the theological systems of the Latin and Greek Churches. Both of them account penance, taken in its widest sense of the method of dealing spiritually with sins by confession, discipline and absolution, as a sacrament, but there are various differences in their theories and methods. The Greek and Armenian Churches are in full agreement with the Latin Church in regarding confession as an integral and essential part of penance, of which they consider it the outward and visible sign, while the spiritual part of the sacrament consists in the form of absolution, whether precatory or declaratory, pronounced by the priest. And they lay down that the external acts of asceticism performed by the penitent are not strictly part of the sacrament itself, but merely the fulfillment of the church's injunctions, and tokens of that repentance which should attend the confession of sins. And confession, though recommended as a religious observance, is not a matter of formal ecclesiastical precept in the Eastern Church, but is left to the individual conscience, though it is usual to practice it at least once a year, prior to the Easter communion. There are also certain public penances sometimes enjoined in the East for sins of exceptional gravity, publicly or legally proved, but they do not form part of the normal system, one part of which, in strict agreement with ancient usage, consists in suspending heinous offenders from communion for some years, during which they can receive only the blessed bread. And in all cases the Easterns deny that penances are in any sense satisfactions or expiations of sins made to appease Divine justice.

PENANG. See PRINCE OF WALES ISLAND.

PENARTH, a seaport of Glamorganshire, Wales, is picturesquely situated on rising ground on the south side of the mouth of the Taff opposite Cardiff, from which it is four miles distant by rail and two by steamer.

PENATES, Roman gods of the store-room and kitchen, derived their name from *penus*, “eatables, food.” The store-room over which they presided was, in old times, beside the *atrium*, the room which served as kitchen, parlor and bedroom in one; but in later times the store-room was in the back part of the house. It was sanctified by the presence of the Penates, and none but pure and chaste persons might enter into it, just as with the Hindus the kitchen is sacred and inviolable. The family hearth, which anciently stood in the *atrium*, was their altar; on it were placed their images, two in number, for the Penates were always in pairs—the name does not occur in the singular. They had no individual names, but were always known under the general designation Penates. Closely associated with the Penates were the Lares, another species of domestic deities, who seem to have been the deified spirits of deceased ancestors (see LARES). But, while each family had two Penates, it had but one Lar. In the household shrine the image of the Lar (dressed in a toga) was placed between the two images of the Penates, which were represented as dancing and elevating a drinking-horn in token of joy and plenty. The three images together were sometimes called Penates, sometimes Lares, and either name was used metaphorically for “home.”

PENCIL (Lat. *penicillus*, small tail), a name originally applied to a small fine-pointed brush used in painting, and still employed to denote the finer camel's-hair and sable brushes used by artists, has, in English, come commonly to signify solid cones or rods of various materials used for writing and drawing. Some method of producing black or colored markings with rods of solid material on parchment, paper, wood and other like smooth surfaces must have been known from time immemorial, but the ordinary so-called black-lead pencil does not possess a very high antiquity. It has been asserted that a manuscript of Theophilus, attributed to the thirteenth century, shows signs of having been ruled with a black-lead pencil; but the first distinct allusion to the common form of the instrument occurs in the treatise on fossils by Conrad Gesner of Zurich (1565), who describes an article for writing formed of wood and a piece of lead, or, as he believed, an artificial composition called by some *stimmi anglicanum* (English antimony).

M. L. Leman, of New York, was the pioneer in the manufacture of lead pencils in the United States in 1830. In 1849 Eberhard Faber came to New York as the agent of A. W. Faber, of Stein, Germany, and in 1881, the centennial of the house, it was determined to establish the industry in America. This was really the start of the pencil industry in this country.

The pencil leads consist of a most intimate mixture of graphite and clay, both first brought to a condition of the finest subdivision. The graphite is reduced to fine powder in a mortar; it is sifted and sometimes treated with mineral acid, to free it from iron, etc., then washed, and thereafter calcined at a bright-red heat. To get it in the condition of fine division, it is mixed with water and poured into a vat, where the heavier particles sink. From this vat the water bearing the lighter particles passes into another at a lower level, and so into one or two more, in each of which the comparatively heavy particles sink, and only the still finer particles are carried over. That which sinks in the last of the series is in a condition of extremely fine division, and is used for pencils of the highest quality. The clay, which must be free of sand and iron, is treated in the same manner and brought to a state of great uniformity and smoothness. Clay and graphite so prepared are mixed in varying proportions from about



equal parts to two of clay for one of graphite according as the pencils are to be hard or soft. They are thoroughly incorporated and ground together, then placed in bags and squeezed in a hydraulic press till they have the consistency of stiff dough, in which condition they are ready for forming pencil rods. For this purpose the plastic mass is placed in a strong upright cylinder of brass, into which a plunger or piston works, moved by a powerful screw-press. The bottom of the cylinder consists of a thick bronze plate having in it a number of small apertures the section and size of the leads to be made. By the application of pressure to the plunger the graphite mixture is squeezed in continuous threads through the holes, and these threads are received and arranged in straight continuous lengths on a board, on which they are left to dry for some hours. For further drying by gentle heat they are placed in straight grooves in a grooved board, covered with another board, in which position they harden to stiff rods. These are afterward cut into lengths for pencils, which are packed with charcoal in a covered crucible and submitted to a high furnace-heat. The two elements which regulate the comparative hardness and blackness of pencils are the proportions of graphite and clay in the leads and the heat to which they are raised in the crucible. According as the proportion of graphite is greater and the heat lower the pencil is softer and of deeper black streak.

The cedar in which pencils are cased is cut into sets of rectangular slips of unequal thickness; but so that a thick and a thin slip put together form in section a square. In the thick or body piece is formed the groove or depression to receive the lead, which perfectly fits and fills it. The thinner covering piece is glued on and the pencil rounded between revolving cutters working at great speed. The cutters leave the rounded surface perfectly smooth, and it only remains to stamp the finished pencil with name and grade, etc.

Black pencils of an inferior quality are made from the dust of graphite melted up with sulphur and run into molds. Such, with a little tallow added to give them softness, are the pencils commonly used by carpenters. Colored pencils consist of a mixture of clay, with appropriate mineral coloring matter, wax, and tallow, treated by the method of making lead pencils. In the indelible and copying pencils which have come into use in recent years, the coloring matter is an aniline preparation mixed with clay and gum. The mixture not only makes a streak which adheres to the paper, but, when the writing is moistened with water, it dissolves and assumes the appearance and properties of an ink.

PENDULUM. See CLOCKS. MECHANICS.

PENELOPE, the faithful wife of the Greek hero Odysseus (Ulysses), immortalized by Homer in the *Odyssey*. She was the daughter of the Spartan Icarus and Peribœa. Shortly before Odysseus left his native island of Ithaca to war against Troy, Penelope bore him a son, Telemachus. When her husband tarried long many chieftains of Ithaca and the islands round about wooed her to wife; they behaved wantonly, wasting the substance of Odysseus, insulting his son, and corrupting the maidservants. The heart of Penelope yearned for Odysseus, and, to rid herself of the importunities of the wooers, she bade them wait till she had woven a winding-sheet for old Laertes, the father of Odysseus. But every night she undid the piece which she had woven by day, so that the web was always unfinished. This she did for three years, till her maids revealed the secret to the wooers. Robbed of her pretext for delay she was in sore straits, till she was relieved by the arrival of Odysseus after an absence of

twenty years. He slew the wooers, and the long-parted husband and wife were united once more.

PENGUIN, the name (of very uncertain origin) of a flightless sea-bird, but, so far as is known, first given to one inhabiting the seas of Newfoundland, as in Hore's "Voyage to Cape Breton," 1536, which subsequently became known as the Great Auk or GAREFOWL; and, though the French equivalent *pingouin* preserves its old application, at the present day, the word penguin is by English ornithologists always used in a general sense for certain birds inhabiting the Southern Ocean, called by the French *Manchots*, the *Spheniscidæ* of ornithologists, which in some respects form perhaps the most singular group of the whole Class, or at least we may say of the Carinate Subclass. The most conspicuous outward character presented by the Penguins is the total want of quills in their wings, which are as incapable of flexure as the flippers of a Cetacean, though they move freely at the shoulder-joint, and some at least of the species occasionally make use of them for progressing on land. In the water they are most efficient paddles, and are usually, if not always, worked alternately with a rotatory action. The plumage which clothes the whole body, leaving no bare spaces, generally consists of small scale-like feathers, many of them consisting only of a simple shaft without the development of barbs; but several of the species have the head decorated with long cirrhous tufts, and in some the tail-quills, which are very numerous, are also long. In standing these birds preserve an upright position, generally resting on the "tarsus" alone, but in walking or running on land this is kept nearly vertical, and their weight is supported by the toes alone.

PENINSULAR CAMPAIGN. The year 1861, the first year of the war between the States, had proven barren of results advantageous to the Union forces. In the fall of that year George B. McClellan was made commander-in-chief of the Federal army as successor to General Scott, retired. During the winter McClellan organized the Army of the Potomac, which in March, 1862, was composed of 180,000 men, divided into four corps. Opposed to this force and menacing the security of Washington was an army of 75,000 Confederate troops under the command of Gen. Joseph E. Johnston. While preparing to inaugurate a campaign having for its objects the raising of the blockade of the Potomac river, the re-opening of communication between Washington and the west (then obstructed at Harper's Ferry) and, finally, the capture of Richmond, capital of the Confederate States, McClellan was directed by the President to open the Baltimore and Ohio road, also to destroy the batteries the Confederates had planted on the banks of the Potomac. While McClellan was occupied in executing that part of the order having reference to the Baltimore and Ohio road, Johnston abandoned the Potomac for the Rapidan, and deprived McClellan's plans of the promise they held out at their inception. The latter, thereupon, selected Fortress Monroe as a base of operations, and formulated a campaign to be conducted in territory bounded by Fortress Monroe, the upper Chickahominy, the James, York and Pamunkey rivers, consisting of the Peninsula proper with a stretch of land extending above Richmond. On March 17, 1862, a portion of McClellan's army rendezvoused at Alexandria to embark for the field of operations.

His removal as commander-in-chief was directed, and the Potomac army reduced to 120,000, the balance of the 180,000 soldiers enlisted under his command being retained at Washington for the defense of that city. On April 6th, following, an army of 119,965 men, with forty-

four batteries of artillery, were assembled at Fortress Monroe, ready for active service, and McClellan had commenced his march up the Peninsula. On the 5th of the same month he arrived opposite Yorktown. The left wing of his army, however, delayed at Warwick's creek, a small stream along which for ten miles or more was Magruder's line of defense. The latter with an army of 11,000 men refused to retire before McClellan's advance, and concluding that his antagonist had been reinforced McClellan determined to postpone an attack until the arrival of McDowell's corps. He was soon after advised that McDowell's three divisions had been withdrawn from immediate service, and that Wool and 15,000 men at Fortress Monroe were to constitute an independent command. To add to the perplexities of the situation, the naval force that was expected to operate on York river was diverted from that purpose on the plea that the *Virginia* demanded close watching. However April 16th witnessed the commencement of active hostilities, but after repeated attempts to capture Yorktown McClellan decided to besiege it. This policy was continued until May 5th, when preparations to bombard the place were concluded. It was discovered that the city as also York river, was evacuated and abandoned. The Confederate army began its retreat to Richmond, pursued by McClellan on land, while Franklin's division of McDowell's corps was ordered to be landed at White House, on the Pamunkey river, east of Richmond.

At Williamsburg, on the west shore of the peninsula, the Confederates had constructed a series of fortifications, at this time defended by Longstreet's corps. Upon the arrival there of the Union forces, Hooker attacked the enemy's right, and a fierce engagement followed. The battle was prolonged and bloody, and Hooker was falling back when Kearney came to his relief. Late in the afternoon, Hancock attacked the enemy's left. He was opposed by Early's brigade, which was, however, put to flight, and hostilities were suspended. During the same night McClellan arrived on the scene, but in the morning when preparations for resuming the battle were making, it was discovered that the enemy had evacuated their defenses and recommenced their retreat to Richmond, a movement pursued and concluded without interruption.

The Army of the Potomac was hurried to White House, where Franklin arrived May 7th, and where McClellan established his depots and by May 21st had his army in *echelon* along the left bank of the Chickahominy. The confederate forces meanwhile were concentrating at Richmond. The destruction of the *Merrimac* and the opening of the James river to the Union forces strengthened McClellan in his purpose of transferring his base to the James and coöperating with Admiral Goldsborough in an attack upon Richmond from the south. The center and right wing of his army remained on the Chickahominy, but as he was about to transfer the remainder of his forces at Bottoms Bridge the authorities at Washington became alarmed at the threatened attitude of Jackson in the valley, countermanded the order theretofore issued to McDowell's corps to join McClellan with 41,000 men and caused an abandonment of the proposed plan. On May 31st General Johnston attacked the Union forces at Fair Oaks and was himself so severely wounded as to compel his temporary retirement from the field. He was succeeded by Gen. Robert E. Lee, who thereafter until the surrender of the confederate army at Appomattox was chief in command.

During the month of June unpropitious weather prevented the continuance of active hostilities. The only incidents of importance were the raids of General Stuart

around the Union lines and on the railroad and White House. About June 25th, news was conveyed to McClellan that Jackson was threatening his rear, and that A. P. Hill, Longstreet and D. H. Hill, were about to effect a junction with the first named, and attack the Union right. Jackson was delayed, but Longstreet and the Hills united their forces and the Battle of Mechanicsville was fought with disastrous results to the Confederates. McClellan now abandoned the north bank of the Chickahominy, and by stationing the divisions of McCall and Porter at Cold Harbor, sought the protection of the railroad by which his army supplies were being carried from White House to the James. On June 27th, was fought the battle of Gaines' Mill. The action began about two o'clock in the afternoon, and the Confederates were defeated. At four o'clock Jackson came into the field, and forming a junction with D. H. Hill and Longstreet, made an attack along the entire Union line. The line yielded at every point, but the timely arrival of French and Meagher's brigades saved the day.

That night the Union forces crossed the river and on the night of June 28th were in motion, with Lee in pursuit. The next morning they were reunited, and the same afternoon while the larger portion was pursuing its way to Malvern Hill by way of White Oak swamp, Sumner's corps repulsed Magruder at Savage's Station. It now became Lee's apparent purpose to attack McClellan's army at its center and defeat it in detail. With this object in view White Oak Swamp was flanked by Longstreet, who hurried forward and forming a junction with A. P. Hill, fought the battle of Frazier's Farm. During that night, the Union army was massed at Malvern Hill, and on the afternoon of July 1st it was attacked by the Confederates. A desperate battle followed, the Confederate force sustaining a fearful loss; the bloody contest raged until darkness brought it to a close. During the same night the Union army was withdrawn to Harrison Landing and the Peninsular campaign passed into history.

The leaders of the opposing forces in this campaign, as also the campaign itself, have been made the subject of critical comment by historians, writers, and speakers for the past quarter of a century. While admitting that McClellan's knowledge of the art of war, of the planning of campaigns and the marshaling of an army was without a superior, the claim is urged that his indecision at critical points, when he should have "imitated the actions of the tiger," lost him opportunities that men differently constituted, though less brilliant than he, would have taken advantage of, and personally profited by. Critics also insist that he was guilty of special errors in the conduct and management of the campaign. And while such have been some of the remarks heard respecting his career as a commander, the universal verdict has been that his retreat to Harrison's Landing was one of the most remarkable achievements of the war.

The losses entailed by the seven days' battles were in round numbers—Union side, 16,000; Confederate side, 20,000. These figures include the killed and wounded and missing.

PENN, WILLIAM, the Quaker, was the son of Admiral William Penn and Margaret Jasper, a Dutch lady, and was born at Tower Hill, London, on October 14, 1644. During his father's absence at sea he lived at Wanstead in Essex, and went to school at Chigwell close by, in which places he was brought under strong Puritan influences.

Until the outbreak of the plague Penn was a student of Lincoln's Inn. For a few days also he served on the staff of his father—now great captain commander—

and was by him sent back in April, 1665, to Charles with dispatches. Returning after the naval victory off Lowestoft in June, Admiral Penn found that, probably from the effect upon his mind of the awful visitation of the plague, his son had become settled in seriousness and Quakerism.

He was sent to Ireland, and on September 3, 1667, he attended a meeting of Quakers in Cork, at which he assisted to expel a soldier who had disturbed the meeting. He was in consequence, with others present, sent to prison by the magistrates. From prison he wrote to Lord Orery, the president of Munster, a letter, in which he first publicly made a claim for perfect freedom of conscience. He was immediately released and at once returned to his father in London, with the distinctive marks of Quakerism strong upon him. Penn now became a minister of the denomination, and at once entered upon controversy and authorship.

His first public discussion was with Thomas Vincent, a London Presbyterian minister, who had reflected on the "damnable" doctrines of the Quakers. In this he appears to have acted as second to George Whitehead. The imputations upon his opinions and good citizenship, made as well by dissenters as by the church, he repelled in *Innocency with her Open Face*. It was now, too, that he published the most important of his books, *No Cross, no Crown*.

An informal reconciliation now took place with his father, who had been impeached through the jealousy of Rupert and Monk (in April, 1668), and whose conduct in the operations of 1665 he had publicly vindicated; and Penn was again sent on family business to Ireland. He returned to London in 1670, and was immediately involved in fresh trouble. Having found the usual place of meeting in Gracechurch Street closed by soldiers, Penn, as a protest, preached to the people in the open street. With William Mead he was at once arrested and indicted at the Old Bailey on September 1st for preaching to an unlawful, seditious, and riotous assembly, which had met together with force and arms.

In the beginning of 1671 Penn was again arrested for preaching in Wheeler Street meeting-house by Sir J. Robinson, the lieutenant of the Tower, formerly lord mayor, and known as a brutal and bigoted churchman. During this imprisonment Penn wrote several works, the most important being *The Great Case of Liberty of Conscience* (February, 1671), a noble defense of complete toleration. Upon his release he started upon a missionary journey through Holland and Germany.

Upon his return home in the spring of 1672 Penn married Gulielma Springett. To this year, 1672, belong the *Treatise on Oaths* and *England's Present Interest Considered*. In the year 1673 Penn was still more active. He secured the release of George Fox, addressed the Quakers in Holland and Germany, carried on public controversies with Hicks, a Baptist, and Faldo, an Independent, and published his treatise on the *Christian Quaker and his Divine Testimony Vindicated*, the *Discourse of the General Rule of Faith and Practice, Reasons against Railing* (in answer to Hicks), *Counterfeit Christianity detected*, and a *Just Rebuke to One-and-twenty Learned Divines* (an answer to Faldo and to *Quakerism no Christianity*). His last public controversy was in 1675 with Richard Baxter, in which, of course, each party claimed the victory. During this year his active sympathies were enlisted on behalf of imprisoned Quakers at Aberdeen. At this point Penn's connection with America begins.

The province of New Jersey, comprising the country between the Hudson and Delaware rivers on the east and west, had been granted in March, 1663-64, by Charles II. to his brother; James in turn had, in June

of the same year, leased it to Lord Berkeley and Sir G. Carteret in equal shares. By a deed, dated March 18, 1673-74, John Fenwick, a Quaker, bought one of the shares, that of Lord Berkeley (Stoughton erroneously says Carteret's) in trust for Edward Byllinge, also a Friend, for \$5,000. This sale was confirmed by James, after the second Dutch war, on August 6, 1680. Disputes having arisen between Fenwick and Byllinge, Penn acted as arbitrator; and then, Byllinge being in money difficulties, and compelled to sell his interest in order to satisfy his creditors, Penn was added, at their request, to two of themselves, as trustee. The disputes were settled by Fenwick receiving ten out of the 100 parts into which the province was divided, with a considerable sum of money, the remaining ninety parts being afterward put up for sale. Fenwick sold his ten parts to two other Friends, Eldridge and Warner, who thus, with Penn and the other two, became masters of West Jersey, West New Jersey, or New West Jersey, as it was indifferently called. The five proprietors appointed three commissioners, with instructions dated from London, August 6, 1676, to settle disputes with Fenwick (who had bought fresh land from the Indians, upon which Salem was built, Penn being himself one of the settlers there) and to purchase new territories, to survey and divide them, and to build a town—New Beverley, or Burlington, being the result. For the new colony Penn drew up a constitution, under the title of "Concessions," which he himself thus describes: "There we lay a foundation for after ages to understand their liberty as men and Christians, that they may not be brought in bondage but by their own consent; for we put the power in the people." The greatest care is taken to make this constitution "as near as may be conveniently to the primitive, ancient, and fundamental laws of the nation of England." But a democratic element is introduced, and the new principle of perfect religious freedom—"that no men, nor numbers of men upon earth, hath power or authority to rule over men's consciences in religious matters"—stands in the first place. Such a constitution, which is in marked contrast with Locke's aristocratic one for Carolina, settled eight years previously, soon attracted large numbers of Quakers to West Jersey.

It was shortly before these occurrences that Penn inherited through his wife the estate of Worthinghurst in Sussex, whither he removed from Rickmansworth. He now (July 25, 1677), undertook a second missionary journey to the Continent along with George Fox, Robert Barclay, and George Keith. Of this journey a full account, published seventeen years later, will be found in his selected works.

In 1678 the Popish Terror came to a head, and to calm and guide Friends in the prevailing excitement Penn wrote his *Epistle to the Children of Light in this Generation*. A far more important publication was *An Address to Protestants of all Persuasions*, by William Penn, Protestant, in 1679. This was succeeded, at the general election which followed the dissolution of the pensionary parliament, by an important political manifesto, *England's Great Interest in the Choice of this New Parliament*. Next came *One Project for the Good of England*, perhaps the most pungent of all his political writings. But he was not merely active with his pen. Encouraged by his success in the New Jersey provinces, he again turned his thoughts to America. In repayment of the debt mentioned above Penn now asked from the crown, at a council held on June 24, 1680, for "a tract of land in America north of Maryland, bounded on the east by the Delaware, on the west limited as Maryland [*i.e.*, by New Jersey], northward as far as plantable;" this latter limit Penn explained to be "three

degrees northward." This formed a tract 300 miles by 160, of extreme fertility, mineral wealth, and richness of all kinds. Disputes with James, and with Lord Baltimore, who had rights over Maryland, delayed the matter until March 24, 1681, when the grant received the royal signature, and Penn was made master of the province of Pennsylvania. His own account of the name is that he suggested "Sylvania," that the king added the "Penn" in honor of his father, and that, although he strenuously objected and even tried to bribe the secretaries, he could not get the name altered. It should be added that early in 1682 Carteret, grandson of the original proprietor, transferred his rights in East Jersey to Penn and eleven associates, who soon afterward conveyed one-half of their interest to the earl of Perth and eleven others. It is uncertain to what extent Penn retained his interest in West and East Jersey, and when it ceased. The two provinces were united under one government in 1699; and Penn was a proprietor in 1700. In 1702 the government of New Jersey was surrendered to the crown.

By the charter for Pennsylvania Penn was made proprietary of the province. He was supreme governor; he had the power of making laws with the advice, assent, and approbation of the freemen, of appointing officers, and of granting pardons. The laws were to contain nothing contrary to English law, with a saving to the crown and the English council in case of appeals. Parliament was to be supreme in all questions of trade and commerce; the right to levy taxes and customs was reserved to England; an agent to represent Penn was to reside in London; neglect on the part of Penn was to lead to the passing of the government to the crown (which event actually took place in 1692); no correspondence might be carried on with countries at war with Great Britain. A clause added at the last moment illustrates curiously both the strength and the jealousy of the Anglican Church at the time. The importunity of the bishop of London extorted the right to appoint Anglican ministers, should twenty members of the colony desire it, thus securing the very thing which Penn was anxious to avoid—the recognition of the principle of an establishment.

Having appointed Colonel Markham, his cousin, as deputy, and having in October sent out three commissioners to manage affairs until his arrival, Penn proceeded to draw up proposals to adventurers, with an account of the resources of the colony. He negotiated, too, with James and Lord Baltimore with the view, ultimately successful, of freeing the mouth of the Delaware, wrote to the Indians in conciliatory terms, and encouraged the formation of companies to work the infant colony in both England and Germany, especially the "Free Society of Traders in Pennsylvania," to whom he sold 20,000 acres, absolutely refusing, however, to grant any monopolies. In July he drew up a body of "conditions and concessions." This constitution, savoring strongly of Harrington's *Oceana*, was framed in consultation with Sidney, though to what extent is doubtful. The inferences drawn by Hephworth Dixon from a single letter of Penn to Sidney, given at length by Stoughton, are quite unjustifiable. This sketch of a constitution was democratical in the purest sense. Until the council of seventy-two (chosen by universal suffrage every three years, twenty-four retiring each year) and the assembly (chosen annually) were duly elected, a body of provisional laws was added.

It was in the midst of this extreme activity that Penn was made a Fellow of the Royal Society. Leaving his family behind him, Penn sailed with a hundred comrades from Deal in the *Welcome* on September 1, 1682.

His *Last Farewell to England* and his letter to his wife and children contain a beautiful expression of his pious and manly nature. He landed at Newcastle on the Delaware on October 27th, his company having lost one-third of their number by smallpox during the voyage. After receiving formal possession, and having visited New York, Penn ascended the Delaware to the Swedish settlement of Upland, to which he gave the name of Chester. The assembly at once met, and on December 7th passed the "Great Law of Pennsylvania." The idea which underlies this law is that Pennsylvania was to be a Christian state on a Quaker model. Only one condition was made necessary for office or citizenship, viz., Christianity. The constitution was purely democratic; all offices, for example, are elective. In many other provisions Penn showed himself far in advance of his time, but in none so much as where the penalty of death was abolished for all offenses except murder. Lawsuits were to be superseded by arbitration, always a favorite idea with Penn. Philadelphia was now founded, and within two years contained 300 houses and a population of 2,500. At the same time an act was passed, uniting under the same government the territories which had been granted by feoffment by James in 1682. His connection with the Indians was one of the most successful parts of his management, and he gained at once and retained through life their intense affection. At his death they sent to his widow a message of sorrow for the loss of their "brother Onas," with some choice skins to form a cloak which might protect her "while passing through the thorny wilderness without her guide."

Penn now wrote an account of Pennsylvania from his own observation for the "Free Society of Traders," in which he showed considerable power of artistic description.

Tales of violent persecution of the Quakers, and the necessity of settling disputes which had arisen with Lord Baltimore, his neighbor in Maryland, carried Penn back to England (October 2, 1684), after an absence of two years. Within five months after his arrival in England Charles II. died, and Penn found himself at once in a position of great influence. His close connection with James, dating from the death of his father, was rendered doubly strong by the fact that, from different causes, each was sincerely anxious to establish complete liberty of conscience.

In 1686, when making a third missionary journey to Holland and Germany, Penn was charged by James with an informal mission to the prince of Orange to endeavor to gain his assent to the removal of religious tests. In 1687 James published the Declaration of Indulgence, and Penn probably drew up the address of thanks on the part of the Quakers.

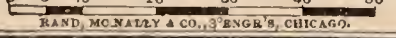
At the Revolution he behaved with courage. He was one of the few friends of the king who remained in London, and, when twice summoned before the council, spoke boldly in his behalf. He admitted that James had asked him to come to him in France; but at the same time he asserted his perfect loyalty. During the absence of William, in 1690, he was proclaimed by Mary as a dangerous person, but no evidence of treason was forthcoming. It was now that he lost by death two of his dearest friends, Robert Barclay and George Fox. In 1691, again on Fuller's evidence, a proclamation was issued for the arrest of Penn and two others as being concerned in Preston's plot. He might, on the intercession of Locke, have obtained a pardon, but refused to do so. He appears to have especially felt the suspicions that fell upon him from the members of his own body. In 1692 he began to write again, both on questions of Quaker discipline and in defense of the sect.





**W. VIRGINIA**

Scale of Statute Miles.



RAND, McNALLY & CO., ENGINEERS, CHICAGO.

Longitude West from Washington. Longitude East from Washington.

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*Just Measures in an Epistle of Peace and Love, The New Athenians* (in reply to the attacks of the *Athenian Mercury*), and *A Key opening the Way to every Capacity* are the principal publications of this year.

Meantime matters had been going badly in Pennsylvania. No sooner had Penn by a skillful compromise settled matters than the colony was torn by the religious schism caused by George Keith. On October 21, 1692, an order of council was issued depriving Penn of the governorship of Pennsylvania, and giving it to Colonel Fletcher, the governor of New York. To this blow were added the illness of his wife and fresh accusation of treasonable correspondence with James.

In 1694 (February 23d) his wife Gulielma died, leaving two sons, Springett and William, and a daughter, Letitia, afterward married to William Aubrey. Two other daughters, Mary and Hannah, died in infancy. He consoled himself by writing his *Account of the Rise and Progress of the People called Quakers*. In March, 1696, he formed a second marriage, with Hannah Callowhill, his son Springett dying five weeks later. In this year he wrote his work *On Primitive Christianity*, in which he argues that the faith and practice of the Friends were those of the early church. In 1697 Penn removed to Bristol, and during the greater part of 1698 was preaching with great success against oppression in Ireland, whither he had gone to look after the property at Shannangarry. In 1699 he was back in Pennsylvania, landing near Chester on November 30th.

Affairs now again demanded his presence in England. The king had, in 1701, written to urge upon the Pennsylvania Government a union with other private colonies for defense, and had asked for money for fortifications. The difficulty felt by the crown in this matter was a natural one. A bill was brought into the Lords to convert private into crown colonies. The accession of Anne appears to have put an end to the bill in the Lords, and to Penn's troubles on this score. He once more assumed the position of leader of the Dissenters, and himself read the address of thanks for the promise from the throne to maintain the Act of Toleration. He now took up his abode again at Kensington, and published, while here, his *More Fruits of Solitude*.

In 1703 he went to Knightsbridge, where he remained until 1706, when he removed to Brentford, his final residence being taken up, in 1710, at Field Ruscombe, near Twyford. In 1704 he wrote his *Life of Bulstrode Whitelocke*. He had now much trouble from America. Moreover, pecuniary troubles came heavily upon him, while the conduct of his son William, who became the ringleader of all the dissolute characters in Philadelphia, was another and still more severe trial. Difficulties with his government of Pennsylvania continued to harass him. Fresh disputes took place with Lord Baltimore, the owner of Maryland, and Penn also felt deeply what seemed to him the ungrateful treatment which he met with at the hands of the assembly. He therefore, in 1710, wrote, in earnest and affectionate language, an address to his "old friends," setting forth his wrongs. So great was the effect which this produced that the assembly which met in October of that year was entirely in his interests. Penn now, in February, 1712, being in failing health, proposed to surrender his powers to the crown. Before, however, the matter could go further he was seized with apoplectic fits, which shattered his understanding and memory. A second attack occurred in 1713, and from that time until his death his powers gradually failed, although at times his intellect was clear and vigorous. He died May 30, 1718, leaving three sons by his second wife, John, Thomas, and Richard, and was buried along with his first and second wives at Jourdan's meeting-house,

near Chalfont St. Giles, in Buckinghamshire. It has finally to be mentioned that in 1790 the proprietary rights of Penn's descendants were bought up for a pension of £4,000 (\$20,000) a year to the eldest male descendant by his second wife, and that this pension was commuted in 1884 for the sum of \$335,000.

PENNANT, THOMAS, naturalist and antiquary, was descended from an old Welsh family, who for many generations had resided at Downing, Flintshire, where he was born June 14, 1726. He died in 1798.

PENNI, GIANFRANCESCO (born in 1488, died in 1528), Italian painter, surnamed "Il Fattore," from the relation in which he stood to Raphael, whose favorite disciple he was after Giulio Romano, was a native of Florence, but spent the latter years of his life in Naples. He painted in oil as well as in fresco, but is chiefly known for his work in the Loggie of the Vatican.

PENNSYLVANIA, one of the original thirteen States of the North American Union, is 160 miles wide, and more than 300 miles long from east to west. Its northern, southern, and western border-lines were meant to be straight; the eastern follows the course of the Delaware river. It is bounded by the States of New York and New Jersey on the north and east, by Ohio on the west, and by Delaware, Maryland, and West Virginia on the south. Its surface, subdivided into sixty-seven counties, measures nearly 28,800,000 acres or 45,000 square miles; less than one-half of its acreage is in cultivated farms, and only 1,000,000 of the people live in separate farmhouses. Out of a population of 4,283,000, nearly 2,000,000 lived in towns and cities in 1880, and more than 2,000,000 in country hamlets or factory villages, at iron mines and furnaces, at coal-mines and coke-ovens, at lumber-camps and oil-wells, or along the many lines of canal and railroad which traverse the State in all directions.

In physical features Pennsylvania is topographically divisible into three parts—a southeast district, the open country between the South Mountains and the sea; a middle belt of parallel valleys separated by low parallel mountain-ridges; and a northern and western upland, behind the escarpment of the Alleghany Mountains. One and a half millions of its people inhabit the fertile and highly-cultivated southeastern triangle, which is nowhere more than 600 or 700 feet above the level of the sea. One million inhabit the middle belt of higher-lying valleys, rich in iron ore and anthracite coal. One and a half millions occupy the great bituminous coal and oil regions of the northern and western counties, elevated from 1,000 to 2,500 feet above the sea, which constitute at least one-half of the State, and drain, not eastward into the Atlantic, but northward into the St. Lawrence and westward into the Mississippi.

The valleys of the middle belt are of two characters, distinguished by the farming population of the Atlantic States as "rich valleys" and "poor valleys." The former, whether large or small, are completely inclosed and comparatively level areas of limestone land, surrounded by rocky and wooded barriers. Their entire limestone floor has been under cultivation for a century, and the best iron-ore deposits of the State and its oldest mines are situated in them. They are gardens of fertility, yielding heavy crops of wheat, rye, and maize; innumerable caverns ramify beneath the surface; sink-holes receive the drainage of the fields; many of the watercourses appear and disappear beneath sunken arches of limestone; and wells are the chief source of supply. Old orchards and great planted trees abound, and more picturesque landscapes cannot be found. Nittany, the largest of these isolated valleys, occupies the center of the State. Sinking Spring valley is at its

southwestern end, and here it is traversed by the Little Juniata river, along the banks of which runs the Pennsylvania Railroad. A narrow valley, called Canoe valley, leads southward into Morrison's cove, which is half as large as Nittany valley. The next largest limestone valley is Kishicoquilis, forty miles long by five miles wide, ending southward in a point, and split at its north-east end into three. Farther south is McConnell's cove, west of this Friend's cove, and still farther west Millikin's cove. Two little oval holes in the mountains northeast of Nittany valley, Nippenose valley and Oval valley, and two long slit-like depressions in Tuscarora and Black Log mountains conclude the short list of these remarkable limestone thrashing-floors of Pennsylvania.

The eight counties which lie along the face of the South Mountains, in the southeastern region of the State, are in the highest state of cultivation. The region as a whole is divisible into at least four districts, differing as much in population as in soil and situation. The counties of York and Adams, lying west of the Susquehanna river, along the Maryland line, are inhabited by Germans. The counties of Montgomery and Bucks, lying between the Schuylkill and Delaware rivers, have a mingled population of the descendants of Germans, Quakers, and French Huguenots. The hilly district of northern Chester is also partly German. Southern Lancaster, southern Chester, and Delaware counties support a population largely composed of the descendants of Penn's colonists. The district which they inhabit is a veritable fairyland, and its principal town, Westchester, has been for a long time one of the notable centers of scientific life in the State.

The climate of so great a State is necessarily various in character, and is made more variable by its situation on the eastern side of the continent, facing the Gulf Stream. The northwest wind is dry and cold in winter, the southwest wind always mild and rainy, and the southeast ocean wind wet and sultry in summer; but the northeasters of New England lose much of their rigor by the time they reach the Delaware. The northern highlands of the State are buried under four or five feet of snow four months of the year. The southern middle counties enjoy genial weather the whole year round, interrupted only by a few short intervals of intense heat or cold, never lasting more than three consecutive days. The midland valleys are very hot in midsummer and very cold in midwinter, the thermometer ranging between 0° and 100°, with a not infrequent sudden fall after a sultry week of 30° or 40° in a few hours, ending with thunder-storms, and followed by dry, clear, cool weather, with winds from the northwest. The climate of the southwestern counties is comparatively dry and equable, but with a sufficient annual rainfall, and plenty of snow in winter, productive of good river floods in spring. The average annual rainfall ranges from 36 inches in the western counties to 42 inches at Philadelphia.

For unknown geological reasons Pennsylvania is peculiar for exhibiting the Palæozoic system in its maximum development, that is, from the Permian formation down to the base of Murchison's Lower Silurian, with a total thickness of more than 40,000 feet at the eastern outcrops, diminishing to half that amount in the western counties. Near Harrisburg, at Pottsville, and at Mauch Chunk the Carboniferous, Devonian, and Upper Silurian rocks, standing vertical, show a cross section five miles thick. At the Delaware and Lehigh water-gaps the Lower Silurian slates are 6,000 feet thick. In Canoe valley the underlying Lower Silurian limestones have been measured 6,500 feet thick. In the southwestern corner of the State about 1,000 feet of Permian rocks overlie the Coal-measures proper.

The mineral resources of Pennsylvania have never been exaggerated except by those who compare its iron-mines with those of other States. But Pennsylvania has the advantage over other States of a first plant, in both iron-works and coal-mines, and in a consequent multiplication and concentration of capital for these industries, which must keep her *facile princeps* in this respect for a long time to come.

The coal-fields of Pennsylvania are divided into seven anthracite and eight bituminous coal districts, and the productions for the year 1888 were as follows:

## ANTHRACITE.

No. of District.	No. of tons mined.
1.....	9,881,878.06
2.....	5,455,537.51
3.....	8,684,493.00
4.....	4,892,514.00
5.....	4,962,331.00
6.....	4,710,014.54
7.....	2,658,803.00
Total.....	41,225,571.11

## BITUMINOUS.

No. of District.	No. of tons mined.
1.....	2,313,957
2.....	6,228,117
3.....	1,893,845
4.....	4,632,043
5.....	5,240,941
6.....	3,265,596
7.....	4,683,981
8.....	5,513,866
Total.....	33,772,346

The number of working collieries in the anthracite region, that year, was 606, and 591 in the bituminous region, and a total of 177,606 men were employed in both districts during the same period.

The iron industry of Pennsylvania has always competed with the cotton growth of the southern States and the cotton industry of the eastern States for political power in Congress, to save itself against a foreign importation of rolled iron. The ironmasters of Pennsylvania have led in every debate upon a protective tariff. Pennsylvania has always furnished one-half of the total amount of pig-iron cast in the United States. In 1885 it made 2,445,496 tons, out of a total of 4,529,869 tons made in twenty-six States and one Territory. Of these 1,235,248 tons were anthracite pig, 1,198,100 coke and raw coal pig, and only 12,148 were charcoal pig. In like manner Pennsylvania has always rolled more than one-half of the iron and steel rails of American manufacture.

The vegetation of the State corresponds in variety with the variety of elevation and distance from the seaboard. The mountains are clad with forests of pine, hemlock, oak, beech, maple, walnut, wild cherry, cucumber, dogwood, and laurel; cultivated apple, cherry, pear, and peach trees grow in the clearings. Wild grapes grow in sheltered places; wild huckleberries, strawberries, and blackberries flourish. Oats, barley, and timothy grass yield heavy crops. The original forest remains only here and there in secluded spots. In the northwestern counties the discovery of petroleum in 1859 produced a great demand for derrick lumber, and the ephemeral wooden cities which sprang up during the succeeding twenty-five years caused a rapid bringing under cultivation of at least 5,000 square miles, lying between 1,000 and 2,000 feet above the level of the sea.

Two hundred and eighty-four genera and 544 species of plants are enumerated as growing on the plateau of Wayne county, in the northeast corner of the State, a typical portion of the whole upland region, covered with glacial drift-sand and gravel, with innumerable lakes,



ponds, and small swamps, lying at various elevations from 1,100 to 2,000 feet above the sea.

The zoölogy of Pennsylvania exhibits that transition stage of its history in which we live. The elk has disappeared; but the panther (puma) and the small wolf are occasionally met with. The black bear is not by any means extinct, and can always find its way anew into the State from West Virginia. The wildcat is common in the least settled counties. Hedgehogs, groundhogs, weasels, polecats, squirrels of three species, mice of several species, and muskrats abound; but the beaver, which has given name to so many mountains, rivers, creeks, and swamps all over the State, no longer exists. The wild turkey is practically exterminated, but is occasionally shot on the mountains. Owls, wood-doves, thrushes, and other birds are abundant. Harmless snakes of various species are innumerable, especially a constrictor, the black snake, which grows to a length of five or six feet. Two venomous snakes are still numerous, the copperhead in the half-cultivated districts, and the rattlesnake in the mountains. The latter, in spite of all efforts to exterminate it, breeds with incredible rapidity. In summer it descends into the valleys. Poisonous insects are almost unknown; but infinite swarms of gnats torment cattle and men in the forest counties. During a short season in summer mosquitoes abound along the tidal rivers, when the south wind blows. Fleas have only recently been imported; but ticks are common in the lowland woods, and the native bedbug, which breeds under the bark of the hemlock, has become domiciled throughout the State, and is the curse not only of the traveler but of a large part of the resident population.

The constitution of 1874 gives the right to vote to every male citizen over twenty-one years of age who has been a citizen of the United States one month, resident in Pennsylvania one year, and in his election district two months; but, if over twenty-two years old, he must have paid a tax at least two months before the day of election. The legislative power is vested in a general assembly of two houses—50 senators elected by the people for four years and 200 representatives for two years. There are strong constitutional guards against special legislation. The executive department consists of a governor, lieutenant-governor, secretary of internal affairs, elected each for four years, an auditor for three, and a treasurer for two, together with a secretary of state, an attorney-general, and a superintendent of public instruction, each appointed for four years by the governor with consent of the senate. The judiciary consists of a supreme court of seven judges elected for twenty-one years; forty-three district courts of common pleas each with one or more judges elected for ten years, and exercising probate jurisdiction except in cities where there are orphans' courts; and local magistrates of minor jurisdiction. The State sends twenty-seven representatives to the national Congress; and federal courts for the eastern district are held at Philadelphia, and for the western district at Pittsburgh, Williamsport, and Erie.

The population, which in 1755 was figured at 255,000, had increased in 1880 to 4,282,891, and was in 1890 shown by the census to be 5,258,014. During the legislative session of 1887, a resolution was adopted providing for an amendment to the constitution prohibiting the manufacture, sale, or keeping for sale of any intoxicating liquor to be used as a beverage. The question was voted upon in the fall of 1889, and the proposed amendment rejected.

January 1, 1889, there were 2,298 school districts in the State, owning property valued at \$39,998,783.75, represented in part by 21,342 schools, 9,551 of which

were graded. The teachers number 23,681, of whom 14,678 are women, the average monthly wages for men being \$38.54, and for women \$30.16. There were 13 normal schools in 1889 under State patronage. The total school expenditure for 1888 was \$11,012,990, including \$1,500,000 of State aid, given every year. The schools are free to all persons from six to twenty-one years of age; and this "school population" in 1888 numbered 831,367, exclusive of Philadelphia. The average attendance was 573,041. There are 28 colleges giving four-year courses, but only 5 confine themselves strictly to college work, viz., University of Pennsylvania at Philadelphia, Lehigh University at South Bethlehem, Lafayette College at Easton, Haverford College at Haverford, and Dickinson College at Carlisle. The grounds, buildings, and apparatus of twenty institutions are valued at \$3,186,000, and they hold \$3,951,000 in productive funds. Swarthmore College and eight others admit both sexes to equal privileges. The peculiar industries of the State have led to extensive provisions for technical and scientific instruction. There are 17 theological schools, a law department in the university of Pennsylvania, 5 medical colleges, all in Philadelphia, an academy of fine arts, and about 200 academies of various grades. Schools for the education of the orphans of soldiers are also maintained, but by an act of the legislature dated June 2, 1887, admissions thereto after June 1, 1890, were prohibited. The schools were established in 1864, and are prepared to furnish tuition to upward of 3,000 pupils annually.

There are two penitentiaries, the Eastern, at Philadelphia, on the separate-cell system, with about 1,000 convicts, and the Western, at Allegheny, on the congregate system, with about 650 convicts. The reform school at Morganza (cottage system) and the house of refuge at Philadelphia receive youthful offenders, who in both institutions average over 1,000. This latter was in 1888 made the recipient of a large donation of money by two citizens of Philadelphia, and in the year following appropriated the same to the purchase of land upon which a new house of refuge is in progress of construction. An industrial reformatory at Huntingdon has room for 500 youthful criminals sentenced for first offenses.

Pennsylvania has made liberal provision for the care of her insane. Four exclusively State institutions, and one which has been built and largely maintained by State aid, afford accommodation for more than 4,000 inmates. They are severally located at Harrisburg, Danville, Warren, Dixmont, and Norristown, and, with three other establishments, are now largely occupied. In addition to these there are the Pennsylvania Training School for Feeble Minded Children, at Media, Delaware county; the Pennsylvania Institution for the Deaf and Dumb, for the Instruction of the Blind, the Working Home for Blind Men, and the Industrial Home for Blind Women, all located at Philadelphia; the Western Institution for the Deaf and Dumb at Wilkesburg, and the Pennsylvania Institute for the Instruction of the Blind.

Of the 2,000,000 persons in Pennsylvania in all descriptions of occupation about one-fifth, or 400,000 people, are devoted to agriculture. The number of farms is upward of 200,000, of which one-quarter is under improvement. The principal crops are wheat, maize, hay, and tobacco, the latter being largely grown in Lancaster county.

The manufacturing industries have more than doubled since 1860, and at present represent a capital invested approximating \$500,000,000, giving employment to a large army of operatives and annually turning out over one-seventh of the total product of manu-

factures of the United States. Iron and steel are the principal lines conducted, though textile fabrics, such as carpets, woolens, cottons, yarn, hosiery, etc., contribute largely to swell the sum total, and flour and grist mills, lumber-mills, glass factories, and salt-wells are extensively operated.

Connections between the navigable rivers was effected in former years by a system of canals which cost over \$50,000,000, but are now chiefly used for the carriage of coal and subordinate to the mining and railroad corporations, which are closely related. There are nine canal companies in Pennsylvania which make annual reports to the Department of Internal affairs. Their returns for the year 1890 show a paid in capital of \$52,500,000, and a floating and bonded indebtedness of \$47,500,000. The gross shipment of freight was 6,502,103 tons, and the total receipts were \$2,749,533.33. With respect to railways, the report of the Secretary of Internal Affairs for the year ending June 30, 1890, says: The reports of 283 companies show an increase of \$23,920,902.05 in the amount of "capital stock paid in," the amount now being \$799,987,217.65. The funded and unfunded debt is still accruing and will undoubtedly in a year or two reach \$1,000,000,000.00, the amount at present being \$984,123,679.30, or an increase of \$18,400,300.92. The entire cost of roads and equipments is shown to be \$1,311,245,952.80, or about \$327,000,000.00 more than the present reported indebtedness of these corporations. The increase during the year of miles of road operated by companies required by law to report to this department is 1,761.36, or a grand total of mileage of 18,810.32. The companies that do make a specific report show 11,775.46 miles in the state. In 1890 314 miles were added.

Steel rails are fast taking the place of iron. During the past year over 6,500 miles of track were laid with steel rails.

The magnitude of the railway system can be realized when it is known that by the corporations operating lines in whole or in part within this state there is an army of 176,945 persons employed. The total earnings of these corporations for the year was \$270,442,882.80, the total expenses \$235,560,006.19.

The report of the State Treasurer for the fiscal year ending November 30, 1890, showed as follows: Balance on hand at beginning of year, \$3,969,587; total receipts from all sources during year, \$8,625,919, aggregating \$12,595,506. The total payments during the year amounted to \$8,168,861, leaving a balance on hand December 1, 1890, of \$4,426,645. The public debt on December 1, 1890, stood at \$12,349,920, of which sum \$134,220 bears no interest. The sinking fund at the same date was \$3,019,724, leaving a net debt of \$4,330,196.

The annual report of the insurance commissioner, dated April, 1891, submits the amount of business done in the State during 1890, as follows: Premiums for fire and marine insurance \$14,227,730, with total losses paid of \$7,906,955. The total net income of all companies was \$3,105,902, of which \$1,379,676 was paid out in dividends.

The grant of the extensive territory called Pennsylvania, made by Charles II. in 1681 to William PENN (*q.v.*), carried with it full proprietorship and dominion, saving only the king's sovereignty. Penn at once created a quick market for lands by publishing in England and on the continent his liberal scheme of government and his intention to try the "holy experiment" of "a free colony for all mankind." In 1682, when he crossed the sea to take possession, he found the western bank of the Delaware already occupied by nearly 6,000 Swedes, Dutch, and English, the Swedes

having begun a settlement in 1638. To these, as to settlers from all nations, he conceded equal liberties. English Quakers, Scotch and Irish Presbyterians, German Mennonites, French Huguenots, men of all religions, were alike welcome; the population increased for a few years at the rate of one thousand a year; then more rapidly, so that at the end of seventy-five years it exceeded 200,000. Penn twice visited Pennsylvania, staying each time two years. In December, 1682, he summoned delegates to meet him at Upland (now Chester) to confer about government; the land was divided into counties, and in March following representatives chosen by the people of these districts agreed on a constitution, based upon popular suffrage, and guaranteeing liberty of conscience. All magistrates and officers were to be chosen by the people, Penn surrendering all claim for revenue by taxation, and retaining for himself and his deputies only the governorship. (See PENN.) The failure to settle the boundary-line between Pennsylvania and Maryland, in dispute between Lord Baltimore and Penn, long caused great irritation among the settlers, who were liable to double taxation; but in 1750 Lord Hardwick's decree in chancery confirmed the original claims of Penn, and in 1763-67 Mason and Dixon definitely fixed and marked 246 miles of the line between the States of Pennsylvania, Maryland and Delaware.

For over sixty years the predominance of the Quakers in the assembly had prevented any legislation for public defense—of which, indeed, there was little need so long as Indians and whites kept their covenant. But in 1744 the Indians became allies of the French, then at war with Great Britain. The party of non-resistance was overborne by a sense of public danger, which found strong expression in a pamphlet by Franklin, and in 1747 the assembly permitted volunteer organization. One hundred and twenty companies were soon enrolled, ten of them, of a hundred men each, in Philadelphia. But there was no efficient management nor hearty co-operation with adjacent colonies. Braddock's defeat in 1754 intensified the alarm; Fort Duquesne (site of Pittsburgh), which he aimed to reduce, was held by the French till 1758. The peace of Paris in 1763 did not quiet the red men. Pontiac, a famous sachem, united the western tribes in a war of extermination, only ended when the whites had proved their mastery. Though stout against the Stamp Act of 1765 and other parliamentary encroachments, Pennsylvania was not swift to move; a committee of safety seized the reins till the people could speak through a representative convention. The convention espoused the revolution; in September, 1776, a state constitution was promulgated, in 1778 the old charter was formally annulled and the Penn claims silenced by payment of \$650,000. During the war Pennsylvania was the scene of important events—the deliberations of the Congress and the Declaration of Independence in 1776; the battles of Brandywine and Germantown in 1777; the British occupation of Philadelphia, and the encampment of Washington at Valley Forge, in 1777-78. A brief but violent mutiny of the unpaid soldiery of Pennsylvania in 1781 led Congress to adopt a better system of finance, under the wise guidance of Robert Morris of Philadelphia. In 1812, at the outbreak of war with Great Britain, Pennsylvania promptly furnished its quota of troops. At the opening of the war with the Southern States in 1861, in response to the president's call for 14,000 men as the State's quota, Pennsylvania sent 25,975, and during the war furnished a total of 387,284. No other northern state was invaded. At Gettysburg, near the state border, a three days' battle was fought, June 30 to July 3, 1863, resulting in a decisive victory of the Federal

forces. In 1864 Chambersburg was burned by the Confederates.

For more than two centuries Penn's commonwealth has been advancing in population, and prosperity, and the great body of the people have dwelt in peace. There have been five serious local disturbances. Between 1791 and 1794 there was organized resistance to the collection of a Federal tax on distilled spirits, but a strong display of force quelled the insurrection without bloodshed. In 1844 there were riots in Kensington, a suburb of Philadelphia, between "native Americans" and Catholic Irish, resulting in the destruction of thirty dwellings, three churches, one convent, and many lives. Between 1835 and 1861 anti-slavery meetings in Philadelphia were often roughly interrupted, and in 1838 Pennsylvania Hall was burned by a pro-slavery mob. A criminal combination in the anthracite mining region, known as the "Molly Maguires," was broken up in 1876 by due course of law, twenty men being hanged for murder. In 1877 the "railroad riots," an outbreak of dissatisfied railway employes, caused a vast destruction of property at Pittsburgh and vicinity, but were quelled by the military. The constitution has been four times revised—in 1838, 1850, 1857, 1874.

PENRITH, a market-town of Cumberland, England, situated near the river Eamont, and on the Lancaster and Carlisle section of the London and North-Western Railway, eighteen miles south of Carlisle, and five northeast of Ulswater. The town consists chiefly of one long and wide street. The principal public buildings are the grammar school, founded by Queen Elizabeth in 1566, the agricultural hall, the mechanics' institute, and the workingmen's literary institute. There are breweries, tanneries and sawmills, but the town depends chiefly on agriculture. The population of the urban sanitary district, in 1871, was 8,317, and in 1881 it was 9,268, and in 1890 estimated at 10,500.

Old Penrith, the *Bremetenracum* of the Romans, was about five miles north-by-west of the present town. At the Conquest the honor of Penrith was a royal franchise; but it was alternately in the possession of the English and Scottish kings until given to Anthony Beck, bishop of Durham, by Edward I. The town more than once lapsed to the crown. In 1696 it was granted to William Bentinck, earl of Portland, and in 1783 it was sold by the duke of Portland to the duke of Devonshire.

PENSACOLA, a city of the United States, capital of Escambia county, Fla., on the northwest coast of Pensacola Bay. The harbor has recently been improved so as to secure a uniform depth of twenty-four feet. Pensacola is the terminus of several railway lines which connect it with Mobile, Montgomery, Jacksonville, and Millview, the starting-place of steamers plying to Cedar Keys, etc., and the seat of a large trade in lumber (mainly pitch pine), early vegetables, and winter fruits. About seven miles west of Pensacola lies a United States navy-yard. The average annual value of the exports to Great Britain and the British colonies is about \$1,500,000, to other foreign countries \$1,600,000, and to the Northern States \$500,000. The total imports were only \$200,000. In 1850 the population was 2,164, in 1870, 3,347, and in 1880, 6,345; and it has now (1890) increased to 11,751.

Pensacola Bay is said to have been discovered by Narvaez in 1528. French, and afterward Spanish, colonists settled on the site of the town in the close of the seventeenth century. In 1719 it was captured by Bienville, in 1723 restored to the Spaniards, in 1763 occupied by the British, in 1781 captured by General Galvez, in 1814 taken from the British by the United

States general Jackson, and again, in 1818, taken by the same general from the Spaniards. In 1821, according to the treaty of 1819, it became, with the rest of Florida, part of the United States territory.

PENSION SYSTEM OF THE UNITED STATES. The present elaborate and comprehensive pension-system of the United States dates its origin back to the days of the first continental congress. The measures then undertaken in acknowledgment of the nation's obligation to the soldiers, and as an expression of the gratitude felt by the nation for his services, have since been extended to the purposes for which they were inaugurated, until the system has become one of the most responsible and invaluable of any maintained by the general government. Nine years after the passage of the original act, or in 1785, the sums derived by taxation for this fund proved inadequate, and until 1789 the deficiency thus created was made up from appropriations by the States. Upon the adoption of the Federal Constitution legislation was enlisted and the system developed. The acts of 1790-2-3 and 1806 provided for the payment of pensions to beneficiaries during their lives, and extended to the militia and State troops disabled in service against the enemy. Disabled officers and soldiers of the regular army were also provided for. Subsequent legislation in the way of amendments, etc., was had, and the laws then created have since been accepted as authorities on the subject of pensions for injuries received prior to the civil war. The act also provided pensions for the widows and children of officers dying of wounds received in battle; payment to commence from the date of death, and at the rate of one-half the amount paid decedent monthly during his connection with the army. In February, 1871, soldiers of the war of 1812, and widows of deceased soldiers of that war were placed upon the service pension list, and allowed \$8 per month from the date of the passage of the bill; payment, however, being conditioned upon proof of loyalty during the Rebellion, and that marriage occurred prior to the close of the war. By the act of March, 1878, soldiers who had served fourteen days in the army during the Rebellion, or had participated in battle during that war, were granted a pension of \$8 per month, the same sum being also allowed to widows of such soldiers. The latter's pensions were subsequently increased to \$12 per month by act of March, 1886. The year following the benefits of the system were again extended to survivors of the Mexican war who had served sixty days in the army or navy in Mexico, on the coasts or frontier thereof, or *en route* thereto, or engaged in battle in that country and had been honorably discharged. These and the widows of survivors who had attained the age of sixty-two years, and been disabled by some cause covered by the pension laws, were, by the act of January 29, 1887, granted the same increase. On June 7, 1888, an act was adopted for the payment to the widows for the full period of time which had elapsed between the deaths of their husbands and the dates of the commencements of the pensions they were then enjoying. An act was also passed the same year directing the payment of \$30 per month to soldiers who become totally deaf, with a corresponding increase over rates previously paid in cases of partial deafness. At the sessions of congress of 1889-90, there was but limited legislation, the bulk of same being almost entirely confined to the passage of private acts; the Morrill service pension bill, up to June 1, 1890, having failed to become a law.

When the system was first introduced the administration of its affairs was directed by the secretary of war, those relating to the navy by the secretary of the navy, and the laws with reference to bounty lands by the

treasury department. Both the latter branches came under the jurisdiction of the pension department proper March 4, 1840, and January 20, 1843, respectively, and on March 3, 1849, the department was made a separate and independent bureau of the interior department, at that time but recently created. The office since that date has been in charge of a commissioner of pensions, appointed by the president. He has original jurisdiction of matters pertaining to pensions, assisted by two or more commissioners, and a full force of clerks, examiners, legal and medical reviewers, and subordinates.

Those who are entitled to pensions include army, navy, marine, and militia officers, enlisted men disabled by wounds received or contracted while in the service, widows or minor children under sixteen years of age, of officers and soldiers in the army or navy who have died of wounds or disease received or contracted in the service, and the dependent fathers, mothers, brothers or sisters of officers and soldiers in the army or navy, who have died of wounds received or disease contracted as above stated. The father inherits from the mother in case of the latter's death, and the minor brothers and sisters from the father, share and share alike. The first grade named above receive \$72 per month, being regarded as totally disabled; the second grade, which includes those incapacitated from manual labor, are paid \$30; and the third grade, partial disability, \$24 per month.

The growth of the system has been no more wonderful than substantial. During the year closing June 30, 1889, there were 489,725 pensioners on the rolls, of whom 351,484 were invalids, 97,590 widows, minor children, and dependent relatives, 6,813, navy invalids, widows, and dependent relatives, 603 survivors of the war of 1812, 17,065 survivors of the Mexican war, and 6,206 widows of those who served in that war. During the year the rolls were increased by 37,168 pensioners added thereto. There were \$88,275,113.28 paid for pensions, an increase of \$9,499,251.36; and the aggregate annual value of pensions was \$64,246,556.36, in addition to which there were \$203,821.84 disbursed for fees for examining army and navy surgeons. Since July 30, 1860, there have been 1,248,146 applications for pensions filed, of which 789,121 have been allowed, and \$1,052,218,413.17 have been disbursed in pursuance thereof.

Pensions are obtained upon furnishing evidence to the Bureau of the righteousness of the claim, and payment of same is made quarterly, beginning July 1st of each year, at agencies located as follows: Augusta, Me., Boston, Mass., Buffalo and New York city, N.Y., Columbus, Ohio, Concord, N. H., Des Moines, Iowa, Detroit, Mich., Indianapolis, Ind., Knoxville, Tenn., Louisville, Ky., Milwaukee, Wis., Philadelphia and Pittsburgh, Penn., San Francisco, Cal., Topeka, Kan., Washington, D. C., and Chicago, Ill.

**PENTATEUCH AND JOSHUA.** The name Pentateuch, already found in Tertullian and Origen, corresponds to the Jewish חמשה חומשי התורה (the five-fifths of the Torah or law); the several books were named by the Jews from their initial word, though at least Leviticus, Numbers, and Deuteronomy had also titles corresponding to those we use, viz., תורת כהנים, חמש הפקודים (*Ἀμμεσφρακωδειμ*, Origen, in *Eus.*, *H. E.* vi. 25), and משנה תורה. The Pentateuch, together with Joshua, Judges, and Ruth, with which it is usually united in Greek MSS., makes up the Octateuch; the Pentateuch and Joshua together have recently been named the Hexateuch. The date of the division of the Torah into five books cannot be made out; it is probably older than the Septuagint translation.

Moses is already taken for the author of the Penta-

teuch in 2 Chronicles xxv. 4, xxxv. 12 *seq.*; only the last eight verses of Deuteronomy are, according to the rabbins, not from his pen. From the synagogue belief in the Mosaic authorship passed to the church, and is still widely prevalent among Christians. At an early date, indeed, doubts suggested themselves as to the correctness of this view, but it was not till the seventeenth century that these became so strong that they could not be suppressed. It was observed that Moses does not speak of himself in the first person, but that some other writer speaks of him in the third—a writer, too, who lived long after. The expression of Gen. xii. 6, "the Canaanite was then in the land," is spoken to readers who had long forgotten that a different nation from Israel had once occupied the Holy Land; the words of Gen. xxxvi. 31, "these are the kings that reigned in Edom, before there reigned any king over the children of Israel," have no prophetic aspect; they point to an author who wrote under the Hebrew monarchy. Again, the "book of the wars of Jehovah" (Num. xxi. 14) cannot possibly be cited by Moses himself, as it contains a record of his own deeds; and when Deut. xxxiv. 10 (comp. Num. xii.) says that "there arose not a prophet since in Israel like unto Moses," the writer is necessarily one who looked back to Moses through a long series of later prophets.

At the same time attention was drawn to a variety of contradictions, inequalities, transpositions, and repetitions of events in the Pentateuch, such as excluded the idea that the whole came from a single pen. Such observations could not but grievously shake the persuasion that Moses was the author of the Pentateuch, while at the same time they directed criticism to a less negative task—viz., the analysis of the Pentateuch.

Thus the investigation into the composition of the Pentateuch reached a point of rest and a provisional conclusion. The results may be thus summarized. The five books of Moses with Joshua form one whole; and it is not the death of Moses but the conquest of the promised land which forms the true close of the history of the patriarchal age, the exodus, and the wanderings in the wilderness; it is therefore more correct to speak of the Hexateuch than of the Pentateuch. From this whole it is most easy to detach the book of Deuteronomy, and accordingly its independence was very early recognized. Of the other elements, that which has the most marked individuality is the work of the Elohist, which we may call the Priestly Code. This too, like Deuteronomy, is a law-book, but it has a historical setting. Its main stock is Leviticus, with the cognate parts of the adjacent books, Exod. xxv.—xl. (except chaps. xxxii.—xxxiv.) and Num. i.—x., xv.—xix., xxv.—xxxvi. (with some inconsiderable exceptions). This law-book does not, like Deuteronomy, embrace precepts for civil life, but is confined to affairs of worship, and mainly to the esoteric aspect of public worship, that is, to such points as belonged to the function of the priests as distinguished from the worshiping people. The Priestly Code is characterized by a marked predilection for numbers and measures, for arrangement (titles to sections) and formality of scheme, by the poverty and inflexibility of its language, by standing repetitions of certain expressions and phrases such as are not elsewhere found in old Hebrew. Thus its distinguishing marks are very pronounced, and can always be recognized without difficulty. If now Deuteronomy and the Priestly Code are successively subtracted from our present Pentateuch the Jehovistic history-book remains, distinguished from both the others by the fact that it is essentially narrative and not law, and by the pleasure it takes in bringing out details of the historical tradition, so that individual points of the story receive

full justice and are not sacrificed to the interests of the general plan. The patriarchal history belongs almost entirely to this document, and forms the most characteristic part of it; here that history forms no mere epitomized introduction to more important matter, as in the Priestly Code, but is treated in all fullness as a subject of first-rate importance. Legislative elements are incorporated in the Jehovistic narrative only at one point, where they naturally fall into the historical context, viz., in connection with the lawgiving on Sinai.

PENTECOST, a feast of the Jews, was in its original meaning the closing feast of the harvest gladness, at which, according to Lev. xxiii. 17, leavened bread was presented at the sanctuary as the first fruits of the new cereal store. Hence the names "Feast of Harvest," "Day of First Fruits;" but the commoner Old Testament name is "Feast of Weeks," because it fell exactly seven weeks, or, on the Jewish way of reckoning an interval by counting in both termini, just fifty days after the offering of the first sheaf of the harvest at the Feast of Unleavened Bread. Pentecost or "Fiftieth" day is only a Greek equivalent of the last name in the Apocrypha and New Testament. The orthodox later Jews reckoned the fifty days from the sixteenth of Nisan, cutting the ritual sheaf on the night of (that is, on our division of days, the night preceding) that day (see PASSOVER). In Deuteronomy Pentecost, like the other two great annual feasts, is a pilgrimage feast, and so it was observed in later times; but, unlike the others, it lasts but one day, agreeably to its character, as merely the solemn closing day of harvest-time. Like the other great feasts, it came to be celebrated by fixed special sacrifices. The amount of these is differently expressed in the earlier and later priestly law; the discrepancy was met by adding the two lists. The later Jews also extended the one day of the feast to two. Further, in accordance with the tendency to substitute historical for economic explanations of the great feasts, Pentecost came to be regarded as the feast commemorative of the Sinaitic legislation.

To the Christian church Pentecost acquired a new significance through the outpouring of the Spirit. (See WHITSUNDAY.)

PENZA, a government of eastern Russia, bounded on the north by Nijni Novgorod, on the east by Simbirsk, and on the south and west by Saratoff and Tamboff, and having an area of 15,000 square miles. The surface is undulating, with deep valleys and ravines, but even in its highest parts it does not reach more than 600 or 900 feet above sea-level. Chalk, potter's clay, peat, and iron are the chief mineral products, in the north. There are extensive forests in the north, but the south shows the characteristic features of a steppeland. The government is watered by the Moksha, the Sura (both navigable), and the Khoper, belonging respectively to the Oka, Volga, and Don systems. Timber is floated down several smaller streams, while the Moksha and Sura are important means of conveyance for grain, spirits, timber, metals, and oils. The climate is harsh and continental, the average temperature at Penza being only 39.8° (12.2° in January and 68.5° in July). The population was 1,356,600 in 1881.

PENZA, capital of the above province, is situated 440 miles by rail southeast from Moscow. It is mostly built of wood, on the slopes of a plateau 730 feet above the sea, at the confluence of the little Penza with the navigable Sura. The population, in 1881, had reached 41,650.

PENZANCE, a seaport and municipal borough of Cornwall, and the westernmost borough of England, is finely situated on gently rising ground on the northwestern shore of Mount Bay, at the terminus

of the Great Western Railway, ten miles east-northeast of Land's End, and twenty miles west-southwest of Truro. The town has a considerable shipping trade, the total number of vessels which entered the port in 1882 being 1,829 of 197,933 tons burden, the number which cleared 1,774 of 187,569 tons. The exports include tin, copper, granite, serpentine, and fish, and the imports coal, timber, and provisions. Large quantities of pilchard are annually exported to Italy. Fruits, flowers, and vegetables are grown in the neighborhood for the London market. On account of its sheltered situation and its remarkably mild and equable climate, the town has a high repute as a winter residence for persons suffering from pulmonary complaints; and on account of its fine scenery it is also becoming a favorite watering-place. The population of the municipal borough, in 1871, was 10,414, and in 1881 it was 12,409. It has been immortalized by Gilbert and Sullivan's opera *Pirates of Penzance*.

PEONY, a genus of *Ranunculaceæ* remarkable for their gorgeous flowers, constructed almost exactly on the same lines as those of the common buttercup except as regards the pistil, which in the peonies consists of two or more separate carpels each containing several seeds, and surrounded at the base by a fleshy cup or disk, which grows up around the carpels. The receptacle of the flower, moreover, instead of being flattish or somewhat convex, is in peonies a little depressed in the center, so that the stamens become somewhat perigynous as in water-lilies or roses. The carpels when ripe form dry follicles, splitting along one edge so as to expose the numerous shining black seeds, provided with a small fleshy aril. There are but few species, natives of the northern hemisphere of the Old World, and divisible into two main groups—those with herbaceous stems dying down in winter, and those with shrubby stems (Moutan or Tree Peonies). The herbaceous peonies have magnificent cup-like flowers in different varieties, of all shades of color from white to clear yellow, rose-colored, and richest crimson. The Moutan or Tree Peonies have an erect bushy stem, from which the bark peels off in flakes; the foliage is divided as in the commoner kinds, and more or less glaucous. The flowers are remarkable for the extreme delicacy of tint, and botanically by the large development of the disk above mentioned. Moutan Peonies are natives of China.

PEORIA, capital of Peoria county, Ill., is a city of remarkable growth and promise. It is pleasantly located at the south end of Peoria lake, an attractive sheet of water, and on the west bank of the Illinois river, 159 miles south of Chicago, 65 miles north of Springfield, 53 miles east of Galesburg and 43 miles west of Bloomington. It is the third city in the State in population, and in all respects is a model of enterprise, design, and construction. The city is laid out after the most approved plans, with wide streets intersecting each other at right angles, handsomely shaded and brilliantly illuminated with gas and electric lights; the residence, business, and manufacturing districts have been built up with elegant and substantial structures perfectly adapted for the uses to which they are respectively devoted, while the undulating prairies with which the city is surrounded are dotted with evidences of the taste and cultivation of the people. It is a prominent railroad city, being the intersection of the Terre Haute and Peoria; Lake Erie and Western; Ohio, Indiana and Western; Peoria, Decatur and Evansville; Peoria and Pekin Union; Wabash and Western; Central and St. Louis; Toledo, Peoria and Western; Rock Island and Peoria; Chicago, Rock Island and Pacific, and Chicago, Burlington and Quincy, also the terminus of a line of steamboats that

plies between the city and St. Louis. It contains a courthouse, city-hall, five first-class hotels, about thirty churches, the Peoria county normal school, a high school and a number of subordinate schools, nine national, six private and two savings banks, between two and three hundred stores devoted to every line of commercial endeavor, an opera-house and two public halls with an aggregate seating capacity of forty-one hundred. The representative industries embrace enterprises conducting the manufacture of engines and machinery, agricultural implements, trunks, glucose, brass fixtures, cigars, carriages, brushes, brooms, sash, doors and blinds, soap, highwines (special attention being paid to the distillation of whisky which is extensively engaged in) and bitters, patterns, safes, baskets, mantels, coal-drills, saws, metal rope, jewelry, cornices, elevators, stoves and hardware specialties, grain registers, watches, marble mantels, etc., and other intricate mechanical devices. Five daily newspapers, two of which are German, five weeklies and two monthlies are published here, and a heavy business is done annually in the shipment of bituminous coal taken from mines operated on the city's outskirts. The population, which was 22,849 in 1870 and 29,259 in 1880, was in 1890 returned at 41,024.

PEPPER, a name applied to several pungent spices known respectively as Black, White, Long, Red or Cayenne, Ashantee, Jamaica, and Melegueta Pepper, but derived from at least three different natural orders of plants.

*Black Pepper* is the dried fruit of *Piper nigrum*, L., a perennial climbing shrub indigenous to the forests of Travancore and Malabar, whence it has been introduced into Java, Sumatra, Borneo, the Malay Peninsula, Siam, the Philippines, and the West Indies. It is one of the earliest spices known to mankind, and for many ages formed a staple article of commerce between India and Europe—Venice, Genoa, and the commercial cities of central Europe being indebted to it for a large portion of their wealth. The largest quantities of pepper are produced in Penang, the island of Rhio, and Johore, near Singapore—Penang affording on an average about half of the entire crop.

Pepper owes its pungency to a resin, and its flavor to a volatile oil, of which it yields from 1.6 to 2.2 per cent. The oil agrees with oil of turpentine in composition as well as in specific gravity and boiling point. Pepper also contains a neutral crystalline substance, called piperin, to the extent of 2 to 8 per cent., which is largely used in medicine as a stimulant and stomachic.

*White Pepper* is obtained from the same plant as the black, and differs only in being prepared from the ripe fruits.

*Long Pepper* is the fruit-spike of *Piper officinarum*, C. DC., and *P. Longum*, L., gathered shortly before it reaches maturity, and dried.

*Ashantee* or *West African Pepper* is the dried fruit of *Piper Clusii*, C. DC., a plant widely distributed in tropical Africa, occurring most abundantly in the country of the Niam-niam. It differs from black pepper in being rather smaller, less wrinkled, and being attenuated into a stalk, like cubebs, to which it bears considerable resemblance externally.

*Jamaica Pepper* is the fruit of *Pimenta officinalis*, Lindl., an evergreen tree of the myrtle family. It is more correctly termed "pimento," or "allspice," as it is not a true pepper.

*Melegueta Pepper*, known also as "Guinea grains," "grains of paradise," or "alligator pepper," is the seed of *Amomum Melegueta*, Roscoe, a plant of the ginger family; the seeds are exceedingly pungent, and are used as a spice throughout central and northern Africa.

PEPPERMINT, an indigenous perennial herb of the natural order *Labiata* and genus *Mentha*, the specific

name being *Mentha piperita*, Huds., is distinguished from other species of the genus by its stalked leaves and oblong-obtuse, spike-like heads of flowers. It is met with, near streams and wet places, in several parts of England and on the Continent, and is also extensively cultivated for the sake of its essential oil in England, in several parts of continental Europe, and in the United States.

Peppermint oil varies considerably in commercial value, that of Mitcham, England, commanding nearly three times the price of the finest American. The flavor varies to a slight extent even with particular plots of land, badly drained ground being known to give unfavorable results both as to the quantity and quality of the oil. That of the Japanese and Chinese oil also differs slightly from the English, and is thus distinguishable by experts. In America the oil is liable to be injured in flavor by aromatic weeds which grow freely among the crop. When pure the oil is nearly colorless, and has an agreeable odor and powerful aromatic taste, followed by a sensation of cold when air is drawn into the mouth. Oil of peppermint is often adulterated with a third part of rectified spirit, which may be detected by the milkiness when the oil is agitated with water. Oil of rosemary and rectified oil of turpentine are sometimes used for the same purpose. If the oil contains turpentine it will explode with iodine. If quite pure it explodes in its own weight of rectified spirits of wine. In the form in which menthol is imported it bears some resemblance to Epsom salts, with which it is said to be sometimes adulterated. It is usually not entirely free from the essential oil, and consequently undergoes purification and recrystallization. The amount of menthol imported by a large firm at Leipsic between September, 1883, and April, 1884, is stated by them to have been 6,380 pounds, while it is certain that at least an equal quantity is imported into England from Yokohama. Although the Japanese peppermint plant has been imported by a London merchant, no attempt has as yet been made to cultivate the plant in order to manufacture menthol in England. Menthol is now (1890), however, manufactured from *M. Piperita* in the United States, where also *M. arvensis*, var. *piperascens*, is cultivated.

Oil of peppermint is used in medicine as an antispasmodic for the relief of griping pains in the alimentary canal, to expel flatulence, to relieve nausea, to hide the taste of other medicines, and to act as an adjunct to purgatives. The dose is usually from one to three minims. It forms a most valuable remedy in diarrhea, acting as an antiseptic and as a stimulant to the circulation, and as an anodyne. The oil rubbed over the head is used in China to cure sunstroke. Menthol has lately come largely into use as a remedy for neuralgia, being molded by heat into the form of small cones, which are rubbed over the part affected. A small portion placed on the tongue frequently relieves headache, and catarrh and coryza if placed in the nostril. The largest consumption of the oil is in the manufacture of peppermint lozenges.

PEPPER-TREE. The tree usually so called has no real consanguinity with the true pepper (*Piper*), but is a member of the Anacard family known botanically as *Schinus Molle* or *Mulli*, the latter epithet representing, it is said, the Peruvian name of the plant. The resin is used for medicinal purposes by the Peruvians, and has similar properties to mastic. The Japan pepper-tree is *Xanthoxylum piperitum*, the fruits of which have also a hot taste. Along the Riviera the tree known as *Melia Azedarach*, or the "Pride of India," a very ornamental tree with elegant foliage and dense clusters of fragrant lilac flowers, is also incorrectly called the pepper-tree by visitors.

PEPSIN. See NUTRITION.

PEPYS, SAMUEL, of diary fame, was the fifth child of John Pepys and Margaret (Perkins? *Diary*, September 17, 1663), and was born on February 23, 1632 or 1633.

In January, 1659 or 1660, Pepys began to keep his *Diary*. He was at this time living in Axe Yard, Westminster, in a small house with one servant, in straitened circumstances. In March Montagu gave Pepys the post of secretary to the generals at sea. On June 28th he became clerk of the acts of the navy, an office which Montagu had procured for him against powerful competition. On July 23d he became clerk of the privy seal. In this month he took his M.A. degree. On September 24th he was sworn in as J. P. for Middlesex, Essex, Kent, and Southampton.

In 1669 the increasing weakness of his eyesight compelled him to discontinue the *Diary*, his last entry being on May 31st. In June, 1673, he was chosen at a by-election as James' nominee for Castle Rising, a Howard borough, but a vote of the committee of privileges declared the election void. On August 7, 1677, Pepys was elected master of the Clothworkers' Company, who still possess the silver cup he gave them on the occasion. In April, 1680, Pepys attended the king by command to Newmarket, and there took down in shorthand from his own mouth the narrative of his escape from Worcester.

On his return Pepys was again made secretary to the admiralty. In the same year (1684) he was elected president of the Royal Society. At the coronation of James II. he figured as one of the barons of the Cinque Ports; and he sat in James' parliament for his old seat of Harwich along with his former colleague, Sir Anthony Deane. He died on May 26, 1703.

The importance of Pepys' *Diary*, historically speaking, may be summed up by saying that without it the history of the court of Charles II. could not have been written.

PERA. See CONSTANTINOPLE.

PERÆA. See GILEAD.

PERAK. See MALAY PENINSULA, and STRAITS SETTLEMENTS.

PERCEVAL, AMAND-PIERRE CAUSSIN DE, Orientalist, was born at Paris, January 13, 1795. He died during the siege of Paris, January 15, 1871.

PERCEVAL, SPENCER, prime minister of England from 1809 to 1812, was the second son of John, second earl of Egmont, and was born in Audley Square, London, in November, 1762. He was shot by an assassin, perhaps a madman, named Bellingham, in the lobby of the House of Commons, May 11, 1812. Perceval will be chiefly remembered for his strenuous opposition to Catholic emancipation, an opposition due to a conscientious dread of the political evils that might result from it. He was a vigorous debater, specially excelling in replies, in which his thorough mastery of all the details of his subject gave him a great advantage.

PERCH (*Perca fluviatilis*), a freshwater fish generally distributed over Europe, northern Asia, and North America, and so well known as to have been selected for the type of an entire family of spiny-rayed fishes, the *Percidae*, which is represented in European fresh waters by several other fishes such as the pope (*Acerina cernua*) and the pike-perch (*Lucioperca*). It inhabits rivers as well as lakes, but thrives best in waters with a depth of not less than three feet; in large, deep lakes it frequently descends to depths of fifty fathoms and more. It occurs in Scandinavia as far north as the 69th parallel, but does not extend to Iceland or any of the islands north of Europe. In the Alps it ascends to an altitude of 4,000 feet.

PERCIVAL, JAMES GATES, an American writer of many-sided activity, but chiefly remembered by his verses, was born at Berlin, Conn., on September 15, 1795. He died at Hazel Green, Wis., May 2, 1856.

PERCY. This family, whose deeds are so prominent in English history, claimed descent from one Manfred de Perci, who was said to have come out of Denmark into Normandy before the adventure of the famous Rollo. But it is more certain that two brothers, William and Serlo de Percy, came into England with William the Conqueror, who endowed his namesake, the elder, with vast possessions in Hampshire, Lincolnshire, and Yorkshire, among which were Topcliffe in the North Riding and Spofforth in the West Riding, the principal seats of the family for many ages afterward. This William deserves special notice besides, since he reformed the noble abbey of Whitby.

The next important member of the family is Henry de Percy, whom Edward I., after the deposition of John Baliol, appointed governor of Galloway, and who was one of his most active agents in the subjugation of Scotland.

To him succeeded another Henry Percy, a feudal baron like his predecessors, who fought at Crécy during his father's lifetime; and to him another Henry, who was made earl of Northumberland at the coronation of Richard II. Powerful in the south as well as in the north, he was the Lord Henry Percy who protected Wycliffe when cited before the archbishop at St. Paul's. As earl of Northumberland he exhibited his independence of Richard II. in a way characteristic of a northern baron. He was the father of the noted Hotspur.

The whole family of the Percies seem to have felt that their services to Henry of Lancaster were ill requited.

A crisis occurred in the fortunes of the family in the reign of Henry VIII., on the death of the sixth earl, whose two brothers, much against his will, had taken part in the great insurrection called the "Pilgrimage of Grace." A thriftless man, of whom it is recorded that in his youth he was smitten with the charms of Anne Boleyn, but was forced to give her up and marry a woman he did not love, he died childless, after selling many of the family estates and granting the others to the king. The title was forfeited, and was granted by Edward VI. to the ambitious Dudley, earl of Warwick, who was attainted in the succeeding reign. It was restored in the days of Queen Elizabeth to Thomas Percy, who, being a staunch Catholic, was one of the three earls who took the lead in the celebrated "Rising in the North," and was beheaded at York. His brother Henry, who succeeded him, was no less unhappy. Involved in Throgmorton's conspiracy, he was committed to the Tower, and was supposed to have shot himself in bed with a pistol found beside him; but there were grave suspicions that it had been discharged by another hand. His son, the next earl, suffered like his two predecessors for his attachment to the religion of his forefathers. At length, in 1670, the male line of this illustrious family became extinct.

Not one of the English noble houses is so distinguished as the Percies throughout the whole range of English history. It is remarkable alike for its long unbroken line, its high achievements, its general culture of arts and of letters. Preëminent also, as remarked by Sir Harris Nicolas, for its alliances among the peerage, it continues to this day, though represented once more by a female branch. The present dukedom of Northumberland was created in 1766 in the family of Smithson, who assumed the name of Percy and have borne it ever since. Sir Hugh Smithson, who became the first duke, married a granddaughter of a daughter of the last earl.

PERCY, THOMAS, bishop of Dromore, the editor of

the *Percy Reliques*, was born at Bridgnorth, England, April 13, 1729, and died in 1811.

PERDICCAS, son of Orontes, a distinguished Macedonian general under Philip and Alexander the Great, and regent of the empire from the death of the latter till he perished in a mutiny in 321 B.C. (See MACEDONIAN EMPIRE.)

The same name was borne by three kings of Macedonia: PERDICCAS I., whom Herodotus calls the founder of the monarchy of Macedon; PERDICCAS II., the enemy of Athens in the Peloponnesian War (died c. 414 B.C.); and PERDICCAS III., (died 359 B.C.)

PEREKOP, a town of European Russia, in the Crimea, sixty miles southeast of Kherson, on the isthmus which connects the peninsula with the continent, and, as its name (*perekop*, a cutting) indicates, commanding the once defensive ditch and dyke which cross from the Black Sea to the Sivash lagoon. It was formerly an important place, with a great transit trade in salt (obtained from the great salt lakes of the immediate neighborhood), which occupied so large a place in popular estimation that the Tartars of the Crimea were usually styled the "Perekop horde" and their khans the "Perekop khans." Since the opening of the railway route to the Crimea it has greatly declined.

PEREYASLAV, a town of European Russia, in the Poltava government, 175 miles west-northwest of Poltava, at the junction of the Trubezh and the Alta, which reach the Dnieper five miles lower down at the town's port, the village of Andrushki. The population was 10,835 in 1865, and 9,300 in 1870.

PEREYASLAVL, or PERESLAVL (called Zalyesskii, or "Beyond the Forest," to distinguish it from the older town in Poltava after which it was named), is one of the earliest and most interesting cities in northwest Russia, situated in Vladimir government, eighty-seven miles east of Moscow on the road to Yaroslavl, and on both banks of the Trubezh, near its entrance into Lake Pleshtchevo. The population was 6,253 in 1864, 7,210 in 1870, and 8,700 in 1880.

PEREZ, ANTONIO, for some years the favorite minister of Philip II. of Spain and afterward for many more the object of his unrelenting hostility, was an Aragonese. He was born about 1540 and died in comparative obscurity in Paris on November 3, 1611.

PERFUMERY is the art of manipulating odoriferous substances for the gratification of the sense of smell. Perfumes may be divided into two classes, the first of which includes all primitive or simple odoriferous bodies derived from the animal or vegetable kingdom, as well as the definite chemical compounds specially manufactured, while the second comprises the various "bouquets" or "mélanges" made by blending two or more of the foregoing in varying proportions—toilet powders, dentifrices, sachets, and the like. The second class contains the endless combination of tinctures for scenting the handkerchief sold under fancy names which may or may not afford a clue to their composition, such as "comédie française," "eau de senteur," "eau de Cologne," "lavendre ambrée," "blumengeist." These are sometimes made upon a quasi-scientific basis, namely, that of the odophone or gamut of odors of the late Dr. Septimus Piesse. Their numbers may be almost infinite; one large firm is known to manufacture several hundreds.

PERGAMUM, an important city of Teuthrania, a district in Mysia. The name, which is related to the German *burg*, is appropriate to the situation on a lofty isolated hill in the broad and fertile valley of the Caicus, about 120 stadia, less than fifteen miles, from its mouth. According to the belief of its inhabitants, the town was founded by Arcadian colonists, led by

Telephus, son of Heracles. Under the Roman empire Pergamum was one of the chief seats of the worship of Asclepius; invalids came from distant parts of the country to ask advice from the god and his priests. The temple and the curative establishment of the god were situated outside the city. Pergamum was one of the early seats of Christianity, and one of the seven churches enumerated in the Revelation was situated there. Two tributaries of the Caicus, named Selinus and Cetius, flowed through or near the city. The ancient name is still preserved under the form "Bergamo."

PERGOLESI (or PERGOLESE), GIOVANNI BATTISTA, Italian musical composer, was born at Jesi, Ancona, January 3, 1710, and died in 1736.

PERIANDER was born about 665 B.C. and succeeded his father Cypselus as despot of Corinth in 625 B.C. His rule appears to have been at first mild and beneficent, but evil advice or domestic calamity converted him into a cruel tyrant. At last, enfeebled by age, Periander offered to resign the tyranny to his son and to retire himself to Corcyra; but the prospect alarmed the Corcyreans, and they put Lycophron to death. The tyrant took his revenge by sending 300 of the noblest Corcyrean youths to Alyattes, king of Lydia, to be made eunuchs of; they were rescued, however, by the Samians. Periander did not long survive his son; he fell into a deep despondency, and died, either of grief or by violence voluntarily incurred, in 585 B.C., at the age of eighty.

PERICARDITIS, or inflammation of the pericardium, is a disease of frequent occurrence; the result of a large number of post-mortem examinations being to show that about one in twenty-three of all who die at an adult age exhibit traces of recent or old attacks of this disorder. The symptoms of pericarditis are pain in the situation of the heart, increased by a full inspiration, by pressure upon or between the ribs in the cardiac region, and especially by pressure upward against the diaphragm by thrusting the fingers beneath the cartilages of the false ribs; palpitations, a dry cough, and hurried respiration, discomfort or pain on lying on the left side, restlessness, great anxiety of countenance, and sometimes delirium. The pulse usually beats from 110 to 120 in a minute, and is sometimes intermittent, and febrile symptoms are always present. The physical signs are three in number: 1. In consequence of irritation propagated to the muscular tissue of the heart at the commencement of the inflammation of its investing membrane, the ventricles contract with increased force, rendering the sounds of the heart louder and its impulse stronger than in health, or than in the more advanced stages of the disease. 2. When much fluid is effused into the pericardium, dullness on percussion is always observable to a greater degree than in health. This sign, which is very characteristic, is seldom perceived till the disease has continued for two or three days. In extreme cases the dullness may extend over a space whose diameter is seven inches or more. Simultaneous with the increased dullness, there is a diminution of the heart's sounds in consequence of the intervening fluid, and the impulse is often scarcely perceptible. 3. The rubbing of the inflamed and roughened surfaces upon each other gives rise to a sound which is commonly called the friction sound, but which has received various names. Sometimes it closely resembles the noise made by a saw in cutting through a board; sometimes it is more like that occasioned by the action of a file or of a rasp, but its essential character is that of alternate rubbing; it is a to-and-fro sound. This sound is heard early in the disease, before the surfaces of the pericardium are separated by the effusion of fluid. Pericarditis is a



disease which occasionally runs a rapid course, and terminates fatally in forty-eight hours or less. In slight cases it is probable that a true cure, without adhesion, may take place.

PERICLES, a great Athenian statesman, and one of the most remarkable men of antiquity, was the son of Xanthippus, who commanded the Greeks at the battle of Mycale in 479 B.C. The steps by which he rose to the commanding position which he occupied in later life cannot be traced with certainty.

The first public appearance of Pericles of which we have record probably fell about 463. When Cimon, on his return from the expedition to Thasos, was tried on the utterly improbable charge of having been bribed by the Macedonian king to betray the interests of Athens, Pericles was appointed by the people to assist in conducting the prosecution; but, more perhaps from a conviction of the innocence of the accused than, as was said, in compliance with the entreaties of Cimon's sister Elpinice, he did not press the charge, and Cimon was acquitted. Not long afterward Pericles struck a blow at the conservative party by attacking the Areopagus, a council composed of life-members who had worthily discharged the duties of archon. Pericles seems to have deprived it of nearly all its functions, except its jurisdiction in cases of murder. The popular party seems to have immediately followed up its victory over the Areopagus by procuring the ostracism of Cimon, which strengthened the hands of Pericles by removing his most influential opponent (461). Pericles took part in the battle of Tanagra (457) and bore himself with desperate bravery. After the battle Cimon was recalled from banishment, and it was Pericles who proposed and carried the decree for his recall. In 454 Pericles led an Athenian squadron from the port of Pegæ on the Corinthian Gulf, landed at Sicyon, and defeated the inhabitants who ventured to oppose him; then, taking with him a body of Achæans, he crossed to Acarnania, and besieged the town of Cœniadæ, but had to return home without capturing it. Not long afterward Pericles conducted a successful expedition to the Thracian Chersonese, where he not only strengthened the Greek cities by the addition of 1,000 Athenian colonists, but also protected them against the incursions of the barbarians by fortifying the isthmus from sea to sea. This was only one of Pericles' many measures for extending and strengthening the naval empire of Athens. Colonies were established by him at various times in Naxos, Andros, Oreus in Eubœa (in 446), Brea in Macedonia (about 443), and Ægina (in 431).

When Cimon died, in 449, the aristocratic party sought to counterbalance the power of Pericles by putting forward Thucydides, son of Melesias, as the new head of the party. He seems to have been an honest patriot, but, as the event proved, he was no match for Pericles. The Sacred War in 448 showed once more that Pericles knew how to defend the interests of Athens. The peace left Pericles at liberty to develop his schemes for promoting the internal welfare of Athens, and for making it the center of the intellectual and artistic life of Greece. But first he had to settle accounts with his political rival, Thucydides; the struggle was soon decided by the ostracism of the latter in 444. Thenceforward to the end of his life Pericles guided the destinies of Athens alone. The period during which he ruled Athens was the happiest and greatest in her history, as it was one of the greatest ages of the world. Other ages have had their bright particular stars; the age of Pericles is the Milky Way of great men. In his lifetime there lived and worked at Athens the poets Æschylus, Sophocles, Euripides, Cratinus, Crates, the philosophers Anaxagoras, Zeno, Protagoras, Socrates,

the astronomer Meton, the painter Polygnotus, and the painters Myron and Phidias. Contemporary with these, though not resident at Athens, were Herodotus, the father of history; Hippocrates, the father of medicine; Pindar, "the Theban eagle;" the sculptor Polyclitus; and the philosophers Empedocles and Democritus, the latter joint author with Leucippus of the atomic theory. When Pericles died other stars were rising or soon to rise above the horizon—the historians Thucydides and Xenophon, the poets Eupolis and Aristophanes, the orators Lycias and Isocrates, and the gifted but unscrupulous Alcibiades. Plato was born shortly before or after the death of Pericles. Of this brilliant circle Pericles was the center. His generous and richly-endowed nature responded to all that was beautiful and noble not only in literature and art, but in life, and it is with justice that the age of Pericles has received its name from the man in whom, more than in any other, all the various lines of Greek culture met and were harmonized. In this perfect harmony and completeness of nature, and in the classic calm which was the fruit of it, Pericles is the type of the ideal spirit, not of his own age only, but of antiquity. In the autumn of 429 he died.

He was buried among the great dead in the Ceramicus, and in after years Phormio, Thrasybulus, and Chabrias slept beside him. In person he was graceful and well made, save for an unusual height of head, which the comic poets were never weary of ridiculing. In the busts of him which we possess, his regular features, with the straight Greek nose and full lips, still preserve an expression of Olympian repose.

PERIDOTE, a name applied by jewelers to the green transparent varieties of olivine. When yellow, or yellowish-green, the stone is generally known as "chrysolite." The color of the peridote is never vivid, like that of emerald, but is usually some shade of olive, pistachio, or leek green. Although sometimes cut in rose-forms and *en cabochon*, the stone displays its color most advantageously when it is worked in small steps. There can be little doubt that the ancient "topazion" was our peridote or chrysolite, and that the mineral now called topaz was unknown to ancient and mediæval writers.

PÉRIGORD, an old province of France which formed part of the military government of Guienne and Gascony, and was bounded north by Angoumois, east by Limousin and Quercy, south by Agenais and Bazadais, and west by Bordelais and Saintonge. It is now represented by Dordogne and part of Lot-et-Garonne. The capital was PÉRIGUEUX, (*q.v.*)

PÉRIGUEUX, formerly capital of Périgord, now chief town of the department of the Dordogne, France, situated on the slope of an eminence commanding the right bank of the Isle, one of the tributaries of the Dordogne. It is 310 miles by rail south-southwest of Paris and 79 miles east-northeast of Bordeaux. The population, in 1881, was 25,036.

PERINTHUS, a town of Thrace, on the Propontis, twenty-two miles to the west of Selymbria, strongly situated on a small peninsula on the Bay of Perinthus, on the site of the modern Eski Eregli. It is said to have been a Samian colony, and to have been founded about 599 B.C.

PERIODICALS may be broadly divided into two classes, the one chiefly devoted to general literature, apart from political and social news, and the other more exclusively to science and art, or to particular branches of knowledge or trade. The former class, and those of general interest only, will be principally dealt with in this article, where an endeavor is made to trace briefly the history of the rise and progress of that vast

and increasing body of printed matter which, under the different names of reviews, magazines, etc., forms so large a part of current literature.

The first literary periodical in English was the *Mercurius Librarius, or a Faithful Account of all Books and Pamphlets* (1680), a mere catalogue.

After the close of the first quarter of the eighteenth century the literary journal began to assume more of the style of the modern review.

These periodicals had now become extremely numerous, and many of the leading London publishers found it convenient to maintain their own particular organs. It is not a matter of surprise, therefore, that the authority of the reviews should have fallen somewhat in public estimation. The time was ripe for one which should be quite independent of the booksellers, and which should also aim at a higher standard of excellence. As far back as 1755 Adam Smith, Blair, and others had endeavored to carry on such a quarterly without achieving success, and in 1773 Gilbert Stuart and William Smellie issued during three years an *Edinburgh Magazine and Review*. To the northern capital is also due the first high-class critical journal which has kept up its reputation to the present day. The *Edinburgh Review* was established in 1802, by Jeffrey, Scott, Horyer, Brougham, and Sydney Smith. It created a new era in periodical criticism.

Soon after the introduction of the literary journal in England, one of a more familiar tone was started by the eccentric John Dunton in the *Athenian Gazette, or Casuistical Mercury, resolving all the most Nice and Curious Questions* (1689-90 to 1695-96), a kind of forerunner of *Notes and Queries*, being a penny weekly sheet, with a quarterly critical supplement. In the last part the publisher announces that it will be continued "as soon as ever the glut of news is a little over." Defoe's *Review* (1704-13) dealt chiefly with politics and commerce, but the introduction in it of what its editor fittingly termed the "scandalous club" was another step nearer the papers of Steele and the periodical essayists, the first attempts to create an organized popular opinion in matters of taste and manners. These little papers, rapidly thrown off for a temporary purpose, were destined to form a very important part of the literature of the eighteenth century, and in some respects its most marked feature. Although the frequenters of the clubs and coffee-houses were the persons for whom the essay-papers were mainly written, a proof of the increasing refinement of the age is to be found in the fact that now for the first time were women specially addressed as part of the reading public. The *Tatler* was commenced by Richard Steele in 1709, and issued thrice a week until 1711.

As from the "pamphlet of news" arose the weekly paper wholly devoted to the circulation of news, so from the general newspaper was specialized the weekly or monthly review of literature, antiquities, and science, which, when it included essay-papers, made up the magazine or miscellaneous repository of matter for information and amusement. Several monthly publications had come into existence since 1681, but perhaps the first germ of the magazine is to be found in the *Gentleman's Journal* (1691-94) of Peter Motteux, which, besides the news of the month, contained miscellaneous prose and poetry.

The increased influence of this class of periodicals upon the public opinion of our own era was first apparent in *Blackwood's Edinburgh Magazine*, founded in 1817 by the publisher of that name, and carried to a high degree of excellence by the contributions of Scott, Lockhart, Hogg, Maginn, Syme, and John Wilson, the editor. It is still issued, and has always

remained liberal in literature and conservative in politics.

From 1815 to 1820 a number of low-priced and unwholesome periodicals flourished. The *Mirror* (1823-49), a two-penny illustrated magazine, begun by John Limbird, and the *Mechanics Magazine* (1823) were steps in a better direction. The political agitation of 1831 led to a further popular demand, and a supply of cheap and healthy serials for the reading multitude commenced with *Chambers' Edinburgh Journal* (1832), the *Penny Magazine* (1832-45) of Charles Knight, issued under the patronage of the Society for the Diffusion of Useful Knowledge, and the *Saturday Magazine* (1832-44), begun by the Society for Promoting Christian Knowledge.

Recent shilling monthlies began with *Macmillan* (1859), the *Cornhill* (1860), and the *Temple Bar* (1860).

In 1889, apart from political newspapers, there were published in Paris 1,381 periodicals of all kinds. They may be classified in the following order:—Theology 95, jurisprudence 132, reviews 75, popular reading 172, history and geography 37, political economy and finance 243, science generally 26, mathematics 6, medicine 101, natural science 21, military 14, naval 12, fine arts 75, fashion 81, education 46, technology 137, agriculture 46, sport 24, miscellaneous 40.

Periodicals have been specialized in Germany to an extent perhaps unequalled in any other country. Those of a really high class have become very numerous and form a marked feature in the current literature.

There were in Austria, in 1848, 22 literary and 41 special periodicals, and in 1883 110 literary and 413 special periodicals. Germany possessed, in 1848, about 947 periodicals, and in 1884, 1,550. According to the *Deutscher Zeitschriften-Katalog*, 1884, there were published in Austria, Germany, and Switzerland in 1874, 2,219 periodicals in the German language.

Spurred by the success of the *Gentleman's Magazine* in England, Benjamin Franklin printed and published the earliest miscellany in America, under the title of the *General Magazine* (1741), at Philadelphia, which, owing to want of support, expired after six monthly numbers had appeared. Franklin's rival, John Webbe, brought out in opposition the *American Magazine* (1741), which ran only to two numbers. Further attempts at Philadelphia in 1757 and 1769 to revive periodicals with the same name were both fruitless. The other pre-revolutionary magazines were the *Boston American Magazine* (1743-47), an imitation of the *London Magazine*; the *Boston Weekly Magazine* (1743); the *Christian History* (1743-44); the *New York Independent Reflector* (1752-54); the *New England Magazine* (1758-60), a collection of fugitive pieces; the *Boston Royal American Magazine* (1774-75); and the *Pennsylvania Magazine* (1775-76), which, founded by R. Aitken, with the help of Thomas Paine, came to an untimely end upon the commencement of the war. The *Columbian Magazine* (1786-90) was continued as the *Universal Asylum* (1790-92). Matthew Carey brought out the *American Museum* in 1787, and it lasted until 1792. Five or six more magazines ran out a brief existence before the end of the century. One of the most successful of them was the *Farmer's Museum* (1793-99), supported by perhaps the most brilliant staff of writers American periodical literature had yet been able to show, and edited by Dennie, who in 1801 commenced the publication of the *Portfolio*, carried on to 1827 at Philadelphia. The *Literary Magazine* (1803-8) was established at Philadelphia by C. B. Brown, who, with Dennie, may be considered as having been the first American professional man of letters. The *Anthology*

Club was founded at Boston in 1803, by Phineas Adams, for the cultivation of literature and the discussion of philosophy. Ticknor, Everett, and Bigelow were among the members, and were contributors to the organ of the club, the *Monthly Anthology* (1803-11), the forerunner of the *North American Review*. In the year 1810 Thomas (*Printing in America*, ii. 292) informs us that twenty-seven periodicals were issued in the United States. The first serious rival of the *Portfolio* was the *Analectic Magazine* (1813-20), founded at Philadelphia by Moses Thomas, with the literary assistance of W. Irving (for some time the editor), Paulding, and the ornithologist Wilson. In spite of a large subscription list it came to an end on account of the costly style of its production. The first southern serial was the *Monthly Register* (1805) of Charleston. New York possessed no periodical worthy of the city until 1824, when the *Atlantic Magazine* appeared, which changed its name shortly afterward to the *New York Monthly Review*, and was supported by R. C. Sands and W. C. Bryant. For many years *Graham's Magazine*, published in Philadelphia, was the leading popular miscellany in the country, reaching at one time a circulation of about 35,000 copies. The first western periodical was the *Illinois Monthly Magazine* (1830-32), published in Southern Illinois, owned, edited, and almost entirely written by James Hall, who followed with his *Western Monthly Magazine* (1833-36), produced in a similar manner. In 1833 the novelist C. F. Hoffman founded at New York the *Knickerbocker* (1833-60), which soon passed under the control of Timothy Flint and became extremely successful, most of the leading native writers of the next twenty years having been contributors. Equally popular was *Putnam's Monthly Magazine* (1853-57, 1867-69). The *Dial* (1841-44), Boston, the organ of the transcendentalists, was first edited by Margaret Fuller, and subsequently by R. W. Emerson and George Ripley. Among other extinct magazines may be mentioned the *American Monthly Magazine* (1833-38), the *Southern Literary Messenger* (1834), Richmond, the *Gentleman's Magazine* (1837-40), and the *International Magazine* (1850-52), edited by R. W. Griswold. The *Yale Literary Magazine* dates from 1836. The *Merchants' Magazine* was united, in 1871, with the *Commercial and Financial Chronicle*. Foremost among existing magazines come *Harper's Monthly Magazine* (1850) and *Scribner's Monthly* (1870) (now *The Century*), the *Cosmopolitan*, the new *Scribner's*, all famous for their unrivaled wood engraving and literary excellence. Within the last few years the circulation of these two periodicals has increased to a remarkable degree, both at home and abroad. Not less admirable in their way are the *Atlantic Monthly* (1857), *Lippincott's Magazine*, the *Manhattan*, and *Belford's Magazine*.

The first attempt to carry on an American review was made by Robert Walsh, in 1811, at Philadelphia, with the *American Review of History and Politics*, which lasted only a couple of years. Still more brief was the existence of the *General Repository and Review* (1812), brought out at Cambridge by Andrew Norton with the help of the professors of the university, but of which only four numbers appeared. Niles' *Weekly Register* (1811-48) was political, historical, and literary. The *North American Review*, the oldest and most prosperous of all the American reviews, dates from 1815, and was founded by William Tudor, a member of the previously-mentioned Anthology Club. After two years' control Tudor handed over the review to the club, then styled the North American Club, whose most active members were E. T. Channing, R. H. Dana, and Jared Sparks. On his return from Europe, in 1819, Edward Everett became the editor; his elder brother,

Alexander, acquired the property in 1829. The roll of the contributors to this review numbers almost every American writer of note. Since January, 1879, it has been published monthly. The *American Quarterly Review* (1827-37), established at Philadelphia by Robert Walsh, came to an end on his departure for Europe. The *Southern Review* (1828-32), conducted by H. Legaré, S. Elliott, and G. W. Simms in defense of the politics and finance of the South, enjoyed a shorter career. It was resuscitated in 1842, and lived another ten years. These two were followed by the *Democratic Review* (1838-52), the *American Review*, afterward the *American Whig Review* (1845-52), the *Massachusetts Quarterly Review* (1847-50), and a few more. The *New Englander* (1843), the *Biblical Repertory and Princeton Review* (1825), and the *National Quarterly Review* (1860) are still published. The critical weeklies of the past include the *New York Literary Gazette* (1834-35, 1839), *De Bow's Review* (1846), the *Literary World* (1847-53), the *Criterion* (1855-56), the *Round Table* (1863-64), the *Citizen* (1864-73), and *Appleton's Journal* (1869). The leading weeklies of the day include the *Nation* (1865), the *Literary World* (1870), and the *Critic* (1881).

Religious periodicals have been extremely numerous in the United States during the last hundred years. The earliest was the *Theological Magazine* (1796-98). The *Christian Examiner* dates from 1824 and lasted down to 1870. The *Panoplist* (1805), changed to the *Missionary Herald*, still represents the American Board of Missions. The *Methodist Magazine* dates from 1818 and the *Christian Disciple* from 1813. The *American Biblical Repository* (1831-50), a quarterly, was united with the *Andover Bibliotheca Sacra* (1843) and with the *Theological Eclectic* (1865). *Brownson's Quarterly Review* began as the *Boston Quarterly Review* in 1838, and did much to introduce to American readers the works of the modern French philosophical school. Among more recent serials of this class we may notice the *Protestant Episcopal Quarterly Review* (1854), the *Presbyterian Magazine* (1851-60), the *Catholic World* (1865), the *Southern Review* (1867), the *New Jerusalem Magazine* (1827), *American Baptist Magazine* (1817), the *Church Review* (1848), the *Christian Review* (1836), the *Universalist Quarterly* (1844). Among historical periodicals may be numbered the *American Register* (1806-11), Stryker's *American Register* (1848-51), Edwards' *American Quarterly Register* (1829-43), the *New England Historical and Genealogical Register* (1847), the *Historical Magazine* (1857), the *New York Genealogical Record* (1869), and the *Magazine of American History* (1877.)

For many years the leading English periodicals have been regularly reprinted in the United States, and many serial publications have been almost entirely made up of extracts from English sources. Perhaps the earliest example is to be found in *Select Views of Literature* (1811-12). The *Eclectic Magazine* (1844) and *Littell's Living Age* (1844) are still published. On the other hand, the leading American periodicals and some of the journals have English offices of publication, and are there reprinted and published.

In 1817 America possessed only one scientific periodical, the *Journal of Mineralogy*. Professor Silliman established the journal known by his name in 1818. Since that time the *American Journal of Science* has enjoyed unceasing favor. Among other special periodicals of the day may be mentioned the *American Naturalist*, the *American Journal of the Medical Sciences*, the *American Journal of Speculative Philosophy*, the *American Journal of Philology*, the *American Railroad Journal*, the *Banker's Magazine*, the

*Index Medicus*, and the *Journal of the Franklin Institute*.

The number of periodicals devoted to light literature and to female readers has been, and still remains, extremely large. The earliest in the latter class was the *Lady's Magazine* (1792) of Philadelphia. The name of the *Lowell Offering* (1841), written chiefly by factory girls, is well known in England. *Godey's Lady's Book* is still issued. Children's magazines originated with the *Young Misses' Magazine* (1806) of Brooklyn; *St. Nicholas* is a modern high-class representative of this kind; another current example is the *Child's Paper* (1852).

The following estimate of the number of periodicals now appearing in the United States is taken from G. P. Rowell & Co.'s *American Newspaper Record* (1888). Weeklies, and those published more frequently than once a week, are omitted on account of the difficulty of distinguishing them from newspapers. The numbers given are—bi-weeklies, 61; semi-monthlies, 229; monthlies, 1,704; bi-monthlies, 25; quarterlies, 109.

PERIPATETICS was the name given in antiquity to the followers of Aristotle, from their master's habit of walking up and down as he lectured conversationally to his pupils. Others derive the name from the *Peripatos*, or covered walk of the Lyceum. Aristotle's central conception is the correlative opposition of form and matter. This may be called the supreme category under which he views the world; it is the point where, as Zeller puts it, Aristotle's system at once refutes and completes the Platonic doctrine of the "idea" in its relation to phenomena. But Aristotle did not succeed in expelling the dualism which he blamed in Plato. His deity is pure form, and dwells in abstract self-contemplation withdrawn from the actual life of the world. The development of the world remains, therefore, unrelated to the divine subject. In Aristotle's doctrine of man, precisely the same difficulty is experienced in connecting the active or passionless reason with the individual life, the latter being a process of development bound up with sense, imagination, and desire. The soul is originally defined as the entelechy of the body, and, moreover, not of body in general but of its particular body. It is impossible, therefore, from this point of view to speak of soul and body as separate entities. Yet Aristotle holds that besides the individual mind, which is all things potentially—which *becomes* all things—there is superinduced upon the process of development the active or creative reason, the pure actuality which the development presupposes as its necessary *prins*, just as the world-process presupposes God. This reason is "separable," and is said to enter "from without" when it unites itself to the process of individual life. It must, therefore, exist before the individual, and it alone outlasts the death of the body; to it alone properly belong the titles of "immortal" and "divine." But its relation to the universal divine reason was not handled by Aristotle at all. The question was destined to become the *crux* of his commentators. In general it is evident that, if reason in man be identified with the process of natural development (and there is Aristotelian warrant for declaring these to be simply two aspects of the same thing), we drift into a purely naturalistic or materialistic doctrine. On the other hand, the doctrine of the "active reason" may be maintained, but what Aristotle left vague may be further defined. The rational soul of each individual may be explicitly identified with the divine reason. This leads to the denial of individual immortality and the doctrine of one immortal impersonal reason, such as we find, for example, in the rationalistic pantheism of Averoes. A third position is possible, if the statements of Aristotle

be left in their original vagueness. Aristotle may then be interpreted as supporting monotheism and the immortality of separate rational souls. This was the reading adopted by the orthodox scholastic Aristotelians, as well as by those early Peripatetics who contented themselves with paraphrasing their master's doctrine.

Aristotle's immediate successors, Theophrastus, who presided over the Lyceum from 322 to 288 B.C., and Eudemus of Rhodes, were distinguished by a learned diligence rather than by original speculative power. The naturalistic tendency of the school reached its full expression in Strato of Lampsacus, who succeeded Theophrastus as head of the Lyceum, and occupied that position for eighteen years, (287–269 B.C.) His predilection for natural science earned for him in antiquity the title of "the physicist." He is the most independent, and was probably the ablest, of the earlier Peripatetics.

The successors of Strato in the headship of the Lyceum were Lyco, Aristo of Ceos, Critolaus (who, with Carneades the Academic and Diogenes the Stoic, undertook, in 155 B.C., the famous embassy to Rome, more important in its philosophical than in its political bearings), Diodorus of Tyre, and Erymneus, who brings the philosophic succession down to about the year 100 B.C.

From the outset the characteristic of the Aristotelian philosophy had been its disinterested scientific character; but the age was one for which speculation as such had lost its attractiveness. At such a time it was natural, therefore, that the Peripatetic school should suffer more than the others. It had also in practical matters taken up a mediating position, so that it lacked the attractions which, in the case of extreme views, enlist supporters and inspire them with propagandist zeal. The fact, at all events, is not to be denied that, after Strato, the Peripatetic school has no thinker of any note to show for about 200 years. With Strato, moreover, the scientific activity of the school has an end; when it received a new infusion of life its activity took another direction. Strato accuses the Peripatetics of this period of devoting themselves to the tricking out of commonplaces. This seems in great measure true of those who still occupied themselves with philosophy; they cultivated ethics and rhetoric, and were noted for the elegance of their style. But the majority followed the current of the time, and gave themselves up to the historical, philological, and grammatical studies which mark the Alexandrian age.

PERIPATUS. See MYRIAPODA.

PERITONITIS, inflammation of the peritoneum or membrane investing the abdominal and pelvic cavities and their contained viscera. It may exist in an acute or a chronic form, and may be either localized in one part or generally diffused.

*Acute peritonitis* may attack persons of both sexes and of any age. It is sometimes brought on, like other inflammations, by exposure to cold, but it would appear to arise quite as frequently in connection with some antecedent injury or disease in some of the abdominal organs, or with depraved conditions of the general health. The symptoms usually begin by a rigor, together with vomiting and pain in the abdomen of a peculiarly severe and sickening character, accompanied with extreme tenderness, so that the slightest pressure causes a great aggravation of suffering. The patient lies on the back with the knees drawn up, and it will be noticed that the breathing is rapid and shallow and performed by movements of the chest only, the abdominal muscles remaining quiescent, unlike what takes place in healthy respiration. The abdomen becomes swollen by flatulent distension of the intestines, which increases the patient's distress. There is usually con-

stipation. The skin is hot, although there may be perspiration; the pulse is small, hard and wiry; the urine is scanty and high colored, and passed with pain. The patient's aspect is one of anxiety and suffering. These symptoms may subside in a day or two, but if they do not the case is apt to go on rapidly to a fatal termination. In such an event the pain and tenderness subside, the abdomen becomes more distended, hic-cough and vomiting of brown or blood-colored matter occur, the temperature falls, the face becomes pinched, cold and clammy, the pulse exceedingly rapid and feeble, and death takes place from collapse, the patient's mental faculties generally remaining clear till the close. When the peritonitis is due to perforation, as may happen in the case of the gastric ulcer, or the ulcers of typhoid fever, the above-mentioned symptoms and the fatal collapse may all take place in from twelve to twenty-four hours. Further, the puerperal form of this disease, which comes on within a day or two after parturition, is always very serious and is often rapidly fatal. The symptoms are similar to those already described, but in addition there are generally superadded those of septicæmia (blood-poisoning).

*Chronic peritonitis* occurs in two forms:—(1) as a result of the acute attack; (2) as a tubercular disease. In the former case, the acute symptoms having subsided, abdominal pain to some extent continues, and along with this there is considerable swelling of the abdomen, corresponding to a thickening of the peritoneum, and it may be also to fluid in the peritoneal cavity. The tubercular form of peritonitis occurs either alone or associated with tuberculous disease of the lungs or other organs. The chief symptoms are abdominal pain and distension, along with disturbance of the functions of the bowels, there being either constipation or diarrhea, or each alternately. Along with these local manifestations there exist the usual phenomena of tuberculous disease, viz., high fever, with rapid emaciation and loss of strength. Cases of this kind are of grave import, and their tendency is to a fatal termination.

In the treatment of acute peritonitis the remedy upon which most reliance is to be placed is opium, which affords relief to the pain, and appears to exercise a certain controlling influence upon the inflammatory process. It requires to be given in considerable quantity, yet with due care, so as to avoid its narcotic action. The old plan of covering the abdomen with leeches is now seldom resorted to; nevertheless a moderate abstraction of blood by this means in a previously healthy person may contribute to the relief of the pain. Hot fomentations with turpentine or opium applied over the abdomen are of value. The strength must be maintained by milk, soups, and other light forms of nourishment. It is not in general desirable that the bowels should act, and this is one of the benefits obtained by the internal administration of opium. In the simple chronic form the use of iodine externally and of tonics with cod-liver oil internally will be found of service; while in the tubercular form remedies are as a rule of little value, but such symptoms as pain, fever, diarrhea, etc., must be dealt with by palliative measures appropriate to these conditions.

PERIZONIUS, JACOB, classical scholar, the most distinguished member of a learned Dutch family of that name (Voorbrock in the vernacular), was born at Dam, in Groningen, in 1651, and died in 1715. The works of Perizonius both as an author and as an editor were very numerous, and by universal consent entitle him to a place of the highest rank among the scholars of his age.

PERJURY is an assertion upon an oath duly administered in a judicial proceeding, before a competent

court, of the truth of some matter of fact, material to the question depending in that proceeding, which assertion the assertor does not believe to be true when he makes it, or on which he knows himself to be ignorant. In the early stages of legal history perjury seems to have been regarded rather as a sin than as a crime, and so subject only to supernatural penalties. The injury caused by a false oath was supposed to be done not so much to society as to the Divine Being in whose name the oath was taken (see OATH). One of the practical effects of this view was to make perjury so common in the Middle Ages that the probable reason for preserving trial by combat was the difficulty of securing a just cause against the perjury of witnesses. The almost universal existence of compurgation was no doubt another explanation of the frequency of perjury. At common law only a false oath in judicial proceedings is perjury. But by statute the penalties of perjury have been extended to extra-judicial matters, e.g., false declarations made for the purpose of procuring marriage, and false affidavits under the Bills of Sale Act, 1878. False affirmation by a person permitted by law to affirm is perjury. In order to support an indictment for perjury the prosecution must prove the authority to administer the oath, the occasion of administering it, the taking of the oath, the substance of the oath, the materiality of the matter sworn, the falsity of the matter sworn, and the corrupt intention of the defendant. The indictment must allege that the perjury was willful and corrupt, and must set out the false statement or statements on which perjury is assigned.

Subornation of perjury is procuring a person to commit a perjury which he actually commits in consequence of such procurement. If the person attempted to be suborned do not take the oath, the person inciting him, though not guilty of subornation, is liable to fine and punishment. Perjury and subornation of perjury are punishable at common law with fine and imprisonment.

In the United States the common law has been extended by most States to embrace false affirmations and false evidence in proceedings not judicial. Perjury in the United States courts is dealt with by an act of Congress of March 3, 1825, by which the maximum punishment for perjury or subornation of perjury is a fine of \$2,000 or imprisonment for five years. The jurisdiction of the States to punish perjury committed in the State courts is specially preserved by the same act. Statutory provisions founded upon 23 Geo. II., c. 11, have been adopted in some States, but not in others. In the States which have not adopted such provisions, the indictment must set out the offense with the particularity necessary at common law.

PERKINS, JACOB, inventor and physicist, was born at Newburyport, Mass., in 1766. He soon made himself known by a variety of useful mechanical inventions, and in 1818 went over to England with a plan for engraving bank-notes on steel, which, though it did not find acceptance at once, ultimately proved a signal success, and was carried out by Perkins, in partnership with the English engraver Heath, during the rest of his long business life. Perkins continued to be fertile of inventions, and his steam-gun, exhibited in 1824, attracted much attention, though the danger attending the use of highly compressed steam prevented its practical adoption. His chief contribution to physics lay in the experiments by which he proved the compressibility of water and measured it by a piezometer of his own invention. He retired in 1834, and died in London, July 30, 1849.

\* PERM, a government of Russia, on both slopes of the Ural Mountains, with an area of 128,250 square miles. Perm is the chief mining region of Russia,

owing to its wealth in iron, silver, platinum, copper, nickel, lead, chrome ore, and auriferous alluvial deposits. Many rare metals besides, such as iridium, osmium, rhodium, and ruthenium, are found along with the above, as also a great variety of precious stones, such as sapphires, jacinths, beryls, phenacites, chrysoberyls, emeralds, aquamarines, topazes, amethysts, jades, malachite. Salt-springs appear in the west; and the mineral waters, though still little known, are also worthy of mention. The population in 1881 amounted to 2,520,100, of which number 106,500 lived in towns.

PERM, capital of the above government, stands on the left bank of the Kama, on the great highway to Siberia, 930 miles northeast from Moscow. During summer it has regular steam communication with Kazan, 685 miles distant, and it is connected by rail with Ekaterinburg. It is the see of the bishop, and has an ecclesiastical seminary and a military school. The population of Perm, in 1879, was 32,350.

PERNAMBUCO, or RECIFE, a city and seaport of Brazil and the chief town of the extensive province of Pernambuco. As it is situated on the coast, not far from the point where the continent begins to trend toward the southwest, it is naturally the first port visited by steamers from Lisbon to Brazil. The city of Pernambuco lies low, and is surrounded by a swampy stretch of country, with no high ground nearer than the hill on which Olinda is built, eight miles to the north. It used to be considered the most pestilential of Brazilian seaports; but its sanitary condition has greatly improved. The great commercial staple is sugar. Cotton, which was first exported in 1778 and continued a small item till 1781, now holds the second place. Coal began to be imported in 1834. In 1889 the population of the town and immediate suburbs was 105,000.

PARNAU, in Russian PERNOFF, a seaport town and watering-place of European Russia, in the government of Livonia, is situated 155 miles north of Riga, on the left bank of the Pernau or Pernova, which about half a mile farther down enters the Bay of Pernau, the northern arm of the Gulf of Riga. The population was 6,690 in 1863, 9,525 in 1867, and 12,918 in 1881.

PÉRNE, ANDREW, a notable character in sixteenth-century history, was born at East Bilney, in England, in 1519. He is best known as a remarkable example of the tergiversation in reference to religious profession, which, owing to the sudden changes in the prescribed theological belief of the state, was only too common in his age. Doctor Perne died in 1589 while on a visit to Archbishop Whitgift, on whose gratitude he had established a lasting claim by the protection he accorded him during the persecution under Mary.

PÉRONNE, chief town of an arrondissement of the department of the Somme, France, and a fortified place on the right bank of that river, at its confluence with the stream called the Doingt or Cologne, lies ninety-four miles north-northeast of Paris, on the railroad from Paris to Cambrai.

PÉROUSE. See LA PÉROUSE.

PERPETUAL MOTION, or PERPETUUM MOBILE, in its usual significance does not mean simply a machine which will go on moving forever, but a machine which, once set in motion, will go on doing useful work without drawing on any external source of energy, or a machine which in every complete cycle of its operation will give forth more energy than it has absorbed. Briefly, a perpetual motion usually means a machine which will create energy.

The earlier seekers after the "perpetuum mobile" did not always appreciate the exact nature of their quest; for we find among their ideals a clock that would periodically wind itself, and thus go without human inter-

ference as long as its machinery would last. The energy created by such a machine would simply be the work done in overcoming the friction of its parts, so that its projectors might be held merely to have been ignorant of the laws of friction and of the dynamic theory of heat. Most of the perpetual motionists, however, had more practical views, and explicitly declared the object of their inventions to be the doing of useful work, such as raising water, grinding corn, and so on. Like the exact quadrature of the circle, the transmutation of metals, and other famous problems of antiquity, the perpetual motion has now become a venerable paradox. Still, like these others, it retains a great historical interest. Just as some of the most interesting branches of modern pure mathematics sprang from the problem of squaring the circle, as the researches of the alchemist developed into the science of modern chemistry, so, as the result of the vain search after the perpetual motion, there grew up the greatest of all generalizations of physical science, the principle of the conservation of energy.

It was no doubt the barefaced fallacy of most of the plans for perpetual motion that led the majority of scientific men to conclude at a very early date that the "perpetuum mobile" was an impossibility. We find the Parisian Academy of Sciences refusing, as early as 1775, to receive schemes for the perpetual motion, which they class with solutions of the duplication of the cube, the trisection of an angle, and the quadrature of the circle. Stevinus and Leibnitz seem to have regarded its impossibility as axiomatic; and Newton, at the beginning of his *Principia*, states, so far as ordinary mechanics are concerned, a principle which virtually amounts to the same thing.

PERPIGNAN, the ancient capital of Roussillon, and now the chief town of the department of Pyrénées Orientales, France, and a first-class fortress, stands about sixty-six feet above sea-level, on the right bank of the Tet, seven miles above the point where it falls into the Mediterranean. The fortifications of the citadel, which is large enough to contain 2,000 men, are of various times. Perpignan was the seat of a university founded by the kings of Aragon, and the town still possesses an interesting museum of sculptures and pictures, where are to be seen the first photographic proofs produced by Daguerre, a natural history collection, and a library containing 30,000 volumes. The manufactures of Perpignan are cloth making, cork-cutting, tanning, and cooperage, and it has a large trade in wine, brandy, honey, fine wool, fruit, and vegetables. The population, in 1881, was 31,735.

PERRAULT, CHARLES, the most prominent author of France in a specially French kind of literature—the fairy tale—and one of the chief actors in the famous literary quarrel of ancients and moderns, was born at Paris on January 12, 1628. No criticism of his famous productions is necessary, and it is scarcely less superfluous to observe that Perrault has no claim to the invention of the subjects. His merit is that he has treated them with a literary skill in adapting style to matter which cannot possibly be exceeded. He died on May 16, 1703.

PERRONE, GIOVANNI, Roman Catholic theologian, was born at Chieri (Piedmont) in 1794. He died on August 26, 1876. He was the author of numerous dogmatic works, which, as clearly and faithfully reflecting the prevailing tendencies of Roman theology, obtained wide currency and were extensively translated.

PERRY, an alcoholic beverage, obtained by the fermentation of the juice of pears. The manufacture is in all essentials identical with that of CIDER (*q. v.*), though there are some variations in detail arising from the more abundant mucilage of the pear.





**PERSIA,  
AFGHANISTAN  
AND  
BELUCHISTAN.**

SCALES.  
Persian Fursakhs (Parasangs),  
0 24 48 72 96 120 144 168 192 216 240 264 288 312 336 360 384 408 432 456 480 504 528 552 576 600  
English Statute Miles,  
0 10 20 30 40 50 60

Submarine Telegraph Lines, thus: S. T. or Sub. Tel.  
Names referring to Ancient Geography are in Light Characters.  
Heights in English Feet.



PERSEPHONE. See PROSERPINE.

PERSEPOLIS. In the interior of Persia proper, some forty miles northeast of Shíráz, and not far from where the small river Pulwár flows into the Kur (Kyrus), there is a large terrace with its east side leaning on Kúhi Rahmet ("the Mount of Grace"). The other three sides are formed by a retaining wall, varying in height with the slope of the ground from fourteen to forty-one feet; and on the west side a magnificent double stair, of very easy steps, leads to the top. On this terrace, which is not perfectly level, stand and lie the ruins of a number of colossal buildings, all constructed of exquisite dark-gray marble from the adjacent mountain. The stones were laid without mortar, and many of them are still *in situ*, although the iron clamps by which they were fastened together have been stolen or destroyed by rust. The mason-work is excellent, and the style of the lofty palaces, colonnades, and vestibules most imposing. Especially striking are the huge pillars, of which a number still stand erect. No traveler can escape the spell of these majestic ruins. It is to be observed that several of the buildings were never finished. Stolze has shown that in some cases even the mason's rubbish has not been removed, and remarks accordingly that in those early times, just as at the present day, an Oriental prince would rather commence a new building of his own than complete the unfinished work of his predecessor.

These ruins, for which the name *Chihil menáre* or "the forty minarets" can be traced back to the thirteenth century, are now known as *Takhti Jamshíd*, "the throne of Jamshíd" (a mythical king). That they represent the Persepolis captured and partly destroyed by Alexander the Great has been beyond dispute, at least since the time of Pietro della Valle.

In the time of its greatest prosperity the Persian metropolis must undoubtedly have covered a great part of the extremely fertile valley of the Pulwár. It is not at all necessary to suppose that its limits are determined by the two heaps of ruins. The great bulk of the houses would, of course, be built in the wretched manner which is all but universal in the East.

The name Persepolis appears to have been first used by Clitarchus, one of the earliest, but unfortunately one of the most imaginative, annalists of the exploits of Alexander. The word was no doubt meant to allude to the "Persians," but apparently he preferred this extraordinary form to the regular "Persopolis" for the sake of a play on the destruction (*persis*) which he relates. Later writers have followed him in the use of the name Persepolis. For information about the capture and treatment of the city by Alexander we are almost entirely dependent on narratives which are based on Clitarchus, since Arrian unfortunately disposes of this episode in a very summary fashion.

Alexander, having crushed the resistance of the Persian army under Ariobarzanes at the "Persian Gates," marched rapidly on the capital. Ariobarzanes had made his way thither with a few followers, but was refused admission by Tiridates, the commandant of the citadel, who had already commenced negotiations with Alexander, and at last surrendered the place with its immense treasures to the conqueror. In a subsequent battle Ariobarzanes was killed. Alexander then ordered a general massacre, and gave up the city to be plundered. In the citadel he placed a garrison of 3,000 men under Nicarchides, and then caused the royal palaces to be set on fire—certainly not in a drunken freak, but apparently with deliberate calculation on the effect it would produce on the minds of the Asiatics.

PERSEUS, a hero of Grecian fable, son of DANAE (*q.v.*) and Zeus. When Perseus was grown to man-

hood Polydectes, the wicked king of Seriphus, cast his eye on Danae; and, that he might rid himself of the son, he exacted of him a promise that he would bring him the head of the Gorgon Medusa. Now the dreadful GORGONS (*q.v.*) dwelt with their sisters the Grææ (the Gray Women) by the great ocean, far away in the west. Guided by Hermes and Athene, Perseus came to the Grææ. They were three hags, with but one eye and one tooth among them, which they handed one to another. Perseus stole the eye and tooth, and would not restore them till the Grææ had guided him to the Nymphs, from whom he received the winged sandals, the wallet, and the cap of invisibility. These he put on, and, being armed by Hermes with a cimeter, came upon the Gorgons as they slept and cut off Medusa's head, while with averted eyes he looked at her image on his brazen shield lest he should be turned to stone. Perseus put the Gorgon's head in his wallet and fled. Coming to Æthiopia he delivered and married ANDROMEDA, (*q.v.*) With her he returned to Seriphus in time to rescue his mother and Dictys from Polydectes, whom he turned to stone along with all his court by showing them the Gorgon's head. The island itself was turned to stone, and was still and lonely ever after; the very frogs of Seriphus (so ran the proverb) were dumb. Perseus then gave the head of Medusa to Athene, who put it on her shield, and with Danae and Andromeda, he hastened to Argos to see his grandfather, Acrisius, once more. But he, fearing the oracle, had gone to Larissa, in Thessaly. Thither his grandson followed him, but at some games given by Teutamias, king of Larissa, he threw a quoit which lighted on his grandfather's foot and caused his death. Ashamed to return to Argos, Perseus gave his kingdom to Megapenthes, and received from him Tiryns in return. There he reigned and founded Midea and the famed Mycenæ, and became the ancestor of the Persides, among whom were Eurystheus and Heracles.

PERSIA, or ÍRÁN. In modern political geography these two terms are synonymous; the kingdom which we call Persia the Persians themselves call Írán.

The name Írán was originally of much wider signification than Persia, and the whole upland country from Kurdistán to Afghánistán may, in accordance with the native use of its ancient inhabitants, be called the Iranian upland. The inhabitants of this upland, together with certain tribes of the same race in adjacent lands, shared with their near kinsmen in India the name of Aryans (Ariya, Airya of the *Avesta*; Sk. Árya).

Modern Írán, or Persia, does not embrace nearly the whole Iranian upland, still less all men of Iranian nationality, that is, all who speak an Iranian dialect akin to Persian. On the other hand, the modern kingdom of Írán has many subjects who are not Iranians ethnographically, but come originally from Central Asia or Arabia, and speak Turkish or Arabic.

The series of the great Iranian monarchies begins for us with the Median empire of Ecbatana. Unfortunately, we possess but little trustworthy information about its history, being almost wholly dependent on what two Greeks, Herodotus and Ctesias, who wrote long after the fall of the kingdom, report from the mouths of Orientals. These two authorities differ so widely that their statements are to a great extent mutually exclusive.

Herodotus says the Medes freed themselves from the Assyrians, and lived for a time without a master till Deioeces obtained the kingly power by stratagem. The duration of the kingdom is exactly a century and a half, divided into two exactly equal portions, each of which is occupied by the reigns of two kings. BOSTON

further, according to Herodotus, the rule of the Medes over Upper Asia, *i.e.*, the land east of the Halys, lasted 128 years, save only the twenty-eight years during which the Scythians ruled. It is easy to see that "save only" means "minus," and that thus the foreign supremacy of the Medes is reckoned at exactly 100 years, or two-thirds of the total duration of the kingdom. Obviously such figures can at most be only approximately correct.

Ctesias' narrative opens with a highly-colored description of a real event, namely, the destruction of Nineveh by the leader of the Medes, called by him Arbaces, with the help of the Babylonian Belesys (the historical Nabopolassar). But the fact that by this event the position of Media as a great power was for the first time assured is mixed up by Ctesias with the beginning of the monarchy itself. In addition, he grossly exaggerates the duration of the empire; so that we arrive at the monstrous result that between 606 or 607, the real date of the destruction of Nineveh, and 550, the year of the fall of the Median supremacy, more than 300 years are supposed to have elapsed.

Down to the destruction of Nineveh we must ignore Ctesias almost completely and follow Herodotus alone.

In perfect harmony with the conditions of development of a small state into a great power is the statement of Herodotus that the second king of the Medes, Phraortes (*Fravarti*; according to Herodotus' reckoning 656-634 [647-625]), extended his sway beyond the limits of Media and first of all subjugated Persis, or Persia proper, the secluded mountain-land southeast of Media. During all this time, indeed, as we learn from Darius' great inscription, Persis had kings of its own; but these were simply vassals of the sultan who had his seat in Ecbatana.

Phraortes' successor, Cyaxares (*Huwakhshatara*; according to Herodotus' reckoning 634-594 [625-585]), brought the empire to the highest pitch of power. He is said to have introduced fixed tactical arrangements into the army. It was to him that the pretenders whom Darins had to overcome traced their descent, as he tells us himself.

Cyaxares marched against Nineveh and destroyed it about 607. Not only Ctesias but also Berosus asserts that the king of the Medes achieved this great success in league with the king of Babylon. After the fall of Nineveh, Nebuchadnezzar, the son of Cyaxares, made himself master of Syria and Palestine, and Cyaxares acquired most of the rest of the Assyrian territory. Probably Assyria proper belonged to him also. When Cyaxares afterward began the war with the Lydians he was already master of Armenia and Cappadocia, though he probably did not acquire them until after he had got rid of the Scythians and destroyed Nineveh. The pretext for the war was afforded by the flight of some Scythians in Cyaxares' service to Alyattes, king of Lydia; but the real cause was doubtless thirst of conquest. The war lasted for five years with varying fortune, and was ended by the battle during which the eclipse of the sun, said to have been predicted by Thales, took place. The terrified combatants saw in this a divine warning and hastily concluded peace.

The Median empire must at this time have reached a tolerably high degree of civilization. The consideration enjoyed by the Median monarch is proved by the fact that in Western lands which never came in contact with it at all its name was so familiar that more than 100 years after its fall the Persians were still mostly called Medes by the Greeks; in particular the wars of independence with the Persians still went at a much later date simply by the name "the Median wars."

Nor was the Median empire properly destroyed by Cyrus; it was only transformed.

We possess three accounts of the mode in which the transition was effected, that of Herodotus, that of Ctesias (of which that of Dinon, preserved only in some fragments and vestiges, is merely a variation), and that of Xenophon in the *Cyropædia*. Though Xenophon had before him the works of both Herodotus and Ctesias, we must, with Niebuhr, regard his book as nothing more than an extremely silly romance; the attempts to employ it as an independent historical source have always failed. Herodotus probably got his charming narrative directly or indirectly from the descendants of Hargagus, a man who undoubtedly played a chief part in transferring the supremacy from the Medes to the Persians. Ctesias' narrative, which we are obliged to piece together from Nicolaus Damascus, Photius, Justin, Polyænus, and Diodorus, is highly colored, but in parts very pretty, and has, in contradistinction to Xenophon's romance, a genuinely Oriental stamp. It appears to be based on the account of a Mede, who gave a marked preference to his own people, and represented the founder of the Persian empire in as unfavorable a light as it was possible for a Persian subject (and probably an official) to do.

Stripped of its romantic features, Herodotus' narrative of the rise of Cyrus is in fundamental harmony with the new document which we possess on the subject, in the shape of annals inscribed on a Babylonian tablet.

After the taking of Ecbatana, which made Cyrus the great king, he must have had enough to do to subdue the lands which had belonged to the Median empire. Little reliance can be placed on Ctesias' account of these struggles. Herodotus states that the Bactrians, who according to Ctesias were soon subdued, were, like the Sacræ, not subjugated until after the conquest of Babylon.

The next war was against the powerful and wealthy king Cræsus of Lydia, who ruled over nearly the whole western half of Asia Minor. It was a continuation of the war between the Medes and Lydians which had been broken off in 585.

The date of Cræsus' fall is not quite certain. It may have been 547 or 546. From that time forward the Lydians never made the slightest attempt to shake off the Persian rule.

But now began that struggle of the Persians with the Greeks which has had so much importance for the history of the world. But Harpagus and other Persian leaders quickly took one Greek town after the other; some, like Priene, were razed to the ground. Some of the Ionians, such as the Teians, and most of the Phocæans, avoided slavery by emigrating. Miletus alone, the most flourishing of all these cities, had early come to an understanding with Cyrus, and the latter pledged himself to lay no heavier burden on it than Cræsus had before him.

Though Cyrus had made, and continued to make, conquests in the interior of Asia, he was still without the true capital of Asia, Babylon, the seat of primeval civilization, together with the rich country in which it lay, and the wide districts of Mesopotamia, Syria, and the border-lands over which it ruled. Before the capture of the city, in the summer of 539, a great battle took place, in consequence of which Cyrus occupied the capital without any further serious fighting, since the Babylonian troops had mutinied against their king. Late in the autumn of 539 Cyrus marched into Babylon, Nabunaid, the king, having previously surrendered himself. According to Berosus, Cyrus appointed Nabunaid governor of Carmania, east of Persis; but in the annals inscribed on the tablet it is said to be recorded that Nabunaid died when the city was taken.

How far to the east Cyrus extended his dominion we do not know, but it is probable that the countries to the east which are mentioned in the older inscriptions of Darius as in subjection or rebellion were already subject in the time of Cyrus.

Different accounts of Cyrus' death were early current. Herodotus gives the well-known didactic story of the battle with Tomyris, queen of the Massagetæ, as the most probable of many which were told.

Cyrus died in the beginning of the year 529. He left behind him two sons, Smerdis (Persian *Bardiya*) and Cambyses (*Kambujiya*); their common mother was according to Herodotus an Achæmenian, according to Ctesias the daughter of the Median king. The great inscription of Darius states that Cambyses caused Smerdis to be put to death without the people being aware of it. From this it follows that the partition of the kingdom between the two brothers, of which Ctesias speaks, can hardly have taken place; for the murder of a king or consort could not have remained concealed. Nothing else is told us about the earlier part of the reign of Cambyses. It is only when we come to his conquest of Egypt that we have more exact information.

It seems that only one great battle was fought, at Pelusium, the gateway of Egypt. The Egyptians, utterly beaten, fled to Memphis, which soon fell into the enemy's hands. Thus Egypt became a province of Persia. This was followed by the submission of the neighboring Libyans and the princes of the Greek cities of Cyrene and Barca. The peculiar religious feelings of the Egyptians were almost as easily wounded as those of the Jews were in later times. The Persians, flushed with victory, recked little of Egyptian wisdom or folly, least of all recked the brutal king. No doubt the Egyptian priests greatly exaggerated the king's wickednesses, but enough remains after all deductions.

The empire was extended in another direction, when Polycrates, the powerful tyrant of Samos and the neighboring islands, sought safety in submission to the great king.

Suddenly, however, the empire rang with the news that the king's brother Smerdis had seized the crown in Persis. We are now in possession of Darius' own account of these events, and can fairly dispense with the Greek narratives; but we may note that here again, in spite of his poetical coloring, Herodotus stands the test much better than Ctesias. Gaumâta, a Magian, gave himself out as Smerdis (spring of 522) and formally assumed the government. Even Darius' account lets us see that Cambyses was very unpopular, and the same thing appears from the fact that everybody sided with the new king. Cambyses seems to have marched against him as far as Syria, but there he put an end to himself—an end plainly affirmed by the great inscription, and quite in keeping with the wildly passionate nature of the man. Gaumâta reigned, universally acknowledged, and, as it seems, beloved, because he granted extensive remissions of taxes. He appeared in the character of Smerdis, son of Cyrus, and therefore as *Persian*. Seven persons conspired against him. The conspiracy was completely successful; and the seven killed Gaumâta in the fortress Sikathahuvati, near Ecbatana, in the land of Nisa, in Media. Darius was then made king.

Darius (*Darayavahu*, in the nominative *Darayavahush*) was then, according to Herodotus (i. 209), about thirty years of age. He acted very energetically and promptly; and the chief provinces were undoubtedly reduced to subjection in the first three years of his reign. The experience gained by Darius in the first unsettled years of his reign must have been in part the occasion of his introducing numerous improvements into the

organization of the empire. Governors with the title of satraps (*khshathrapâvan*, i.e., land-rulers) there had been before, but Darius determined their rights and duties.

Herodotus says that Darius caused the Indus to be explored from the land of the Pactyans (Pakhtu, Afghâns) to its mouth by Scylax, a Greek or rather Carian, and then conquered the country. But in any case this Persian "India" was only one portion of the region of the Indus. If this conquest was somewhat adventurous, much more so was the enterprise against the Scythians. The expedition failed—not through the superior tactics of the Scythians, who behaved just as might be expected of such nomads, with a mixture of timidity and audacious greed of booty—but through the impassable and inhospitable nature of the country, through hunger and thirst, through exhaustion and disease. After sustaining heavy losses Darius was obliged to retreat across the Danube. That the Scythians immediately followed up their enemy, or that they even opened negotiations with the Spartans, as Herodotus states, is not to be supposed. Moreover, Megabyzus, whom Darius on his return left behind in Europe, subdued great districts of Thrace along with the Greek cities on the coast. The king of Macedonia also acknowledged the great king as his liege lord.

The eyes of the Persians were now turned toward Greece proper. While the Greek coast of Asia Minor was indispensable to the power which held the interior, the possession of the mother-country of Hellas was, as we can easily see, not only unnecessary but positively dangerous to the Persians, especially as they were themselves absolutely unfitted for the sea. But to the Persians of those days, absorbed in schemes of universal empire, considerations such as these could not present themselves. The subjugation of the rest of the Greeks of the mainland and islands, as well as of the Carians, now rapidly followed, not without dreadful massacres and devastations. The Phœnicians, who formed the main body of the Persian fleet, seem to have been especially zealous in the work of destruction.

Mardonius cherished great designs. He wished to conquer Greece itself. He did actually conquer Greeks and non-Greeks in the northwest of the Archipelago, but at the promontory of Athos his fleet was shattered by a storm.

The second expedition against Greece was on a greater scale. Under the conduct of the Mede Datis and the younger Artaphernes, son of Darius' brother of the same name, the Persians took Naxos, and destroyed Eretria in Eubœa, the inhabitants of which had sent five ships to help the Ionians at the beginning of the revolt. But at Marathon they were utterly defeated by the Athenians and Plateæans (September or October, 490). It was the first great victory of the Greeks over the Persians in the open field; the moral impression had an immense effect in the sequel, when the danger was much greater.

The southwest of the empire alone had hitherto remained free from rebellion against Darius. Darius, who had been with Cambyses in Egypt, treated the Egyptians with forbearance, and in return loyal priests praised him to fellow-countrymen and Greeks. If a notice of Polyænus is to be trusted, he must have gone in person to Egypt in the year 517, in order to lighten the burdens of the people. Among other measures which promoted the material well-being of the land, he made a canal from the Nile to the Red Sea, as an inscription of the king himself testifies to this day. But the hatred of the Egyptians to the Persians was too great. In the year 486 the first great insurrection of the Egyptians against the Persians took place. Darius

did not live to see the revolt put down, for he died in the following year, 485.

Darius is the most remarkable king of the dynasty of the Achæmenians, and perhaps the most remarkable of all the native kings of Iran. He was as energetic as he was prudent. He was, of course, a despot, and could be ruthless and even cruel, but on the whole he was inclined to be mild. He was succeeded, apparently without any disturbance, by his son Xerxes (*Khshayárshá*) I., who as son of Atossa, elder daughter of Cyrus, had probably always been regarded as heir-apparent. The subjugation of Egypt was effected in 484.

Babylon, too, seems to have again risen in revolt. Ctesias assigns to this date the revolt with which the well-known story of Zopyrus is connected, naming instead of Zopyrus his son Megabyzus. The long siege of which Herodotus speaks does not, as we saw, fit in with the revolt under Darius; it belongs, perhaps, to the time of Xerxes.

Xerxes was firmly resolved to wipe out the disgrace of Marathon, and to bring the whole of Greece under the yoke. His mighty preparations for the march thither had been interrupted by the revolt of Egypt, and, if our conjecture is right, of Babylon. They were now vigorously recommenced; and provision was made for the maintenance of the army, at least within the limits of the Persian domain. Xerxes himself went to Sardis, the first great rendezvous. From there he set forward in the spring of 480. We will not further describe the great expedition, which, after the dearly-bought successes at Thermopylæ and Artemisium, ended with the defeats of Salamis (September, 480) and Plataea (479); all this belongs rather to the history of Greece.

We stand here at the decisive turning point of Persian history. Later Greece may have been coveted and designs against it cherished, but no enterprises were undertaken. The Persians were thrown back upon the defensive. Though they often afterward exercised an influence on the history of Hellas by means of money or diplomacy, still the respect for their fighting power was gone, and so far it is possible to regard Alexander's expedition as a result and continuation of the old struggles, and the saying of Æschylus, "In Salamis the power of the Persians lies buried," may be called prophetic.

About this time Xerxes was assassinated by Artabanus, captain of the body-guard; his youngest son, Artaxerxes, in league with the murderer, put to death his elder brother Darius, who had a better title to the throne.

Artaxerxes (*Artakhshathra*) I. came to the throne in 464. Hardly was Artaxerxes seated on the throne when the second great revolt of Egypt broke out, and the Athenians were rash enough to involve themselves in the struggle (about 460). The Athenians in Egypt were annihilated (probably 455); the same fate befell a reinforcement of fifty ships.

These are the last contests of the Athenians and their allies with the Persians. Peace must have been concluded shortly afterward.

The conclusion of peace did not prevent the Persians, or at least individual satraps, from occasionally supporting enemies of Athens.

During the early years of the Peloponnesian War the Spartans repeatedly held communications with the Persians, whose assistance they desired against Athens. These negotiations were, for the time being, without result. Of the internal state of the empire during the long reign of Artaxerxes I. we know very little.

Artaxerxes died in 424. His successor, Xerxes II., the only one of his eighteen sons who was legitimate, was murdered after a month and a half by his brother Secydianus or Sogdianus. But after six and a half

months the murderer was in his turn overthrown by his brother Oehus, satrap of Hyrcania, and, in violation of solemn oaths, put to death. Oehus assumed the name of Darius, ascending the throne about the beginning of the year 423. Darius II. is called Nothus or Syrus. The king's full brother Arsites, in conjunction with another son of Megabyzus, Artyphius, raised the standard of revolt, probably in Syria. But his Greek soldiers were bribed, and thus he fell into the hands of the royalists, and, in violation of the oath, was put to death at the instigation of Parysatis. The same fate befell some of those who had taken part in the murder of Xerxes II. Darius had presumably come forward from the beginning as his avenger. Soon after 410 the great revolt of the Egyptians was successfully accomplished. The first independent king was called Amyrtæus, and was presumably a grandson or other relative of the former Amyrtæus. The deep decay of the Persian military power is proved by the fact that for sixty years it failed to reduce the unwarlike Egyptians, though the latter were frequently divided among themselves by internal dissension and double rulers.

Pissuthnes, satrap of Sardis, had also revolted. Tissaphernes, who here appears for the first time, put down the rebellion by the usual means of bribery and perjury; the Athenian Lycon, leader of Pissuthnes' Greek mercenaries, plays a far from honorable part in the affair. The events fall after 424, and at least some years before 412. But Pissuthnes' son Amorges continued the revolt in Caria, and was supported therein by the Athenians, perhaps because they already knew for certain that Tissaphernes was preparing to help the Spartans.

When the power of Athens seemed annihilated by the dreadful catastrophe in Sicily, the Persians expected to regain the whole seacoast. Tissaphernes, satrap of Sardis, and his rival Pharnabazus, satrap of Hellespontine Phrygia, vied with each other in invoking the help of the Spartans. The party hostile to Athens in the cities of the mainland and in the islands displayed great zeal in bringing about the alliance.

About the time of the conclusion of peace between Athens and Sparta Darius II. died. Arsicas ascended the throne under the name of Artaxerxes (II). The surname "Mnemon" (the mindful) seems again to have been first mentioned by Dinon. The younger and much abler son, Cyrus, preferred by Parysatis, came with 300 Greek mercenaries, no doubt to seize the throne, but he was too late. Tissaphernes, professedly the friend of Cyrus, warned the king against him, and with good reason. Cyrus was arrested, but at the instance of Parysatis he was released and sent back to his satrapy—a very unwise measure, for his ambition was only inflamed by his imprisonment and by his exasperation against Tissaphernes.

No sooner was Cyrus in his satrapy again than he began to make great encroachments. He gained over the Ionian cities which belonged to the province of Tissaphernes and laid siege to Miletus, which adhered to Tissaphernes. On Orontes, a partisan of the latter, he made open war. Meantime he collected under false pretexts an army of Greek mercenaries, and in 401 set out with the real purpose of seizing the throne. He had with him nearly 13,000 Greek mercenaries commanded by Clearchus, a Spartan exile, and a vast host of Asiatics. Cyrus advanced boldly, confident in the military superiority of the Greeks; but he had some trouble in carrying them with him as far as Syria and Babylonia, for they were not engaged for so distant a goal. He made his way without difficulty into the heart of the empire. Neither the passes of the Taurus leading from Cappadocia into Cilicia nor those of the Amanus from

Cilicia into Syria were blocked. The vassal-prince of Cilicia, Syennesis, put a good face on a bad business, and let him through. Even the line of defense between Babylonia and the Mesopotamian desert was unoccupied. At Cunaxa, 500 stadia from Babylon, they came upon the mighty royalist army. The Greeks carried everything before them; the king proved a miserable coward and fled. But in fighting the Asiatic rabble, Clearchus seems to have adhered too pedantically to the cautious Spartan tactics, and not to have dashed with sufficient rapidity at the enemy's center. Cyrus, however, rushed foolhardily into the *mêlée* and there fell.

Even if we deduct much from Xenophon's idealistic portrait, we must still admit that Cyrus was a very able and in many respects honorable man, far worthier of the throne than his brother. Cyrus' Greeks were an object of terror to the king's troops. All the deception and crimes employed against them had their source in cowardice. The king's hosts were reënforced by the army of Cyrus, which after their leader's fall passed over to the enemy; but all these Asiatics trembled before the dauntless Greek mercenaries, comparatively few in number as they were and strangers to the country. It is characteristic of the state of the empire that Tissaphernes allowed the Greeks to plunder the villages which were the special property of Parysatis; he probably thought that with the death of her favorite son her power was broken, while he himself had succeeded in appearing as the deliverer of the empire. After electing fresh leaders in place of those who were foully assassinated, the "ten thousand" made themselves a way through wild mountains and wild peoples; they had to endure a thousand dangers and hardships, but from the king's forces they experienced no serious hindrance.

This expedition revealed to the Greeks the weakness of the empire and the cowardice of its rulers and defenders. Cyrus had penetrated to its center without striking a blow, and an army of ordinary Greek mercenaries proved itself more than a match for the power of the whole empire. It was perceived how helpless the colossus was; it was perceived that great territories, which had been regarded as royal provinces, were completely independent.

Tissaphernes succeeded to all the privileges of the post which Cyrus had occupied. This could not but hasten the inevitable conflict with Sparta, which now, at the height of her power, could not bring herself to fulfill the treaty and resign to the Persians all the Greek cities of Asia Minor. The Greeks expected to be protected by Sparta against Tissaphernes, who was already enforcing his rights with the strong arm, and the war which the Spartans began in 401 against the Persians in Asia Minor was no doubt popular, but as a land-power with limited resources they were not in a position to conduct much more than a purely predatory war. At the head of the Persian fleet the Athenian admiral, Conon, utterly defeated the Spartans at Cnidus (beginning of August, 394). In a short time nearly all the islands and cities on the Asiatic coast were freed from the Spartan prefects ("harmosts"), and Conon carried his point of nowhere occupying the citadels with Persian garrisons. The Spartan sovereignty of the seas, after lasting ten years, was over forever.

As the land-war in Greece dragged on for a long time, the Spartans had again recourse to diplomacy. The Spartans at last succeeded through their ambassador Antalcidas and through Tiribazus in bringing about a peace, and all the more important states of Greece found themselves obliged to accede to it, however unwillingly. This is the notorious peace of Antalcidas, which Tiribazus laid before the delegates of the Greeks at Sardis or Ephesus in 387.

Thus Greece was split up into a thousand petty communities, which Sparta, who did not dream of extending the independence to her own subjects, could with ease dominate collectively. Through this peace the Spartans gained for about sixteen years a much greater power over the Greek mainland than they had ever possessed before, and they ruthlessly turned it to account. The real gain to Persia by the peace was a firm hold on the seacoast. The domineering attitude toward the other Greeks was a mere appearance. In the following decades the king repeatedly commanded peace, even after Thebes had completely broken the power of Sparta (371). The powers for the time being employed Persian intervention as a means to their own ends, and there were plenty of diplomatic negotiations with the king, but Persia had no advantage from them. Moreover, now one, now another Greek state supported rebel satraps and vassals. They all, the king as well as the rebels, procured mercenaries from Greece.

Meantime another enemy to the Persian supremacy in the west had arisen—an enemy who, if Athens, his friend and sympathizer, had at that time been once more a great naval power with an aggressive policy, might perhaps have excluded the Persians from all the western seas. Evagoras of Salamis had made himself the almost independent lord of Cyprus, relying on the ancestral antagonism of the Greek to the Phoenician element in the island. As early as 390 forces were levied against him. Athens, under obligations to him on Conon's account, supported him openly, although she was at that time still formally leagued with the Persians against Sparta. After the peace of Antalcidas Persia made great efforts to reduce Evagoras again to subjection. He was in league with Egypt, scoured the seas far and wide, and had even for some time maintained a siege of Tyre. The cunning Cypriot also kept up a secret correspondence with the vassal princes of Caria. After a ten years' struggle he had to yield to superior force, but by skillful negotiation with the satraps he was able to procure a tolerable peace. Soon afterward he was murdered, but his descendants long continued to be princes of different towns in Cyprus.

About this time probably the expedition of Artaxerxes against the Cadusians took place, of which Plutarch, after Dinon, has given us a detailed account. The Cadusians are the inhabitants of the modern Gilán, who were probably never completely subdued, and who certainly by their raids inflicted much annoyance on the neighboring territory of the king. Darius II. had taken the field against them shortly before his death, and the repeated mention in the fragments of Ctesias of the Cadusians at the time of the Median empire is presumably a reflex of the state of things in his own day. Artaxerxes' campaign turned out disastrously.

Meanwhile the war with Egypt was never quite at a standstill. Even before the subjugation of Evagoras much fighting took place, but without result. Our knowledge of the particulars, even of the chronology, is very inexact.

The last part of the reign of Artaxerxes II. is filled with revolts of the satraps and chiefs of Asia Minor, of which we have numerous but mostly isolated and, to a large extent, inexact accounts. These revolts, which lasted in part into the reign of Artaxerxes III., must have weakened immensely the imperial power in the western provinces, and prepared the way for the Macedonians.

At the instigation of Parysatis Artaxerxes had married his own daughter Atossa. She used her interest to secure the succession for the energetic and violent Ochus, who is said to have promised to marry her. Soon afterward the aged Artaxerxes died after a reign of

forty-six years (in the course of the year 358). Many stories are told of his mildness and affability, but, even if they are true, they have little significance. The contempt for his brother which Cyrus exhibited was perfectly justified; under the effeminate king the empire gradually fell to pieces.

But his successor Ochus, who took the title of Artaxerxes (III.), was of a different stamp. He was, it appears, one of those great despots who can raise up again for a time a decayed Oriental empire, who shed blood without scruple and are not nice in the choice of means, but who in the actual position of affairs do usually contribute to the welfare of the state as a whole. At the very beginning of his reign he secured himself on the throne by a massacre of his nearest relatives. But for awhile the empire was in a state of absolute dissolution. Artabazus headed a revolt in Phrygia. The revolt of Orontes (or Orontas) fell somewhat later.

The war in Egypt still went on. And now the cities of Phœnicia, previously so trustworthy, also revolted, and so did the kings of Cyprus. Even in Judæa there must have been an insurrectionary movement. Mentor succeeded in everywhere sowing dissension between the Greek mercenaries of the Egyptian king and the Persians; and even more by intimidation than by the sword Egypt was, after long independence, again made a Persian province (344).

Thus by force and policy the old state of the monarchy was restored in all the western lands. Mentor, the real conqueror of Egypt, was splendidly rewarded. He received the satrapy of the west coast of Asia Minor, and quickly removed by cunning and treachery Hermias, tyrant of Atarneus and the friend of Aristotle, who had concluded treaties like an independent prince and stood in suspicious relations to King Philip of Macedonia. Of course no one thought of danger to Asia Minor, much less to the whole empire, but Philip's efforts to secure the mastery of the Bosphorus and Hellespont were enough in themselves to excite grave anxiety.

As early as 350 the story went that Philip had sent an embassy to the king, and it is definitely stated that he concluded a treaty with Ochus. The pacific intentions of the Persians, at least for the moment, were no doubt sincere; not so those of Philip, who had to subdue Greece before he could put into execution his designs on Asia Minor, a circumstance overlooked by the honest but politically short-sighted Isocrates in his exhortation to Philip to attack Persia (347-346). Probably Demosthenes was not alone in perceiving that the safety of Greece now lay in an alliance with the Persians against Philip. Negotiations went on busily between Athens and the king, who at all events sent subsidies repeatedly for the conflict with Macedonia. In the year 340 Persia interfered actively by rescuing, in conjunction with Athens, the town of Perinthus, on the Propontis (and therefore close to Persian territory), which was besieged by Philip; and the Macedonians could perhaps with some right assert that with this step the war between the Persians and them had begun. But the Persians did not see, what to us is obvious from the result, that it was necessary for them to prevent the subjugation of Greece; or, if they saw it, they lacked the energy to act.

Artaxerxes probably did not reach the battle of Chæroneia (August, 338), which made Philip master of Greece. So far as we can judge, however, it was a great misfortune for the empire that this king, the first since Darius I. who had in person energetically conducted a great expedition and restored the empire, died just at this critical moment. Probably he was murdered by Bagoas, who placed Arses, the youngest of the sons of Artax-

erxes, on the throne. But, when Arses was preparing (so it is said) to punish Bagoas, the latter put him and his children to death (355). We know nothing further of this king. Under his reign (spring, 336) a Macedonian army first crossed into Asia, after Philip had previously caused himself to be nominated general of the Greeks against the Persians. The Macedonians gained some not unimportant successes, but the undertaking was checked in the very same year by the assassination of Philip. The commander Parmenio returned to Europe, and Memnon, who after Mentor's death commanded in these regions, probably won back from the Macedonians nearly all their conquests in Asia, though it is likely that Abydus, commanding the passage of the Hellespont, and perhaps one or two more strong places, remained in their hands.

In order to rule securely Bagoas placed on the throne not a near relation of the murdered man, but Codomannus, who reigned as Darius (III.), a great-grandson of Darius II., and a man of about forty-five years of age. But the king-maker was caught in his own snare, for Darius soon put him out of the way.

Over the last of the Achæmenians misfortune has thrown a halo of romance, but sober criticism can see in him only an incapable despot like so many whom the East has produced. It is no reproach that he was not a match for perhaps the greatest general in history, but an Ochus would doubtless have made the task a somewhat harder one, and would scarcely have been guilty of the folly of beheading, in a fit of bad temper, so useful a man as the old condottiere Charidemus, who thoroughly understood the mode of fighting the Macedonians.

The history of Alexander the Great is given under the articles ALEXANDER THE GREAT and MACEDONIAN EMPIRE; here we can only enumerate the chief steps in the downfall of the Persian empire.

After placing a terrible curb on the Greek love of freedom by the destruction of Thebes, Alexander crossed the Hellespont in the beginning of spring, 334. A few weeks later, on the Granicus, he annihilated the great Persian army which should have barred his onward march. Sardis, the capital, at once fell into his hands. At the farthest extremity of Cilicia Darius in person met him at the head of a huge army, but the field of battle was so badly chosen that the numerical superiority of the Persians did not come into full play. The brilliant victory of Issus (about November, 333) and the flight of Darius threw wide regions into the power of Alexander, who, with all his daring, was also cautious, and did not follow the Persian king in his flight into the interior. Egypt welcomed exultingly the Macedonian who freed her from the hated Persians. After the acquisition of Egypt Alexander possessed a territory large and strong enough to be able to survive, if need be, a reverse. In the spring of 331 he left Egypt and marched through Syria and Mesopotamia to Assyria proper, where Darius awaited him at the head of vast masses of troops, and this time in a favorable position. But on October 1, 331, Alexander defeated the king at Gaugamela so decisively that henceforward the Persian empire, as such, was shattered. Darius fled to Media. Without striking another blow Alexander captured the capitals, Babylon and Susa, with their vast treasures. The burning of the royal castle at Persepolis was meant to show the Asiatics that their empire was utterly overthrown, and that Alexander was their only lord.

After the decisive battle of Gaugamela (331 B.C.) Alexander proclaimed himself king of Asia. After Alexander had by his rapid and effective movements taken actual possession of the whole empire, Media was swiftly traversed, but the eastern frontier was not sub-

dued and secured so easily. The Achæmenian power at its climax had never crossed the Indus; Alexander passed the river and pushed into India proper. This adventurous march was undertaken wholly for the sake of prestige, and was specially meant to impress the imagination of the Greeks, to whom India was a land of marvels. Alexander proposed to reach the Ganges and the ends of the habitable earth; and it was sorely against his will that his own soldiers forced him to confine his plans to the rational scope of securing the Indus as his frontier and adding to his realm its commercially important delta. Alexander had now accomplished what, in the eyes of the Arian peoples, was necessary to give the last stamp of legitimacy to the new empire; he had led his armies round all the frontiers and taken personal possession of his lands. To close the circle he had still to march back through Gedrosia and Carmania. But it may well be doubted if he would have faced this last exploit had he known beforehand the full terrors of the burning desert; not a fourth part of the forces that began the march from India survived a journey which has been fitly compared with the retreat from Moscow.

A series of minor expeditions completed the work of the great campaigns by reducing a number of mountain tribes, which had shaken off the weak yoke of the Achæmenians, exacted tribute at the chief passes, and in their irreclaimable savage habits of plunder were like the modern Kurds, the born foes of the Iranian peasant. Such were the Uxians, the Mardians in Persis, and the people of the same name to the south of the Caspian, and finally the Cossæans, whom Alexander disposed of in his last campaign in forty midwinter days. The future obedience of these brigands was secured by planting fortresses at the most difficult points of the roads, and they were compelled to settle down and take to husbandry.

These vast results were only obtained by the aid of continual fresh levies in Europe, and strong garrisons had to be left in the conquered lands. Alexander's work could not last unless the European occupation became permanent; and therefore he planned a great network of new cities, in which colonies of Greek or Macedonian soldiers were planted. According to Plutarch more than seventy cities owed their origin to Alexander; some forty of these can still be traced.

Alexander's capital was Babylon, the natural center of an empire that embraced both Iran and the West, and recommended also by its command of the great lines of international traffic, and by its historical traditions of empire. The Achæmenian system of satrapies was retained; kingships were left only in the exceptional case of India.

To the Greeks a union with a barbarian was no regular marriage; but the Bactrian Roxana was Alexander's queen. His friends were urged to follow his example; eighty of his courtiers married Persians on the occasion of the great wedding at Susa, and 10,000 soldiers who had chosen Asiatic wives received gifts on the occasion. Still more startling was the introduction of polygamy; the king took a second wife, Statira, daughter of Darius, and a third, Parysatis, daughter of Ochus.

Alexander desired to fuse the Greeks and barbarians together, but the practical means directed to this ideal aim were such as brought him into conflict with the natural leaders of the new state. By asking the Greeks as well as the barbarians to worship him as divine he destroyed the whole effect of the theatrical arts in which he was a master, and by which he hoped to recommend his mission as an eminently Hellenic one to the masses; even Callisthenes, the enthusiastic herald of the new era, was bitterly undeceived, and, turning against Alexander, fell a victim to the despotism of the man who

had been his idol. But, what was still more fatal, the net result of his efforts at a fusion of races was not to Hellenize the Persians, but to teach the Macedonians to exchange their old virtues for the effeminacy and vices of the East.

The want of coherence in the empire was seen even while Alexander was in India. Many satraps broke all restraint, renewed the old oppressions of the Persian time, hired mercenaries again, and only awaited a fit moment for open rebellion; the generals of the army that lay in Media committed sacrilege and crimes of every kind; the treasurer Harpalus violated his trust and escaped with his plunder. Alexander, on his return, soon restored order with terrible severity, but the ferment was still at work, especially in the west, and was increased through the disbanded mercenaries of the satraps who returned to the coast.

One Macedonian custom Alexander had retained, that of carousing with his generals. A series of debauches in the malarious climate of Babylon brought on a violent fever, which ended in his death (June 13, 323). The object of his life, the fusion of Macedonians and Persians, was not attained.

Terrible civil wars broke out at once on Alexander's death, and lasted almost unbroken for forty-two years, tearing his work to pieces, and scattering to the winds Macedonia's claims to universal empire. In 312 a victory over Nicanor, who held Media for Antigonos, (the latter having his commission from Antipater the regent), made Seleucus master of Media and the adjoining provinces. Antigonos had still some temporary successes, but at the end of the war Seleucus was acknowledged lord of Babylonia and the upper satrapies.

Instead of the twenty-one Asiatic satrapies of the partitions Seleucus divided his empire into seventy-two, thus diminishing the dangerous strength of the individual governors. But the old arrangement was restored later.

Seleucus had built for himself a new capital, Seleucia on the Tigris, but in process of time his chief attention came to be more and more engrossed by the affairs of the west, and the seat of power was shifted to Antioch in Syria. A kingdom like that of Seleucus could hardly be governed from Syria, which lay so far from its natural center, and about 293 or a little later Seleucus found it advisable to make over the upper satrapies to Antiochus, his son by his first marriage with Apama, daughter of Spitamenes, giving him Seleucia as his capital and his stepmother Stratonice as wife. Seleucus, like Antigonos, dreamed of regaining the whole monarchy of Alexander, and fancied himself within reach of his goal after the fall of Lysimachus, when he was himself removed by assassination. Antiochus Soter (280-261) was prudent enough to be content with what he possessed and acquiesce in the actual division of the empire into three realms, practically corresponding to the three continents.

The heir of the kingdom was his second son, Antiochus II. Theos (261-246), a drunken and dissolute prince, who neglected his realm in the society of unworthy favorites. Under the weak Antiochus II. north-eastern Iran was lost to the empire.

When Antiochus II. died, the horrors that accompanied the succession of his son Seleucus II. Callinicus (246-226) gave the king of Egypt the pretext for a war, in which he overran almost the whole land of the Seleucids as far as Bactria. Meantime a civil war was raging between Seleucus and his brother Antiochus Hierax, for whom the Galatians held, and at the great battle of Ancyra, in 242 or 241, Seleucus was totally defeated and thought to be slain. At this news Arsaces Tiridates, whom the genuine tradition still represents as a brave robber-chief, broke into Parthia at the head

of his Parnians, slew the Macedonian eparch Andragoras, and took possession of the province.

Arsaces Tiridates soon added Hyrcania to his realm and raised a great host to maintain himself against Seleucus, but still more against a nearer enemy, Diodotus of Bactria. On the death of the latter, however, the common interests of the Parthians and Bactrians against the Seleucids brought about an alliance between Arsaces Tiridates and Diodotus II. Tiridates, who on his coins appears first merely as Arsaces, then as King Arsaces, and finally as "great king" (probably in imitation of Antiochus Magnus), reigned thirty-seven years, dying in 211 or 10. His nation ever held his memory in almost divine honor.

Seleucus III. Soter (226-223) died early, and was followed by Antiochus III. Magnus (223-187), who in his brother's lifetime had ruled from Babylon over the upper satrapies.

Antiochus was followed in the kingdom by his sons, first the weak Seleucus IV. Philopator (187-175), and then the gifted Antiochus IV. Epiphanes (175-164).

Now followed the troubled reign of the child-king Antiochus V. Eupator (164-162), which was cut short by Demetrius Soter (162-150).

The true danger for the Macedonian monarchy came from the ever stronger reaction of the Oriental element, of which the little state of Parthia was the most vigorous champion. The kings of Parthia had long kept quiet after the war with Antiochus the Great. Phriapatius, successor of Arsaces II., who reigned fifteen years (c. 191-c. 176), calls himself on his coins "Arsaces Philadelphus," perhaps because he had married a sister, and (first of all Parthian kings) Philhellen. By the last title he presents himself, at a time when the Seleucid power was sinking, as the protector of his present and future Greek subjects. His eldest son and successor, Phraates I. (Arsaces Theopator of the coins), conquered the brave Mardian highlanders and transplanted them to Charax in the neighborhood of the Caspian Gates, a proof that the Parthians had already detached Comisene and Choarene from Media (Strabo, xi. 514), probably just after the death of Antiochus the Great.

About 171 Phraates died and left the crown not to his sons but to his brother Mithradates (Arsaces Epiphanes and apparently also, on tetradrachms of 139, 138, Arsaces Philhellen), a prince of remarkable capacity, who made Parthia the ruling power in Iran. His first conquests, it would seem, were made at the expense of Bactria.

The kingdom of Bactria had made vast advances under Euthydemus, whose son Demetrius crossed the Indian Caucasus and began the Indian conquests, which soon carried the Greeks far beyond the farthest point of Alexander. Demetrius, having succeeded his father, was displaced in Bactria by the able usurper Eucratides, some time between 181 and 171. A thousand cities obeyed Eucratides, and both he and his rival Demetrius sought to extend the Greek settlements, the one founding Eucratidia in Bactria, the other Demetrius in Arachosia. On his way back from the conquest of India Eucratides was murdered by his son and co-regent, probably Heliocles.

In the midst of the civil wars, which became more serious after the death of Eucratides, Mithradates of Parthia began to extend his dominions at the expense of Bactria; even in the lifetime of Eucratides he succeeded in annexing the satrapies of Aspiones and Turiua. These seem to have covered Aria, for the Hindu-Kush is named as the eastern boundary of the Parthians—whence perhaps the mention of Arians among the foes of Eucratides. Another account makes Mithradates

rule as far as India, and declares him to have obtained without war the old kingdom of Porus, or the rule over all nations between the Indus and the Hydraspes.

The change of rule was not well received by the new subjects of Parthia, least of all by the Greeks and Macedonians of the upper provinces.

Mithradates' last campaign was against the king of Elymais. The country was brought under Parthia, but continued to have its own kings. The coins make it likely that Mithradates simply set up a new dynasty, a branch of his own house. Mithradates died in a good old age in 138, or a little later. His memory was revered almost equally with that of the founder of his house, but his real glory was much greater, for it was he who made Parthia a great power. He is praised as a just and humane ruler, who, having become lord of all the lands from the Indian Caucasus to the Euphrates, introduced among Parthians the best institutions of each country, and so became the legislator of his nation.

The complete annihilation of the Macedonian empire in Iran was closely followed by the destruction of Greek independence in eastern Iran, north of the Paropanisus. The last mention of independent Bactria is in 140.

Phraates II., who succeeded his father in 138, and continued his work, wresting Margiana from the Scythians of Bactria in an expedition commemorated on extant coins, had also to meet the last and most formidable attempt to restore the sovereignty of the Seleucids. Antiochus VII., one of the ablest kings of his race, had put down the civil wars in Syria, even taking Jerusalem and compelling the Jews to acknowledge his might by paying him military service, and in 130 he marched eastward at the head of a force of 80,000 combatants, swollen by camp-followers to a total of 300,000. Many of the small princes, on whom the hand of Parthia lay heavy, joined him as they had joined his brother; the enemy was smitten on the Great Zab, and in two other battles; Babylon and then Ecbatana opened their gates to the conqueror; and the subject-nations rose against the Parthians, who, when Antiochus took up his winter quarters in Media, were again confined to their ancient limits. When the snows began to melt, an embassy from Phraates appeared to ask for peace; but the terms demanded by Antiochus—the liberation of Demetrius, the surrender of all conquests, and the payment of tribute for the old Parthian country—were such as could not be accepted without another appeal to the fortunes of war. Demetrius, indeed, was released and sent to Syria, but only to stir up a hostile party in his brother's rear. During the winter the Syrian host had been dispersed over a wide range of cantonments; the disorderly insolence of the soldiers, for which the general Athenæus was held to be mainly responsible, and of the levies raised in the towns had disgusted the natives; the Medes made secret terms with Parthia, and all the cantonments were attacked by concert on a single day. Hastening to relieve the nearest corps, Antiochus was met by the Parthian with a superior force of 120,000 men; he refused the advice of his officers to fall back to the neighboring mountains, and accepted battle on a field too narrow for the evolution of his troops. The Syrian soldiers, enervated by luxury, were readier to imitate the flight of Athenæus than the valor of his master; the whole host was involved in the rout and annihilated. Antiochus himself escaped wounded from the fray, and cast himself from a rock that he might not be taken alive. This catastrophe (February, 129) freed the Parthians for ever from danger from Syria.

Phraates paid funeral honors to the fallen king, and afterward sent his body to Syria in a silver coffin. He entertained his captive family royally, married one of the two daughters, and sent the eldest son Seleucus to



Syria to claim the sovereignty, and so serve future plans of his own; for an attempt to follow and recapture Demetrius, made immediately after the battle, had proved too late. But dangers in the east soon turned the Parthian's attention away from enterprises in the west. In his distress he had bribed the Scythians to send him help; as they arrived too late he refused to pay them, and they in turn began to ravage the Parthian country. Phraates marched against them, leaving his charge at home to his favorite, the Hyrcanian Euhemerus, who chastised the countries that had sided with Antiochus, made war with Mesene, and treated Babylon and Seleucia with the utmost cruelty. But the Scythian war proved a disastrous one; the enemy overran the whole empire, and for the first time for five hundred years Scythian plunderers again appeared in Mesopotamia; in a decisive battle Phraates was deserted by the old soldiers of Antiochus, whom he had forced into his service and then treated with insolent cruelty; the Parthian host sustained a ruinous defeat, and the king himself was slain (spring, 128, or somewhat later).

Artabanus I. (third son of Phriapatius), who now became king, was an elderly man.

His son and successor, Mithradates II. the Great, was the restorer of the empire. We are briefly told that he valiantly waged many wars with his neighbors, added many nations to the empire, and had several successes against the Scythians, so avenging the disgrace of his predecessors.

Artabanus II. was the next monarch, but after him the style of king of kings was taken by the Armenian Tigranes, one of the most dangerous foes Parthia ever had. In 86 it was still a reason for choosing Tigranes as king of part of Syria that he was in alliance with Parthia (Just., xl. 1, 3), but very soon the latter state was so ruined by civil and foreign war that it was no match for Armenia. Of the details in this history we know only the last act. In 77 the Arsacid Sinatruces returned from the land of the Sacaraucae to take the throne at the age of eighty, and reigned seven years.

Phraates III. succeeded his father, Sinatruces, a little before the arrival of Lucullus in the East in 70, and in 69 refused a second invitation to give help against Rome, which Mithradates and Tigranes addressed to him jointly, the latter offering to reward him by giving up all that he had taken from the Parthians. His hatred of Tigranes made him more disposed to alliance with Rome; and after a period of hesitating neutrality Phraates accepted the overtures of Pompey, and prepared to invade Armenia. But the Romans had no further occasion for Parthian help. Immediately afterward Pompey's officer marched into Syria through Mesopotamia, which, by treaty, had been expressly recognized as Parthian. Nevertheless, Phraates at first contented himself with again sending a fruitless embassy to demand that Pompey would observe the treaty and acknowledge the Euphrates as the Parthian frontier.

For a century and a half up to the death of Mithradates the Great there had been an unusual degree of unity in the house of the Arsacids; but the corruptions to which every Eastern dynasty ultimately falls a prey appeared at length. About 57, Phraates, the restorer of the empire, was murdered by his two sons, one of whom, Orodes or Hyrodes I. (Zend, *Huraodha*), took the throne, while his brother Mithradates III. got Media; but the latter ruled so cruelly that he was expelled by the Parthian nobles, and Orodes reigned alone. Mithradates, with a loyal follower, Orsanes, fled to Gabinius, proconsul of Syria, who had already crossed the Euphrates to restore him by force when he was summoned by Pompey to restore Ptolemy XI. to the throne of Egypt (55). Mithradates,

dismissed by the Romans, now tried what he could do without help. Orodes had at first to flee, but soon regained his position, mainly through the help of Surenas, a young noble who had the hereditary right of crowning the king, and was the second person in the empire in point of wealth, nobility, and influence, and the first in courage and political skill. Surenas took Seleucia by storm; Babylon received Mithradates, but was reduced by famine; Mithradates then surrendered to his brother and was killed before his eyes. These events carry us far into the year 54.

Meantime Crassus, hoping for a rich and easy prey, had invaded Mesopotamia without a shadow of pretext, had defeated a small Parthian force at Ichnæ, and occupied a number of large towns, such as Nicephorium, Ichnæ, Carrhæ, whose Greek inhabitants welcomed the Romans as liberators. As Mithradates was at this time in arms in Babylonia, we can understand why Crassus was blamed for a grave error of judgment in not marching direct from Nicephorium on Seleucia and Babylon. Instead of this, he retired to winter quarters in Syria, leaving 7,000 foot and 1,000 horse to garrison the Mesopotamian cities. Thus his hands were tied for the following campaign, and he could not accept the invitation of Artavasdes II. of Armenia to advance through his country and have his coöperation. A Parthian embassy appeared in Syria in spring to remonstrate against the faithlessness of Rome, but at the same time the Parthians were ready for war. At midday, May 6th (June 9th as the calendar then stood) the Romans had crossed the Balissus (Nahr Belik) and met Surenas half way between Carrhæ and Ichnæ, or a little nearer the latter town. Surenas kept the mass of his troops concealed by a wooded hill, showing only the not very numerous vanguard of cataphracts till the Romans were committed to do battle. The Roman cavalry under Publius Crassus, son of the proconsul, charged the enemy, to prevent a threatening flank movement, and were drawn away from the mass of the army by the favorite Parthian maneuver of a simulated flight, and then surrounded and cut to pieces. The mass of the Roman host lost courage at this disaster, and already had suffered terrible loss from the light-armed hordes of Parthian serfs who hovered round the enemy at a safe distance and galled it with arrows shot with deadly precision. The legionaries serried their ranks and covered themselves with their shields; but in this close order they were easily broken by the charge of the Parthian freemen with their long heavy lances and almost impenetrable suits of complete armor. The heat, too, thirst, and dust oppressed the Romans, and this first day would have decided their fate but that the Parthians withdrew before evening, true to their rule of encamping at a distance from the foe. Crassus retired at night, leaving all who were badly wounded behind him, and reached Carrhæ safely; but his army was sadly demoralized, and he himself lost his head, and, though fairly secure at Carrhæ, thought only of immediate retreat to Syria. He marched by night northward toward the mountains; the several divisions lost one another and each sought only to shift for itself. The quæstor Cassius, one of Crassus' best officers, returned to Carrhæ and thence regained Syria in safety. Crassus himself, after getting dangerously entangled in marshy ground, had almost reached the mountains when he was induced, by the despair of his troops rather than by error of his own judgment, to yield to treacherous proposals of Surenas and descend again into the plain. As he mounted the horse which was to convey him to a meeting with the enemy's general the gestures of the Parthians excited suspicions of treachery, a struggle ensued, and Crassus was struck down and slain. Scarcely 10,

000 men out of the whole host reached Syria by way of Armenia; 20,000 had fallen and 10,000 captives were settled in Antioch, the capital of Margiana. The token of victory, the hand and head of Crassus, reached Orodes in Armenia just as he had made peace with Artavasdes and betrothed his eldest son Pacorus to the daughter of the Armenian king. The Roman disaster was due primarily to the novelty of the Parthian way of assault, which took them wholly by surprise, and partly also to bad generalship; but the Romans always sought a traitor to account for a defeat, and in the present case threw the blame partly on Andromachus of Carrhæ, who really did mislead Crassus in his retreat, and was rewarded by the Parthians with the tyranny of his native town, but had no great influence on the disaster, and partly on Abgar, whose advice was no doubt bad, but not necessarily treacherous, while the silence of the older account disposes of Dio's improbable assertion that the men of Orrhoene fell on the rear of the Romans. That the Parthians did not count Abgar their friend and punished him with deposition may be fairly inferred from the list of kings of Edessa given by Dionysius of Telmahar, which shows that the reign of Abgar II. ended in 53, and was followed by a year of interregnum.

Surenas, the victor of Carrhæ, whose fame was now too great for the condition of a mere subject, was put to death a little later, the victim of Orodes' jealousy; the victory itself was weakly followed up. Not till 52 was Syria invaded, and then with forces so weak that Cassius found the defense easy. In July, 51 (Sextilis, according to the old calendar), the attack was renewed with greater forces; the Romans were still weak in troops, their harshness and injustice had alienated the provincials, and some districts—as Judæa—openly sympathized with the foe. Thus all the chances were still favorable to the Parthians, who indeed overran the open country, but were too unskilled in siege to take Antioch. As they drew off, Cassius stopped their way at Antigonia and inflicted on them a defeat in which Osaces, the real leader of their host under the young prince Pacorus, was mortally wounded (August, 51). Pacorus wintered in Cyrrestica, the Romans under the new proconsul Bibulus not venturing beyond the walls of Antioch; but, the satrap of Mesopotamia having raised a revolt against Orodes in the name of Pacorus, the latter was recalled by his father and Syria was entirely evacuated by May, 50.

Orodes avoided the threatened breach with his son by associating Pacorus in the empire; but the Parthians took little advantage of the civil wars that preceded the fall of the Roman republic.

From this point down to 165 the history of Parthia is a continual struggle with Rome. These wars were waged under different kings on the one side, and generals and emperors on the other, until under Cassius in the reign of Marcus Aurelius the overthrow of the Parthian power was completed. The circumstances of its final extinction are as follows:

Volagases III. had designs on Armenia, but an interview between him and Antoninus Pius (spring, 155) delayed for a time the outbreak of war. However, martial preparations went on, and on the death of Antoninus Volagases entered Armenia (162), expelled the Arsacid Sohæmus, who was a client of Rome, and made Pacorus king. The destruction of a Roman legion under the legate of Cappadocia (Ælius Severanus), who fell on his own sword, laid Cappadocia and Syria open to the Parthians; Attidius Cornelianus, legate of Syria, was routed, and the provincials were in such distress that they even began to speak of revolt from Rome. When, late in the year, Ælius Verus

arrived from the capital, he found the troops so demoralized by defeat that he was ready to offer peace; but, when Volagases refused to treat, the able lieutenants whom Verus directed from Antioch soon changed the face of affairs. The war had two theaters, and was officially called the Armenian and Parthian war. Armenia was regained and Sohæmus restored by Statius Priscus and Martius Verus (163, 164), while Avidius Cassius drove Volagases from Syria in a bloody battle at Europus, and, entering north Mesopotamia, took Edessa and Nisibus, though not without serious opposition. At length, deserted by his allies (*i.e.*, by the local kings, who were becoming more and more independent), Volagases abandoned Mesopotamia, and Cassius entered Babylonia, where, on a frivolous pretext, he gave up to rapine and fire the friendly city of Seleucia, still the first city of the East, with 400,000 inhabitants. The destruction of Seleucia was a hideous crime, a mortal wound dealt to Eastern Hellenism by its natural protectors; that Cassius next, advancing to Ctesiphon, razed the palace of Volagases to the ground may, on the other hand, be defended as a symbolical act calculated more than anything else to impair the prestige of the Parthian with his Oriental subjects. Cassius returned to Syria in 165, with his victorious army much weakened through the failure of the commissariat and by the plague, which, breaking out in Parthia immediately after the fall of Seleucia, spread over the whole known world. In the same year Martius Verus won hardly less considerable successes in Media Atropatene, then apparently a separate kingdom. The peace which followed in 166 gave Mesopotamia to Rome. This was the greatest of all wars between Rome and Parthia, alike in the extent of the lands involved and in the energy of attack shown by the Parthians. The Romans used their victory with moderation, but Parthia, after this last effort, continued steadily to sink.

The Romans at the same time made an effort to compete with Parthia for the Chinese trade (especially in silk), which the latter had jealously kept in their own hands, and in 166 an envoy of An-thun (M. Antoninus) reached the court of the emperor Huan-ti, *via* the sea and Tong-king. But the effort to establish a direct trade with China was unavailing, and the trade still flowed in its old channels when a second Roman agent reached China in 226, a little before the fall of the Parthian empire. The Chinese tell us that with India also the Parthians drove a considerable trade.

Volagases III. died in 191, having reigned forty-two years without civil war, and was succeeded by Volagases IV. During the civil troubles of Rome which preceded the establishment of the military empire this prince maintained friendly relations with Pescennius Niger; and his vassal Barsenius of Atra was permitted to supply a force of bowmen, who took part in the fighting against Septimius Severus at Nicæa (194). When Niger's cause declined, however, Volagases allowed his clients of Adiabene to join with Orrhoene, now in revolt against the Roman power. The strongholds of Mesopotamia were taken, and their garrisons put to the sword; Nisibus itself was besieged. In truth, the Parthian could no longer pretend to control the policy of the princes on his frontier, who felt themselves their own masters since they had borne the chief brunt of the last two Roman wars. But in summer, 195, Severus appeared in Mesopotamia, received the submission of Abgar VIII. of Orrhoene, and from Nisibus (which, with true insight into its strategic importance, he raised to a colony and great military station) directed two successful campaigns against Adiabene (196) and the Arabs of the Singara district, incorporating the latter in the province of Mesopotamia. The

Parthians made no movement till Severus was busy with Albinus, when they ravaged Mesopotamia and besieged Laetus in Nisibis; but in 198 Severus was again on the scene of war, and they fell back without fighting, leaving the emperor free to prepare for next year a campaign on a great scale. In 199 a fleet on the Euphrates coöperated with the Roman army, and Severus, taking up an unaccomplished plan of Trajan, dredged out the old Naarmalca canal, through which his ships sailed into the Tigris, and took the Parthians wholly by surprise. Selucia and Coche were deserted by their inhabitants; Ctesiphon was taken by the end of the year with terrible slaughter, 100,000 inhabitants being led captive and the place given up to pillage, for the great king had fled powerless at the approach of the foe. Severus, whose force was reduced by famine and dysenteries, did not attempt pursuit, but drew off up the Tigris. The army was again in its quarters by April 1, 200, and for some time thereafter Severus was occupied in Armenia. But in 201 he undertook a carefully organized expedition against Atra, from whose walls the Romans had been repulsed with great loss when Severus, returning from the Tigris in the previous year, had attempted to carry it by a *coup de main*. This city, which in Trajan's time was neither great nor rich, was now a wealthy place, and the sun-temple contained vast treasures. The classical authors call Atra Arabian, but the king's name is Syriac, Barsenius, *i. e.*, Bar Sîn, son of the moon, and we may suppose that it was really an Aramæan principality, which, like Palmyra, had its strength from the surrounding Arab tribes that it could call into the field. Severus lay before Atra for twenty days, but the enemy's cavalry cut off his foraging parties, the admirable archers galled the Roman troops, a great part of the siege train was burned with naphtha; and, when, in addition, two assaults had been repulsed with tremendous loss on two successive days, the emperor was compelled to raise the siege—a severe blow to Roman prestige in the East, and one that greatly raised the name of Atra and its prince, but did not help the decaying power of Parthia in the least.

In 209 Volagases IV. was succeeded by his son Volagases V., under whom, in 212, the fatal troubles in Persis began, while in 213 his brother Artabanus rose as rival claimant of the kingship; and the civil war lasted for many years. A fresh danger arose when Tiridates, a brother of Volagases IV., who had long been a refugee with the Romans, and had accompanied Severus' campaign of 199, escaped, in company with a Cilician adventurer, the Cynic Antiochus, to the court of his nephew Volagases; for the emperor Antoninus (Caracalla) demanded their surrender, and obtained it only by a declaration of war (215). About the same time Artabanus gained the upper hand, and in 216 he held Ctesiphon and its districts; but Volagases still held out in the Greek cities of Babylonia, as his tetradrachms prove (till 222). Artabanus' strength lay in the north; the Arab histories of the Sásánians make him king of the Median region, and agreeably with this he coins only drachmæ. Presently Artabanus had a war with Rome on his hands; the pretext was that he had refused his daughter to Antoninus, but the emperor was mindful of his father's dying advice to enrich the soldiers and despise all other classes, and saw a prospect of rich booty. In 216 the Romans penetrated to Arbela by way of Carduene and Calachene, and violated the graves of the kings of Adiabene, which they falsely took for those of the Arsacids. Thus far the Parthians, who had been taken by surprise in full peace, had offered little or no resistance, but Antoninus was murdered (April 8, 217), while he was preparing for a new foray, and his successor, Macrinus, at once found that Artabanus was now armed,

and was not the man to let the insult to his territory pass with impunity. An overwhelming Parthian force fell on Mesopotamia and refused to be appeased by the restoration of the captives of the previous year; Macrinus was beaten in two engagements and compelled to retire to Syria, abandoning the Mesopotamian plain; and in the winter of 217-18 he was glad to purchase peace for an indemnity of 50,000,000 denarii (\$8,615,287). In or about 222 Artabanus must also have displaced his brother in Babylonia, for he was a patron of Rab Abba, who became head of the Jewish school of Sura in 219.

Persis, which dealt the last blow to the Arsacids, had through the whole Parthian period held an isolated position, and is so seldom mentioned that our knowledge of its history and native princes is almost wholly due to recently found coins.

#### SÁSÁNIAN EMPIRE.

Of the minor kings who ruled in Persis, in the Arsacid period, in real or nominal allegiance to the Parthian "king of kings" we know some names from coins or ancient writers, but we cannot tell whether they were all of one dynasty. In the beginning of the third century the kings, who then belonged to a dynasty of which the name probably was Bázrangík, had lost much of their power; lesser potentates ruled, in various parts of the land, which, by being all mountainous, falls naturally into ill-connected sections. One of these local princes was Pápak, or, in the more modern pronunciation, Pábak, son or descendant of Sásán, a native of the village of Khír, on the southern margin of the great salt lake east of Shíráz. Pábak overthrew Gózihr, the last prince of the Bázrangík, and became master of the district of Istakhr (Persepolis), and the coins and inscriptions of his son give him the title of king. His legitimate heir was his son, Shápúr, for whom Pábak is said to have asked recognition from the Arsacids; but on Pábak's death a second son, Ardashír, refused to acknowledge his brother, and was in arms against him when Shápúr died suddenly, and hardly by mere accident. That Ardashír's claims were opposed by his brothers and that he put them to death are not to be doubted, as we have these facts from a tradition of strictly legitimist tendency.

Tradition names various local princes conquered by Ardashír for himself or for his father, and perhaps Pábak before his death was already lord of all Persis. Slowly, and not without toil, he rose from king of Persis to be king of the kings of Irán.

The Romans saw with concern the rise of a prince who already directed his aims against their Asiatic possessions, and seems to have had some success in this quarter, till, in 233, he was smitten by Alexander Severus in a great battle. Henceforth, though peace was often made between the two powers, they remained constant rivals—and rivals on equal terms, for, though under able rulers and when the inner condition of the empire was not greatly disturbed, the Europeans of Rome or Byzantium were still too strong for the Asiatics, the tables were not seldom turned, and Rome sustained many a shameful defeat. This struggle fills the chief place in the political history of the Sásánians; and the inner development of the empire, its martial and political institutions, its art and industry, were also most powerfully influenced by the superior civilization of the West.

The nominal capital was always at Istakhr, where, for example, the holy "pyreum" of the royal house stood, and where the heads of conquered foreign kings were hung up. But the real metropolis was the Arsacid capital of Ctesiphon, with Ardashír's new foundation of

Veh-Ardashír, just across the Tigris, on the site of the old Seleucia. The rich alluvial land that surrounded these twin cities was no part of Irán proper, and its inhabitants were mainly Semites; but old example, and probably its vicinity to Roman soil, marked it out for the true seat of government.

The extent of the empire at the time of Ardashír's death is uncertain, for the national tradition ascribes to him some conquests that were really made by his successors, and others which the Sásánians never made at all.

The wars with Rome continued with varying success on both sides down to 546 A.D., when, during the reign of Khosrau, the Romans paid a large sum for a five years' truce, and another five years' truce followed in 553, though Lázistán was excluded from both truces until 556, when the Romans had gained successes there; but during all this time the Persian and Roman Arabs never laid down their arms. At length, about Christmas, 562, a fifty years' peace was concluded, the Romans again promising a considerable yearly subsidy, and the Persians withdrawing their claims on Lázistán, though the possession of the neighboring Suania was left an open question. The treaty also provided for religious freedom to the Persian Christians, while all proselytizing among Zoroastrians was strictly forbidden.

During the truces (546-562) great changes had taken place in the East, where a powerful empire had been formed in the northern steppes by the Turks, whose name then, for the first time, became known in the West. The khákán of the Turks, whom the Greeks call Silzibulos and the Arabs (after the Persians) name Sinjibú, took from the Hephthalites the right bank of the Oxus, while Kosrau (seemingly in alliance with the khákán, whose daughter he wedded) occupied the left bank (c. 560). Thus Bactria, from which the Sásánians had suffered so much, was at length embodied in their empire, and Péróz was fully avenged. But the friendship of Turks and Persians was soon changed to that hostility which has long made the rulers of Turkestán and the deserts appear the natural enemies of the lords of Khorásán.

From the reign of Khosrau (531) down to the reign of Yazdegerd (633), the empire was continually at war with first one then another of its foes — principally the Romans, and in minor affairs with the Turks. The state had also been continually torn with internecine war. On the accession of this prince there seemed reason to predict a change for the better.

Fond hopes could now be entertained that the wounds of the monarchy might be healed under a legitimate prince unstained by descent from the parricide Shéróe, consecrated in the cradle of the monarchy, and upheld by the strong hand of Rustam. Some temporary recovery seems actually to have taken place; but a new foe more dangerous than Julian or Heraclius was already knocking at the gates of the monarchy. That Yemen and some tracts in north Arabia had already been lost by Persia to the Moslems had scarcely been observed at Ctesiphon amid so many greater disasters. But now the Moslems already hovered on the frontier. Mothanná, one of the boldest leaders of those Bedouins who since Dhú Kár had made frequent forays on Persian soil, accepted Islám, and had its strength at his back. These attacks became bolder and bolder. Presently Khálid, in all the prestige of his victory over the revolt of the Arabs against Islám (see MOHAMMEDANISM), appeared with a small force on the lower Euphrates to lead these Bedouins. Persian troops and their Arab allies were repeatedly beaten in small engagements, and soon a number of frontier posts were in the hands of the Moslems. The inhabitants of the western bank of the lower Euphrates, who were all

Christians and had little attachment to Persia, submitted themselves and promised to supply the victors with intelligence. Soon the Arabs ventured to cross the river and plunder the villages west of the Tigris. In the early summer of 634, however, Khálid was called away to Syria; his successor, Abú 'Obaid of Táif, though strengthened by reënforcements, was utterly defeated and slain on his first meeting with a regular Persian host in the hard-fought "battle of the bridge" at the Euphrates, and Mothanná had great difficulty in saving the remains of the army (November 26, 634). Not without hesitation the caliph 'Omar resolved to send a greater force to 'Irák, calling on his Arabs to win for themselves the treasures of the Khosraus and paradise; and now for the first time a considerable Persian army was defeated at Bowaib (635 or 636), with the loss of its general, a prince of the house of Mihrán. In Sa'd ibn Abí Wakkás the Moslems had now an energetic and cautious leader, and the Persian court began to see its danger, especially when the news arrived of the battle of Yarmúk, by which Syria was lost to Heraclius. Rustam in person placed himself at the head of a great army, over which, in sign of the gravity of the enterprise, was borne the venerable sacred banner of the empire (*dirafshi káiviyán*). Sa'd fell back before the Persian advance and posted himself at Kádisiya on the edge of the desert south or southwest of Híra, where the armies lay facing each other for months. The Arab force must have been inferior in strength, for no great army could have long held such a barren post nourished only by forays and what the caliph could send from Medina. At length, toward the close of the year 636, or in 637, battle was joined and raged for several days, Sa'd giving orders to his men in spite of a sickness under which he labored. The Persians were better armed, but the Arabs fought with desperate energy. The elephants, which formed part of every regular Persian army, greatly terrified them at first, but ultimately these huge beasts, getting out of command, only aided the discomfiture of the Persians. Of the mass of a Persian host no great bravery was to be expected; yet it was only after a hard fight that the victory was decided, Rustam slain, and the sacred banner taken.

The battle of Kádisiya virtually decided the fate of the Tigris valley; but there was still some fighting on the plains of Babylonia, at Birs (Borsippa), and Seleucia was not taken without a lengthy siege. Then the Arabs crossed the Tigris and fell on Ctesiphon, Yazdegerd fleeing before them to Holwán on the Medo-Babylonian frontier. At Jalúlá on the road to Holwán the Arabs gained a fresh victory over Rustam's brother, Khorrezádh, and Yazdegerd continued his flight. Meantime another body of Arabs had occupied Lower 'Irák and entered Susiana. A strong and wise leader might still perhaps have saved Irán proper, and 'Omar, as energetic as cautious, was in fact slow to allow his armies to assail the highlands. It was not till some time between 640 and 642 that the "victory of victories," as the Arabs rightly call it, was gained at Nehávend (a little south of the old high road from Babylon to Ecbatana), and the last great army of the Persians was shattered by No'mán, who fell on the field, and the Meccan Hodhaifa. Even now many individual provinces and cities did not yield without stubborn resistance, and in many places rebellion after rebellion had to be crushed, especially in the region around Istakhr, the cradle and sacred hearth of the fallen monarchy. Everywhere the great local barons and even the lesser nobility dealt with the Arabs as independent chiefs, and in many cases came to peaceful terms with them.

Yazdegerd fled from one to another of his lieutenants without venturing himself to strike a blow for his crown and his life. He still retained the forms of sovereignty, and coins were still struck in his name; but one host after another dismissed him as a burdensome guest, and at length he was miserably murdered in the remote district of Merv, not, it would appear, without the connivance of Máhóe, governor of that province (651 or 652).

The region at present laid down on the maps as Persia is bounded on the east by Russia, Afghanistan and Baluchistan; south by the Arabian sea and Persian Gulf; west by Turkey; north by Russia and the Caspian sea. The boundaries of the country are vague and have long been a subject of dispute, both with Russia and with Turkey. Its superficial area is estimated at 610,000 square miles.

#### GEOGRAPHY AND STATISTICS.

Persia of the present day is not only, in the matter of geographical definition, far from the vast empire of Sacred Writ and remote history, but it is not even the less extensive, though very expansive, dominion of the Safawí kings and Nádir Sháh. It may be said, however, to comprise now quite as much settled and consolidated territory as at any period of its political existence of which we can speak with the authority of intimate acquaintance. If it has less extent of land than before its latest disastrous war with Russia, there is certainly within its recognized limits less rebellion and more allegiance. And, if the true interests of Persia, considered as a living power, were only understood by her kings and ministers, she might reasonably seek to attain a state of security which would amply compensate for the loss of precarious and profitless expanse.

There are no sufficient statistics available accurately to estimate the rainfall in Persia, but Sir Oliver St. John, himself a resident of some years in the country, estimated that in no part of it except the watersheds of the Caspian and Persian Gulf (north of 28° latitude) and their immediate reverse slopes, with perhaps the Úrmíya basin, is there an average of ten inches, taking mountain and hill together.

One remarkable feature in the plains of Persia which naturally engaged St. John's attention was the salt-swamp called "kavír." He applied the term to those bogs of slimy mud found in the lowest depressions of the alluvial soil, where the supply of water, though constant, was insufficient to form a lake. In winter they are covered with brine, and in summer with a thick crust of salt. The principal kavír is that in Khurásan, and marked in the maps as the Great Salt Desert.

Other kavírs he finds in the Sarjan or Sayidábád plain west of Karman and in the neighboring valley of Kútrú. Among ordinary kavírs, which are "innumerable," he considers the largest to be on the south of Kháf, and the best known that north of Kúm.

The climate of Persia varies much according to locality. In the Caspian provinces, where the rains fall frequently, it is hot, humid, and unhealthy for the greater part of the year. In the table-lands it is intensely cold in winter, and, though it is hot in summer, its dry, clear heat is temperate in comparison with that of Sind and the Punjab. The spring and autumn are the best seasons. In the south and southwest, toward the Persian Gulf and in Baluchistan, the heat is intense throughout the summer and often in the spring and autumn. The three regions of Nearchus and the old travelers—illustrated by parching heat, sand, and barrenness in the south, a temperate climate, pastures, and cultivation in the center, and severe cold with bare or snow-clad mountains in the north—may still be accepted as con-

veying a fairly accurate description of the tracts lying generally between Bushahr and Tehran; but of course there are seasons and seasons, and it may be very hot as well as very cold in the north as elsewhere.

Where there is irrigation the productiveness of the soil in Persia is remarkable, but, unfortunately, two-thirds of the table-lands of the country are sterile from want of water. The desert is the rule, fertility the exception, and generally in the form of an oasis. Yet wheat, barley, and other cereals are grown in great perfection; there are the sugar-cane and rice also, especially in Mazandaran, where the soil is favorable and water procurable; opium, tobacco, and cotton, madder roots, henna, and other dyes, are as well-known exports as the woolen goods of Persia; and the first may become of importance in its bearing upon the Indian market. In Gílan, famous for its mulberry plantations, silk has been one of the most valuable of products. Yazd and Mazandaran contribute also the same material, but of late years the worm has comparatively failed to do its office, and disease has destroyed crop after crop. The peasants of Gílan recently turned their attention to the cultivation of rice, and though a marked improvement was perceptible in the silk produce, they were not disposed to revert to this branch of culture on the former large scale. Rice was found to suit the cultivators better; it gave them less trouble and provided them with an article of daily food. The production of silk, on the other hand, profited the richer landed proprietors, and subjected the cultivators to oppression.

Vines are abundant, and the Persian grapes are not only of a good flavor and kind, but the wines made from them by the Jews and Armenians have more than a mere local reputation. That of Shíráz is the most universally known and celebrated; but a description of port manufactured at Ispahan is equally palatable and less astringent. It might not, however, bear the vicissitudes of export. A light wine made at Hamadan, diluted with water, is found very drinkable by European visitors and residents. Other cities in Persia could be cited where the juice of the grape is turned to similar account.

Fruits and flowers are abundant, and are fully appreciated in Persia. Of fruits the variety is great, and the quality, though not always the best, is in some cases unrivaled. There is, perhaps, no melon in the world superior to that of Nusrabad, a village between Kashan and Kúm. It were easier to name the few English fruits—such as the gooseberry, strawberry, raspberry, currant, and medlar—that are seldom, if at all, seen, than the many that are commonly enjoyed by Persians. Apples and pears, filberts and walnuts, muskmelons and watermelons, grapes, peaches, plums, nectarines—all these are to be had in profusion and so cheap as to be within reach of the poorest inhabitant.

Among the flowers are roses of many kinds, the marigold, chrysanthemum, hollyhock, narcissus, tulip, tuberose, convolvulus, aster, wallflower, dahlia, white lily (much valued), hyacinth, violet, larkspur, pink, and many ornaments of the European parterre. Of the roses, Lady Sheil observes that they are so profuse during the spring at Tehran that some are cultivated in fields as an object of trade to make rose-water. The double-colored orange rose at Níshápúr is exceptionally attractive and fragrant.

As with fruits and flowers, so also with vegetables for the table. If the parsnip be excepted, which is probably not found because not wanted, all those commonly used in England are to be had in Persia.

Irrespective of scientific classification and detail, it may be stated that among the tame animals of Persia

the horse, mule, and camel occupy an important position; and, jointly perhaps with oxen (used for tilling purposes), are first and foremost in usefulness to man. The Persian-Gulf Arab, though not equal to the pure Arabian, is a very serviceable animal, and has always a value in the Indian market. Among others, the Kashgais, or those wandering semi-Turkish tribes brought down from Turkestan to the neighborhood of Shíráz, have the credit of possessing good steeds. The Turkman horse of Khurásan and the Atak is a large, bony, and clumsy-looking quadruped, with marvelous power and endurance. Col. C. E. Stewart speaks of a "splendid breed of camels" in the northeastern district, of which Radkan, a small town of 4,000 inhabitants with a deputy-governor, is the capital. He also states that the Khurásan camel is celebrated for its size and strength, that it has very long hair, and bears cold and exposure far better than the ordinary Arabian or Persian camel, and that while the ordinary Persian camel only carries a load of some 320 pounds and an Indian camel one of some 400 pounds, the Khurásan camel will carry from 600 to 700 pounds. The best animals, he notes, are a cross between the Bactrian or two-humped and the Arabian one-humped camel. Sheep, goats, dogs, and cats are good of their kind; but not all the last are the beautiful creatures which, bearing the name of the country, have arrived at such distinction in Europe. Nor are these to be obtained, as supposed, at Angora or in Asia Minor. Lake Van or Ispahan is a more likely habitat. The cat at the first place, called by the Turks "Van kedisi," has a certain local reputation.

Among the wild animals are the lion, tiger, leopard, lynx, wolf, jackal, fox, hare, wild ass, wild sheep, wild cat, mountain-goat, gazelle, and deer. The tiger is peculiar to the Caspian provinces.

Poultry is good and plentiful, and the game birds, if not of many varieties, have admirable representatives in the "durráj" (black partridge), and the three kinds of partridge called respectively the "kabk," the "kabk darah," and "tihú." The "hubára," a kind of bustard, is well known to the sportsmen of northern India.

The comparative failure of silk has given an impetus to the cultivation of opium, the greater part of which, when prepared for the market, is shipped to China. Carpets have found new favor in Europe, and the value of those exported is estimated at ten times the amount of former days.

According to the latest information obtained, Persia is found to be portioned out into four large divisions and six smaller governments, of which governors-general or governors are appointed by the king. The four divisions are: (1) Adarbajjan (Azerbaijan) in the west; (2) the North Central Districts; (3) Khurásan in the east, including Sistan; (4) Southern Persia, or from the Shattu'l-'Arab to the Mashkid. The minor governments are: (5) Astrábád, (6) Mazandaran, (7) Gilan, (8) Khansah with Zanjan, (9) Kazvín, (10) Gerrus.

Persia is peopled by men of various races. A very great proportion of the population is composed of wandering tribes, that is, of a large number of families who pass a portion of the year on the hills. It is in this sense only that they can be considered wanderers. They invariably occupy the same pasture-grounds one year after another. Their chiefs are possessed of great authority over the tribesmen, and all dealings between the Government and the tribes are carried on through heads of these divisions. Through the chief the taxes, whether in money or in kind, are paid, and through him the regiments which his tribe may furnish are recruited. The office of chief is hereditary. The tents in which the tribesmen dwell are for the most part com-

posed of a light framework of the shape of a beehive. This is covered with a coating of reeds, and above it is placed a thick black felt. It has but one door, and no window or chimney. This is the Turkman tent, which is used by the Shahsavand and other tribes, but the Íliyats in Central Persia make use of tents of another construction, with flat or slightly sloping roofs.

The inhabitants of Persia may be divided into two classes—those who inhabit the towns and villages, and those who dwell exclusively in tents. The former class remain stationary during the greater part of the year, the richer orders only leaving the towns for two months during the summer heats, when it is possible to obtain cool air in the hills or upper grounds close by. The tribes who dwell in tents move from place to place with the varying seasons of the year. In the springtime they drive their flocks and herds to their accustomed pasture-grounds, and if they have a right to the pasture of mountains which are inaccessible in spring, they move up to their summer quarters as soon as the snow disappears. Winter finds them on the plains, prepared, in their black tents, to brave its utmost rigor. These Íliyát tribes serve each a separate chief. For the Íliyáts of Fars there is an hereditary chief called the Ílkhání, to whom they all owe allegiance; from whom they receive the laws that rule their conduct; and to whom they pay the revenue imposed upon them. They contribute a certain number of soldiers to the Shah's army. Very little is known as to the numbers and the peculiarities of these nomads. The Íliyát tribes of Turkish descent have an Ílkhání appointed by the Shah. Besides these tribes there are wanderers who are less numerous, and who occupy a less prominent position—the gipsies common to so many countries.

It is difficult to form an estimate of the population of Persian towns or districts. In the first place, opinion is divided upon the approximate figure to be accepted for the kingdom at large. According to St. John, the discrepancy is between 10,000,000 and 4,000,000; and if the smaller one were made a basis there would be but a scanty number indeed for partition among the cities and principal centers. The famine of 1870 was, moreover, severe and fatal enough to cause a considerable diminution in the totals calculated prior to its occurrence. When returning through Mashhad in the spring of 1872 the British commissioner for the Sístan boundary settlement was informed that no less than 100,000 persons had been carried off within the limits of the prince-governor's rule, of whom 24,000 were from the city itself, where exclusive of passing pilgrims, reckoned by thousands, a population of 70,000 might well be supposed. In Yazd and Ispahan losses were also very great, and must have sensibly affected the figures.

The official estimate for 1881 is recorded as follows:—inhabitants of cities, 1,963,800; wandering tribes, 1,909,800; inhabitants of villages and country, 3,780,000; total, 7,653,600. It is probable that 8,000,000 would be a fair estimate in round numbers; and this should include the comparatively new accessions of the territory in Sístan and western Baluchistan.

The population of certain cities may be recorded as follows:—Tehran, 100,000; Astrábád (city), 8,000—in the province, 26,000 (Lovett, 1881); Tabríz, 120,000; Úrumíya, 40,000; Hamadan, 30,000; Karmansháh, 25,000; Rasht, 20,000; Kazvín, 25,000; Zanjan or Zanjaánah, 20,000; Kúm, 20,000; Ispahan, 60,000; Shíráz, 30,000; Bushahr, 11,000; Yazd, 40,000; Karman, 40,000; Birjand, 12,000; Ardakan (Khurásan desert), 20,000; Bam, 6,000.

The sháh is regarded as the vicegerent of the Prophet, and, as such, claims implicit obedience so long as his commands do not go against the Koran and

the sacred law. The executive government is carried on by a ministry of which the *personnel* is subject to constant change, and the distribution of duties depends much upon the standing in royal favor of individual ministers. It may be said, as a rule, that those who fill the more important functions and do the most real work are better known by their family names than the official titles accorded them. The somewhat common prefix "mirza" is usually taken by high functionaries of state—a work which invariably denotes a member of the royal house when used as an affix.

The division of the country for administrative purposes has been mentioned above. Provinces are further subdivided into districts under "hákins," or chiefs, who collect the revenue as well as exercise a general superintendence. In villages the "katkhudá," or magistrate, administers justice.

Of the Armenians under Persian rule there are said to be 43,000, chiefly in Julfa near Ispahan, and of Nestorians and Chaldeans 23,000, chiefly in Úrumíya and Salmas. There are probably 70,000 Christians of every denomination. The number of Jews given is 19,000, and of Gabars (Guebres) or Parsís 8,000. Perhaps the Nestorians have been under-estimated; but the Parsís have greatly diminished in recent years. However tolerant the declared principles of the government toward aliens in religion, there is no doubt that much could yet be done to improve the condition of the sháh's non-Moslem subjects in respect of taxation, civil and social rights, and general treatment by local authorities. Efforts on behalf of the Nestorians have from time to time been made in late years, with the support of the British Government, and special agents have been deputed to Úrumíya to report upon supposed grievances with a view to their alleviation or removal. The temporary appointment of a Christian governor was an indication of the sháh's good wishes, but can hardly be said to have attained the desired end. It is just possible that the desire awakened in England in the second half of the nineteenth century to know more of the eastern churches may result in the exercise of a beneficial influence over the fortunes of a people who have suffered various forms of oppression for five centuries or more. (See NESTORIANS, where statistics, etc., are given.)

The value of imports in 1885 was 125,300,000 francs, that of the exports 72,200,000 francs. The leading imports are cottons, glassware, paper, iron, copper, sugar, and tea. The principal articles of export are silk, tobacco, skins, carpets, and opium.

The Persian army, according to official returns of the minister of war, numbers 105,500 men, of whom 5,000 form the artillery, 53,900 the infantry, 31,000 the cavalry, regular and irregular, and 7,200 militia. Of these troops, however, only one-third are employed in active service, the standing army of Persia consisting, on the peace footing, of a total of 30,000 men.

The receipts of the treasury are about 43,750,000 francs (\$9,000,000) per annum, of which 6,600,000 (\$1,300,000) proceed from customs. The expenditure amounts to 40,750,000 francs (\$8,000,000), of which 21,250,000 francs (\$4,250,000), are for the army, and 7,500,000 francs (\$1,500,000) for the royal household.

The character of the Persian is that of an easy-going man with a wish to make things pleasant generally. He is hospitable, obliging, and specially well disposed to the foreigner. His home virtues are many; he is very kind and indulgent to his children, and, as a son, his respect for both parents is excessive, developed in a greater degree to his father, in whose presence he will rarely sit, and whom he is in the habit of addressing and speaking of as "master." The full stream of

his love and reverence is reserved for his mother; he never leaves her to starve, and her wishes are laws to him. The mother is always the most important member of the household, and the grandmother is treated with veneration. The presence of the mothers-in-law is coveted by their sons-in-law, who look on them as the guardians of the virtue of their wives. The paternal uncle is a much nearer tie than with us; while men look on their first cousins on the father's side as their most natural wives.

Black slaves and men-nurses or "lallaks" are much respected; the "dyah" or wet nurse is looked on as a second mother and usually provided for for life. Persians are very kind to their servants; a master will often be addressed by his servant as his father, and the servant will protect his master's property as he would his own. A servant is invariably spoken to as "bacha" (child). The servants expect that their master will never allow them to be wronged. The slaves in Persia have a good time; well fed, well clothed, treated as spoiled children, given the lightest work, and often given in marriage to a favorite son or taken as "segah" or concubine by the master himself, slaves have the certainty of a well-cared-for old age. They are looked on as confidential servants, are intrusted with large sums of money and the conduct of the most important affairs, and seldom abuse their trust. The greatest punishment to an untrustworthy slave is to give him his liberty and let him earn his living. They vary in color and value: the "Habshi" or Abyssinian is the most valued; the Suháli or Somáli, next in blackness, is next in price; the Bombassi, or coal-black negro of the interior, being of much less price, and usually only used as a cook. The prices of slaves in Shiráz are, a good Habshi girl of twelve to fourteen \$200, a good Somáli same age, half as much; while a Bombassi is to be got for \$70, being chosen merely for physical strength. They are never sold, save on importation, though at times they are given away. A Persian is seldom unkind to his own horse or his slave, and when overtaken by poverty he will first sell his shirt, *then* his slave.

In commercial morality, a Persian merchant will compare not unfavorably with the European generally. To the poor, Persians are unostentatiously generous; most of the rich have regular pensioners, old servants, or poor relations who live on their bounty; and though there are no workhouses, there are in ordinary times no deaths from starvation; and charity, though not organized, is general. Procrastination is the attribute of all Persians, "to-morrow" being ever the answer to any proposition, and the "to-morrow" means indefinite delay. A great dislike is shown generally to a written contract binding the parties to a fixed date; and, as a rule, on breaking it the Persian always appeals for and expects delay and indefinite days of grace.

Persians are clean in their persons, washing themselves and their garments frequently. The Persian always makes the best of his appearance; he is very neat in his dress, and is particular as to the sit of his hat and the cut of his coat. All Persians are fond of animals, and do not treat them badly when their own property.

Cruelty is not a Persian vice; torture and punishment of an unusual and painful nature being no part of their judicial system. There are no vindictive punishments, such as a solitary confinement, penal servitude for long terms of years, etc. Seldom, indeed, is a man imprisoned more than twelve months, the rule being that there is a general jail delivery at the New Year. Royal clemency is frequently shown, often, perhaps, with want of judgment.

PERSIGNY, JEAN GILBERT VICTOR FIALIN, DUC DE, the most devoted servant of Napoleon III., who

with the duc de Morny and Marshal Saint-Arnaud formed the triumvirate which established the second empire, was born at Saint-Germain Lespinasse (Loire), January 11, 1808. He had two qualities which gave him ascendancy over the young prince, fidelity and audacity. He it was who planned the attempt on Strasburg in 1836, and that on Boulogne in 1840. For his share in the last escapade he was sentenced to imprisonment in a fortress for twenty years, which was commuted into detention at Versailles. When the Revolution of 1848 broke out he labored indefatigably for the Bonapartist cause, securing the election of Louis Napoleon to the Constituent Assembly in June and in September, 1848, and to the presidency in December, 1848. His own prosperity was now secured; he was made aide-de-camp to the prince president, and elected to the Legislative Assembly in May, 1849, for the department of the Loire. He then became one of the secret plotters of the *coup d'état*, and was at first designed for the office of minister of the interior, but a man of more capacity, De Morny, was chosen for this post, and Persigny only accompanied Colonel Espinasse to take possession of the hall of the assembly. On securing the throne Napoleon III. hastened to reward his most faithful personal adherent. Persigny became minister of the interior in the place of De Morny in January, 1852, and a senator in December, 1852. He resigned office in 1854 and became ambassador in London, with but one short interval (1858-59), from May, 1855, to November, 1860, when he again became minister of the interior. His second tenure of office lasted till June, 1863, when he resigned. As a minister he showed very little capacity, and when the empire fell in 1870 escaped to England. He did not long survive the overthrow of the idea which he had so strenuously supported, and died at Nice, January 11, 1872. Fialin de Persigny was certainly only an adventurer, but he had one merit, which the other founders of the second empire did not possess, fidelity to his master.

PERSIMMON, the name given to the fruits of *Diospyros virginiana* in the United States. The tree which bears them belongs to the order *Ebenaceæ*. The astringency renders the green fruit unpalatable, but, after it has been subjected to the action of frost, or has become partially rotted or "bletted" like a medlar, its flavor is improved. In some of the southern States the fruit is kneaded with bran, made into cakes, and baked. From the cakes a fermented liquor is made with the aid of yeast. The tree is cultivated in England, but rarely, if ever, ripens its fruit.

PERSIUS (A. PERSIUS FLACCUS) stands third in order of time of those recognized by the Romans as their four greatest satirists. Of these four representatives of the most distinctly national branch of Roman literature—Lucilius, Horace, Persius, and Juvenal—Persius is the least important.

Well born and well connected, and the inheritor of a good estate, Persius lived the uneventful life of a student, and was chiefly remarkable for his affection for his friends, his teachers, and his family. He was a native of Etruria, a district which contributed less than any other in Italy to the literary distinction of Rome. And it is noticeable that, while Persius has all the characteristic moral fervor of the more serious Roman writers, he shows less, compared with those who have an important place in the national literature, of that sensuous vivacity and susceptibility to beauty in art and nature with which the purely Italian race was preeminently endowed. He was born at Volaterræ in the year 34 A.D., and died in 62 A.D.

PERSONAL ESTATE. Strictly speaking, the term ESTATE (*q.v.*) is confined in English law to the

extent of interest which can exist in real property. But "personal estate" is a term often conveniently, if not accurately, applied to all property that is not real property. The division of property into real and personal represents in a great measure the division into immovable and movable incidentally recognized in Roman law and generally adopted since. "Things personal," according to Blackstone, "are goods, money, and all other movables which may attend the owner's person wherever he thinks proper to go." This identification of things personal with movables, though logical in theory, does not, as will be seen, perfectly express the English law, owing to the somewhat anomalous position of chattels real.

Personal estate is divided in English law into *chattels real* and *chattels personal*; the latter are again divided into *choses in possession* and *choses in action*. Chattels real are personal interests in real estate, which, though they are annexed to land, still descend in the same manner as personal estate. Examples are a term of years, the next presentation to a benefice, an estate *pur autre vie*, and money due upon a mortgage. Under the head of chattels personal fall all kinds of property other than real estate and chattels real. In cases of bequest to a charity the terms pure and impure or mixed personalty are often used. The latter class is almost conterminous with chattels real. A *chose in action* denotes the right of recovery by legal proceedings of that which, when recovered, becomes a *chose in possession*.

Interest in personal property may be either absolute or qualified. The latter case is illustrated by animals *feræ naturæ*, in which property is only coëxtensive with detention. Personal estate may be acquired by occupancy (including the *accessio, commixtio, and confusio* of Roman law), by invention, as patent and copyright, or by transfer, either by the act of the law (as in bankruptcy, judgment, and intestacy), or by the act of the party (as in gift, contract, and will).

There are several cases in which, by statute or otherwise, property is taken out of the class of real or personal to which it seems naturally to belong. By the operation of the equitable doctrine of conversion money directed to be employed in the purchase of land, or land directed to be turned into money, is in general regarded as that species of property into which it is directed to be converted.

The law in the United States agrees in most respects with that of England. Heirlooms are unknown, one reason being, no doubt, that the importance of title-deeds is much less than it is in England, owing to the operation of the Registration Acts. Long terms in some States have annexed to them the properties of freehold estates. Thus in Massachusetts, if the original term be a hundred or more years, it is deemed a fee as long as fifty years remain unexpired. In the same State estates *pur autre vie* descend like real property. In New York and New Jersey an estate *pur autre vie* is deemed a freehold only during the life of the grantee; after his death it becomes a chattel real. In other States the heir has a *scintilla* of interest as special occupant. In some States railway rolling-stock is considered as purely personal, in others it has been held to be a fixture, and so to partake of the nature of real property. Shares in some of the early American corporations were, like New River shares in England, made real estate by statute, as in the case of the Cape Sable Company in Maryland. In Louisiana animals employed in husbandry are, and slaves were, regarded as immovables. Pews in churches are generally real property, but in some States they are made personal property by statute, *e.g.*, in Massachusetts. The assignment of *choses in action* is generally permitted,







and is in most States regulated by statute. The circuit court has no jurisdiction in the case of an assigned *chose in action* unless a suit might have been prosecuted in that court if no assignment had been made.

PERSPECTIVE. See PROJECTION.

PERTH, an inland county of Scotland, is situated almost in the center of the country. The larger part of its border-line is formed of natural boundaries, the Grampians separating it on the west and north from Argyll, Inverness, and Aberdeen, while the Ochils and the Firth of Tay in the southeast divide it from Kinross, Clackmannan, and Fife. In the south the river Forth forms a large portion of the boundary with Stirling, but the boundary with Forfar in the northeast is almost at no point defined either by rivers or by mountains. The county is of an irregular circular form, the diameter being about seventy miles. A small portion in the southeast is separated from the main portion at the junction of Clackmannan and Fife, and another small portion is surrounded by Stirlingshire. Perthshire is the fourth largest county in Scotland, the total area being 1,617,808 acres, or 2,528 square miles. The lochs and rivers abound in salmon and varieties of trout; and scarcely any of the streams have been perceptibly injured by the pollution of manufactures. About four-fifths of the surface of the county, chiefly in the west and northwest, is occupied by the Grampians, or encroached on by their ridges or by isolated summits. The Ochils, occupying a considerable area in the southeast, attain in many cases a height of over 2,000 feet, and the Sidlaws, practically a continuation of the Ochils running into Forfarshire, reach a height of about 1,500 feet. The lowland districts consist chiefly of the straths and river valleys, as Strath-tay; Strathmore, extending into Forfarshire; Strathearn, stretching across the county from west to east, and bounded on the south by the Ochils, the district of Menteith between the Teith and the Forth; and the Carse of Gowrie between the Sidlaws and the Firth of Tay.

The climate and soil of Perthshire present greater varieties than are known in any other county of Scotland. In the higher western regions it is very moist; and long stretches of exposed uplands alternate with finely-sheltered valleys. The arable land is chiefly in the drier eastern districts. For the most part the soil is sharp and fertile. The county, agriculturally, may be classed in four divisions:—deer-forests, chiefly the wilder mountain districts; grazing and pasture lands on the hills, embracing about four-fifths of the total area; light soils in the lower undulating districts, including the north portion of Menteith and the upper portion of the principal river-valleys, specially suited for oats, barley, turnips, and potatoes; clay and carse land, chiefly in the Carse of Gowrie, which extends to about 100,000 acres, in the Carse of Stirling north of the Forth, and in the lower part of Strathearn below and above Bridge of Earn. A considerable area is occupied by orchards, the light quick soil on Tayside and in the upper districts of Menteith being admirably adapted for apples.

The manufacture of coarser linen fabrics is largely carried on in the towns and villages, and there are a considerable number of flour mills.

Perthshire embraces eighty-one parishes in its limits and contains three ancient cities—Perth, formerly the capital of Scotland, and Dunkeld and Dunblane, formerly the seats of bishoprics, as was also Abernethy. The population of the county in 1831 was 142,166, which by 1851 had diminished to 138,660, and by 1871 to 127,768; but in 1881 it had increased to 129,007, of whom 61,552 were males and 67,455 females.

PERTH, an ancient city, a royal and parliamentary

burgh, and the chief town of the above county, is beautifully situated at the foot of Kinnoul Hill, chiefly on the west bank of the Tay, about forty miles north of Edinburgh and about twenty west of Dundee.

PERTH, a city of Australia, capital of the colony of Western Australia, is picturesquely situated on the Swan river, 12 miles above Freemantle and 1,700 west-northwest of Melbourne. Perth was founded in 1829, received a municipal constitution in 1856, and was created a city in 1880. The population of the city, including the military, in 1871 was 5,007, and in 1881 it was 5,044.

PERTH AMBOY, a city of Middlesex county, N. J., also a port of entry, is located on Raritan River where that stream empties into Raritan Bay, at the south end of Staten Island Sound, opposite Tottenville, N. Y. It is connected with the latter point by ferry, and is twenty-two miles from New York city. The city contains eight churches, two banks, three hotels, two newspaper offices, two public schoolhouses, a young ladies' seminary, custom-house, postoffice and telegraph office. It also has a cork factory, emery-mills, terracotta works, foundry and machine-shop, cigar manufactory, electric-light works, oil refinery, chemical works, and manufactures of fire and glazed brick, and drain-tiles. It is the terminus of a branch road connecting the city with Rahway, and is a prominent station on the New York and Long Branch Road. The population, in 1890, was 9,512.

PERTHES, FRIEDRICH CHRISTOPH, German publisher, was born at Rudolstadt on April 21, 1772. He was an ardent patriot, and during the period of Napoleon's supremacy he distinguished himself by his steady resistance to French pretensions. His zeal for the national cause led him to issue (in 1810-11) *Das Deutsche Museum*, to which many of the foremost publicists in Germany contributed. Perthes died at Gotha on May 18, 1843.

PERTINAX, HELVIUS, Roman emperor, was the son of a charcoal-burner, and was born in 126 A.D., in Liguria, or at Villa Martis, among the Apennines. From being a teacher of grammar he rose through many important offices, both civil and military, to the consulate, which he held twice. Chosen on December 31, 192, to succeed the murdered Commodus, he was himself assassinated in a mutiny of the soldiers after a reign of eighty-six days.

PERTURBATIONS, in Physical Astronomy, are the disturbances produced in the simple elliptic motion of one heavenly body about another, by the action of a third body, or by the non-sphericity of the principal body. Thus, for instance, were there no bodies in space except the earth and moon, the moon would describe accurately an ellipse about the earth's center as focus, and its radius-vector would pass over equal areas in equal times; but only if both bodies be homogeneous and truly spherical, or have their constituent matter otherwise so arranged that they may attract each other as if each were collected at some definite point of its mass. The oblateness of the earth's figure, therefore, produces perturbations in what would otherwise be the fixed elliptic orbit of the moon.

PERTZ, GEORG HEINRICH, editor of the *Monumenta Germaniæ Historica*, was born at Hanover on March 28, 1795, and died at Munich, October 7, 1876.

PERU has, in different periods, included areas of territory of varying extent. The empire of the Yncas and the Spanish viceroyalty were not conterminous with the modern republic nor with each other. The republic of Peru is situated between the equator and the Tropic of Capricorn, yet, owing to the differences of elevation,

it includes regions with every variety of climate. It lies between the parallels of  $3^{\circ} 21'$  S. and  $19^{\circ} 10'$  S. and between  $68^{\circ}$  and  $81^{\circ} 20' 45''$  W. longitude, and has an area of about 480,000 square miles. The length along the Pacific coast is 1,240 miles, while the width ranges from 300 to 400 miles.

The republic is bounded on the west by the Pacific Ocean, on the east by Brazil and Bolivia, on the north by Ecuador, and on the south by Chili.

Peru is divided longitudinally into three well-defined regions, the coast, the sierra, and the montaña. The coast, extending from the base of the Maritime Cordillera to the Pacific Ocean, consists of a sandy desert crossed at intervals by rivers, along the banks of which there are fertile valleys. The sierra is the region of the Andes, and is about 250 miles in width. It contains stupendous chains of mountains, elevated plains and table-lands, warm and fertile valleys, and ravines. The montaña is the region of tropical forests within the valley of the Amazon, and skirts the eastern slopes of the Andes.

The coast has been upraised from the ocean at no very distant geological epoch, and is still nearly as destitute of vegetation as the African Sahara. It is, however, watered by fifty streams which cross the desert at intervals. Half of these have their origin in the summits of the Andes, and run with a permanent supply of water into the ocean. The others, rising in the outer range, which does not reach the snow-line and receives less moisture, carry a volume of water to the sea during the rainy season, but for the rest of the year are nearly dry. The absence of the rain here is caused by the action of the lofty uplands of the Andes on the trade-wind. The southeast trade-wind blows obliquely across the Atlantic Ocean until it reaches Brazil. By this time it is heavily laden with vapor, which it continues to bear along across the continent, depositing it and supplying the sources of the Amazons and La Plata. Finally, the trade-wind arrives at the snow-capped Andes, and here the last particle of moisture is wrung from it that the very low temperature can extract. Coming to the summit of that range, it rushes down as a cool and dry wind on the Pacific slopes beyond. Meeting with no evaporating surface, and with no temperature colder than that to which it is subjected on the mountain-tops, this wind reaches the ocean before it becomes charged with fresh moisture. The constantly prevailing wind on the Peruvian coast is from the south. From November to April there are usually constant dryness, a clear sky, and considerable, though by no means oppressive, heat. From June to September the sky is obscured for weeks together by fog, which is often accompanied by drizzling rain called "garua."

The deserts between the river valleys vary in extent, the largest being upward of seventy miles across. On their western margin steep cliffs generally rise from the sea, above which is the "tablazo" or plateau, in some places slightly undulating, in others with ridges of considerable height rising out of it; the whole apparently quite bare of vegetation. The surface is generally hard, but in many places there are great accumulations of drifting sea-sand. The sand usually forms isolated hillocks, called "medanos," of a half-moon shape, having their convex sides toward the trade-wind. They are from ten to twenty feet high, with an acute crest, the inner side perpendicular, the outer with a steep slope. Sometimes, especially at early dawn, there is a musical noise in the desert, like the sound of distant drums, which is caused by the eddying of grains of sand in the heated atmosphere, on the crests of the "medanos." Apparently the deserts are destitute of all vegetation; yet three kinds of herbs exist, which bury them-

selves deep in the earth, and survive long periods of drought. One is an amaranthaceous plant, whose stems ramify through the sand-hills; the other two are a *Martynia* and an *Aniseia*, which maintain a subterranean existence during many years, and only produce leafy stems in those rare seasons when sufficient moisture penetrates to the roots.

The valleys form a marvelous contrast to the surrounding desert. A great mass of pale-green foliage is usually composed of the "algarrobo" trees, while the course of the river is marked by lines or groups of palms, by fine old willows (*Salix Humboldtiana*), fruit-gardens, and fields of cotton, maize, sugar, and lucerne. In some valleys there are expanses of sugar-cane, in others cotton, while in others vineyards and olive-yards predominate. The woods of "algarrobo" are used for pasture, cattle and horses greedily enjoying the pendulous yellow pods.

The coast of Peru has few protected anchorages, and the headlands are generally abrupt and lofty. These and the few islands are frequented by myriads of sea-birds, whence come the guano deposits, the retention of ammonia and other fertilizing properties being due to the absence of rain. The islets off the coast are all barren and rocky.

The more common sea-birds, which haunt the islets and headlands in countless myriads, are the *Sula variegata* or guano-bird, a large gull called the *Larus modestus*, the *Pelecanus thajus*, and the *Sterna Ynca*, a beautiful tern with curved white feathers on each side of the head. The rarest of all the gulls is also found on the Peruvian coast, namely, the *Xema furcatum*. The immense flocks of birds as they fly along the coast, appear like clouds, and one after another is incessantly seen to plunge from a height into the sea to devour the fishes, which they find in extraordinary numbers. The guano-deposits are in layers from forty to fifty feet thick, of a grayish-brown color outside, and more and more solid from the surface downward, owing to the gradual deposit of strata and evaporation of fluid particles. Sea-lions (*Otaria fosteri*) are common on the rocky islands and promontories. These large creatures frequent particular islets for the purpose of breathing their last, the wounded or aged being helped there by their companions.

The Maritime Cordillera, overhanging the Peruvian coast, contains a long line of volcanic mountains, most of them inactive, but their presence is probably connected with the frequent and severe earthquakes, especially in the southern section of the coast. Since the year 1570 there have been seventy violently destructive earthquakes recorded on the west coast of South America, but the register is of course incomplete in its earlier part. The most terrible was that of 1745, which destroyed Callao.

The most important part of Peru is the region of the cordilleras of the Andes divided into "puna" or lofty uninhabited wilderness, and "sierra" or inhabitable mountain slopes and valleys. This great mountain system, running southeast to northwest with the line of the coast, consists of three chains or cordilleras. The two chains which run parallel, and near each other on the western side, are of identical origin, and have been separated by the action of water during many centuries. On these chains are the volcanoes and many thermal springs. The narrow space between them is for the most part, but not always, a cold and lofty region known as the "puna," containing alpine lakes—the sources of the coast rivers. The great eastern chain, rising from the basin of the Amazon and forming the inner wall of the system, is of distinct origin. These three chains are called the Maritime Cordillera, the

Central Cordillera, and the Andes. Paz Soldan and other Peruvian geographers give the name of Andes, *par excellence*, to the eastern cordillera.

The Peruvian Maritime Cordillera contains a regular chain of volcanic peaks overlooking the coast region of Tarapaca, which attain a height of 16,000 to 18,000 feet. In most parts of the Peruvian Andes the line of perpetual snow is at 16,400 feet above the sea; but on the Cordillera Nevada, above the Callejon de Huaylas, it sinks to 15,400 feet. This greater cold is obviously caused by the intervention of the Cordillera Negra, which intercepts the warmth from the coast.

The Central Cordillera is the true water-parting of the system. No river, except the Marañon, breaks through it either to the east or west, while more than twenty coast-streams rise on its slopes and force their way through the maritime chain. The Central Cordillera consists mainly of crystalline and volcanic rocks, on each side of which are aqueous, in great part Jurassic, strata thrown up almost vertically. In 14° 30' S. latitude the central chain is connected with the Eastern Andes by the transverse mountain-knot of Vilcañota, the peak of that name being 17,500 feet above the sea. The great inland basin of Lake Titicaca is thus formed. The central chain continues to run parallel with the Maritime Cordillera until, at Cerro Pasco, another transverse knot connects it with the Andes in 10° 30' S. latitude. It then continues northward, separating the basins of the Marañon and Huallaga; and at the northern frontier of Peru it is at length broken through by the Marañon flowing to the eastward.

The Eastern Andes is a magnificent range in the southern part of Peru, of Silurian formation, with talcose and clay slates, many quartz veins, and eruptions of granitic rocks. The whole range is highly auriferous, and the thickness of the strata is not less than 10,000 feet. It is nowhere disturbed by volcanic eruptions, except at the very edge of the formation near Lake Titicaca, and in this respect it differs essentially from the Maritime Cordillera.

The third division of Peru is the region of the tropical forests, at the base of the Andes, and within the basin of the Amazons. It is traversed by great navigable rivers. The sub-tropical section is important from the value of its products, and interesting from the grandeur and beauty of its scenery. Long spurs run off from the Andes, gradually decreasing in elevation, and it is sometimes a distance of sixty to eighty miles before they finally subside into the vast forest-covered plains of the Amazon basin. Numerous rivers flow through the valleys between these spurs, which are the native home of the quinine-yielding cinchona trees. In the warm valleys there are large plantations of coca (*Erythroxylon Coca*), or CUCA, the annual produce of which is stated at 15,000,000 pounds. The other products of these warm valleys are most excellent coffee, cocoa, sugar, tropical fruits of all kinds, and gold in great abundance. In the vast untrodden forests farther east there are timber-trees of many kinds, incense-trees, a great wealth of india-rubber trees of the *Hevea* genus, numerous varieties of beautiful palms, sarsaparilla, vanilla, ipecacuanha, and copaiba. The abundant and varied fauna is the same as that of the Brazilian forests.

The earliest reliable enumeration of the people of Peru was made in the year 1793, when there were 617,700 Indians, 241,225 mestizos (Indian and white), 136,311 Spaniards, 40,337 negro slaves, and 41,404 mulattoes, giving a total of 1,076,977 souls, without counting the wild Indians of the montaña. The ecclesiastics numbered 5,496, including 1,260 nuns. This tells a sad story of depopulation since the fall of

the Yncas, to which the abandoned terraces on the mountain-sides, once highly cultivated, bear silent testimony. In 1862 the population was officially estimated at 2,487,716. The latest census was taken in 1876 with much care. The result was 2,673,075 souls (males 1,352,151, females 1,320,924); of these 57 per cent. were Indians, 23 per cent. mestizos, and 20 per cent. of Spanish descent, negroes, Chinese, and foreigners; so that Peru is still the country of the Ynca people.

The principal towns on the coast, except those of Payta, Callao, and Arica, are always situated some distance from the seashore. San Miguel de Piura, founded by Pizarro in 1532, is on the river of the same name. The towns in all parts of Peru are built on the same plan where the ground will allow of it, in squares or "quadras," with the streets at right angles, and a quadrangular open space or "plaza," one side being occupied by the principal church, near the center. Piura is a town of this class. Farther south are the cities of Lambayeque, Chiclayo, and Saña. Truxillo, founded by Pizarro in 1535, is of more importance. Truxillo is the most important city north of Lima.

To the north of Lima there are five principal ports and thirteen smaller ones. Payta has a good anchorage and exports the cotton of the Chira and Piura valleys, the anchorages of Tumbes to the north and Sechura to the south being subsidiary to it. Pimentel is the port for the valleys of Lambayeque and Chiclayo, and Eten for that of Ferreñafe, the older port of San José having been abandoned as more dangerous. Pacasmayo, also a precarious anchorage, is the port which taps the rich valley of Jequetepeque. Farther south Malabrigo is the port for the valley of Chicama. Huanchaco was formerly the port for Truxillo, but Salaverry, a few miles to the south, has been substituted as affording a safer anchorage. Santiago de Chao and Guañape, in the Viru district, are lesser ports, the latter being resorted to by ships loaded with guano at the adjacent islands. Chimbote, in the bay of Ferrol, has a good anchorage, and is important as the principal outlet for the Santa valley and the department of Ancachs. Farther south are the lesser ports of Santa, Samanco, Casma, Huarmey, Supé, Huacho, Chancay, and Ancon.

LIMA, the capital (*q.v.*), according to the census of 1876, had a population of 100,046, of whom 33,020 were of European descent, 23,010 half-castes, 19,630 Indians, 15,378 foreigners, and 9,008 negroes. South of Lima are the cities of Chíncha and Yca, with the principal seaport of Pisco, whence the wines and spirits of the adjacent valleys are exported. The small ports of Cerro Azul and Tambo Mora export the sugars of the Cañete and Chíncha valleys. Farther south the exposed port of Chala, with a bad anchorage, is used for the valley of Acari and the province of Parinacochas in the mountains. Southeast of Yca are the charming agricultural towns of Palpa and Nasca. AREQUIPA (*q.v.*), the most important coast city south of Lima, was founded by Pizarro in 1536. South of Arequipa is the littoral province of Moquegua, with a pleasant town, the center of a vine-growing industry. The cities of Tacna, Arica, and Iquique are in the Chilian province of Tarapaca. The ports of Arequipa were formerly Quilca, then Islay, and now Mollendo. Ylo and Pacocha, in the same bay, are the ports of Moquegua; Saña, under the lofty headland of the same name, is a port where landing is impossible except in "balsas," and it is little used. Arica was a very important port before the Chilian invasion, as through it passed all the trade to Bolivia. Iquique and Pisagua are the chief ports of Tarapaca, the others being Junin, Mexillones, Molle, Chucumata, Patillos. The principal interior towns in the north of Peru are Caxamarca, Huaraz, Huanuco, Cerro Pasco, the center of

the great silver-mining industry, 13,200 feet above the sea, Tarma and Xauxa. Huancavelica owed its existence to the famous quicksilver mine. Ayacucho, formerly Guamanga, founded by Pizarro in 1539, is a charming abode amid lovely scenery. Between Ayacucho and Cuzco are the pleasant towns of Andahuaylas and Abancay. CUZCO (*q.v.*), the center of Peru, the old capital of the Yncas, lies at the foot of the famous hill of Sacsahuaman. South of Cuzco are many delightful places in the vale of Vilcamayu, and the towns in the Collao, the chief being Puno, on the shore of Lake Titicaca.

Universities and colleges were founded in Peru very soon after the conquest, and there was intellectual progress both among the Indians and in the families of Spanish descent. The university of San Marcos, at Lima, is the most ancient in the New World, having been created by order of Charles V. in 1551. The college of San Carlos was founded in 1770, and the school of medicine in 1792. At Cuzco the university of San Antonio Abad was founded in 1598, and the college of San Geronimo at Arequipa in 1616. Since the independence there has been very considerable intellectual and educational progress in the country. There is a university of the first rank at Lima, 5 lesser universities, 33 colleges for boys and 18 for girls, 1,578 schools for boys and 729 for girls, besides private schools.

The early inhabitants of Peru originally consisted of several distinct nations, subdivided into many tribes, which were eventually combined in the empire of the Yncas. The principal race was that of the imperial Yncas themselves, inhabiting the two central sections of the sierra, from the Knot of Cerro Pasco to that of Vilcañota, a distance of 380 miles. Six nations originally peopled this central mountain region—the Yncas in the valley of the Vilcamayu and surrounding plateaus, the Canas round the sources of the Apurimac, the Quichuas along the upper courses of the Pachachaca and the Apurimac, the Chancas, a very warlike people, from Guamanga to the Apurimac, the Huancas in the valley of the Xauxa, and the Rucanas round the summits and on the slopes of the Maritime Cordillera. These six nations were divided into "ayllus" or tribes, the most distinct of which were the still famous Morochucos and Yquichanos, brave mountaineers of the Chanca nation.

In the basin of Lake Titicaca there was another race, anciently called Colla, but now better known as Aymara. Their language survives, and, though closely allied grammatically, the vocabulary differs from that of the Yncas.

The Peruvian coast appears originally to have been inhabited by a diminutive race of fishermen called Changos, a gentle and hospitable people, never exceeding five feet in height, with flat noses. They fished in boats made of inflated sealskins, lived in sealskin huts, and slept on heaps of dried seaweed.

The Ynca or Quichua tribes of the Andes of Peru average a height of five feet to five feet six inches. They are of slender build, but with well-knit, muscular frames, and are capable of enduring great fatigue. Their complexions are of a fresh olive-color, skin very smooth and soft, beardless, hair straight and black, the nose aquiline. They are good cultivators, and excel as shepherds by reason of their patience and kindness to animals. They are naturally gentle, most affectionate to their families, with an intense love of home; but at the same time they are enduring and brave. The Aymaras are more thick-set than the Yncas, and their chief physical peculiarity is that the thigh, instead of being longer, is rather shorter than the leg. The whole build is admirably adapted for mountain-climbing.

The great Ynca Huayna Ccapac died in 1527, the year when Pizarro first appeared on the coast. His consolidated empire extended from the river Ancasmayu north of Quito to the river Maule in the south of Chili. The Yncas had an elaborate system of state-worship, with a ritual and frequently recurring festivals. History and tradition were preserved by the bards, and dramas were enacted before the sovereign and his court. Roads with posthouses at intervals were made over the wildest mountain ranges and the bleakest deserts for hundreds of miles. A well-considered system of land-tenure and of colonization provided for the wants of all classes of the people. The administrative details of government were minutely and carefully organized, and accurate statistics were kept by means of the "quipus" or system of knots. The edifices displayed marvelous building skill, and their workmanship is unsurpassed. The world has nothing to show, in the way of stone-cutting and fitting, to equal the skill and accuracy displayed in the Ynca structures of Cuzco. As workers in metals and as potters they displayed infinite variety of design, though not of a high order, while as cultivators and engineers they in all respects excelled their European conquerors.

On March 10, 1526, the contract for the conquest of Peru was signed by Almagro and Luque, Gaspar de Espinosa supplying the funds. In 1527 Francisco Pizarro, after enduring fearful hardships, first reached the coast of Peru at Tumbez. In the following year he went to Spain, and on July 26, 1529, the capitulation with the crown for the conquest of Peru was executed. Pizarro sailed from San Lucar with his brothers in January, 1530, and landed at Tumbez in 1532. The civil war between Huascar and Atahualpa, the sons of Huayna Ccapac, had been fought out in the meanwhile, and the victorious Atahualpa was at Caxamarca on his way from Quito to Cuzco. On November 15, 1532, Francisco Pizarro with his little army entered Caxamarca and in February, 1533, his colleague Almagro arrived with reinforcements. The murder of the Ynca Atahualpa was perpetrated on August 29, 1533, and November 15 Pizarro entered Cuzco. He allowed the rightful heir to the empire, Manco, the legitimate son of Huayna Ccapac, to be solemnly crowned on March 24, 1534. Almagro then undertook an expedition to Chili, and Pizarro founded the city of Lima on January 18, 1535. In the following year the Yncas made a brave attempt to expel the invaders, and closely besieged the Spaniards in Cuzco during February and March. But Almagro, returning from Chili, raised the siege on April 18, 1537. Immediately afterward the dispute arose between the Pizarros and Almagro as to the limits of their respective jurisdictions. An interview took place at Mala, on the seacoast, on November 13, 1537, which led to no result, and Almagro was finally defeated in the battle of Las Salinas, near Cuzco, April 26, 1538. His execution followed. His adherents recognized his young half-caste son, a gallant and noble youth generally known as Almagro the Lad, as his successor. Bitterly discontented, they conspired at Lima and assassinated Pizarro on June 26, 1541. Meanwhile Vaca de Castro had been sent out by the emperor, and on hearing of the murder of Pizarro he assumed the title of governor of Peru. On September 16, 1542, he defeated the army of Almagro the Lad in the battle of Chupas, near Guamanga. The ill-fated boy was beheaded at Cuzco.

Charles V. enacted the code known as the "New Laws" in 1542. "Encomiendas," or grants of estates on which the inhabitants were bound to pay tribute and give personal service to the grantee, were to pass to the crown on the death of the actual holder; a fixed sum

was to be assessed as tribute; and forced personal service was forbidden. Blasco Nunez de Vela was sent out, as first viceroy of Peru, to enforce the "New Laws." Their promulgation aroused a storm among the conquerors. Gonzalo Pizarro rose in rebellion, and entered Lima on October 28, 1544. The viceroy fled to Quito, but was followed, defeated, and killed at the battle of Anaquito on January 18, 1546. The "New Laws" were weakly revoked, and Pedro de la Gasca, as first president of the Audiencia (court of justice) of Peru, was sent out to restore order. He arrived in 1547, and on April 8, 1548, he routed the followers of Gonzalo Pizarro on the plain of Xaquixaguana, near Cuzco. Gonzalo was executed on the field. La Gasca made a redistribution of "encomiendas" to the loyal conquerors, which caused great discontent, and left Peru before his scheme was made public in January, 1550. On September 23, 1551, Don Antonio de Mendoza arrived as second viceroy, but died at Lima in the following July. The country was then ruled by the judges of the Audiencia, and a formidable insurrection broke out, headed by Francisco Hernandez Giron, with the object of maintaining the right of the conquerors to exact forced service from the Indians. In May, 1554, Giron defeated the army of the judges at Chuquinga, but he was hopelessly routed at Pucara on October 11, 1554, captured, and on December 7th executed at Lima. Don Andres Hurtado de Mendoza, marquis of Cañete, entered Lima as third viceroy of Peru on July 6, 1555, and ruled with an iron hand for six years. The next viceroy was the Conde de Nieva (1561-64). His successor, the licentiate Lope Garcia de Castro, who only had the title of governor, ruled from 1564 to 1569. From this time there was a succession of viceroys until 1824. The viceroys were chief magistrates, but they were not supreme. In legal matters they had to consult the Audiencia of judges, in finance the Tribunal de Cuentas, in other branches of administration the Juntas de Gobierno and de Guerra.

In their legislation the Spanish kings and viceroys showed a desire to protect the people from tyranny, but they were unable to prevent the rapacity and lawlessness of distant officials. The country was depopulated by the illegal methods of enforcing the mita, and an air of sadness and desolation spread over the land.

Peru was the center of Spanish power, and the viceroy had his military strength concentrated at Lima. Consequently the more distant provinces, such as Chili and Buenos Ayres, were able to throw off the yoke first. But the destruction of the viceroy's power was essential to their continued independent existence. The conquest of the Peruvian coast must always depend on the command of the sea. A fleet of armed ships was fitted out at Valparaiso, in Chili, under the command of Lord Cochrane and officered by Englishmen. It convoyed an army of Argentine troops, with some Chilians, under the command of the Argentine general San Martin, which landed on the coast of Peru in September, 1820. San Martin was enthusiastically received, and the independence of Peru was proclaimed at Lima on his entrance, after the viceroy had withdrawn (July 28, 1821). On September 20, 1822, San Martin resigned the protectorate, with which he had been invested, saying that the "presence of a fortunate soldier is dangerous to a newly constituted State," and on the same day the first congress of Peru became the sovereign power of the State. After a short period of government by a committee of three, the congress elected Don José de la Riva Agüero to be first president of Peru, on February 26, 1823. He displayed great energy and capacity as an administrator, but the aid of the Colombians under Bolivar was sought, and the native ruler was unwisely

deposed. Bolivar arrived at Lima on September 1, 1823, and began to organize an army to attack the Spanish viceroy in the interior. On August 6, 1824, the cavalry action at Junin was fought with the Spanish general Canterac, near the shores of the lake of Chin-chay-cocha. It was won by a gallant charge of the Peruvians under Colonel Suarez, at the critical moment. Soon afterward Bolivar left the army to proceed to the coast, and the final battle of Ayacucho (December 9, 1824) with the viceroy and the whole Spanish power was fought by his second in command, General Sucre. The Spaniards were completely defeated. The viceroy and all his officers were taken prisoners, and Spanish power in Peru came to an end.

General Bolivar now showed that he was actuated by personal ambition; he intrigued to impose a constitution on Peru, with himself as president for life. He failed, and left the country on September 3, 1826, followed by all the Colombian troops in March, 1827. General Lamar, who commanded the Peruvians at Ayacucho, was elected president of Peru on August 24, 1827, but was deposed, after waging a brief but disastrous war with Colombia, on June 7, 1829. General Gamarra, who had been in the Spanish service, and was chief of the staff in the patriot army at Ayacucho, was elected third president on August 31, 1829.

For fifteen years, from 1829 to 1844, Peru was painfully feeling her way to a right use of independence. The officers who fought at Ayacucho, and to whom the country felt natural gratitude, were all-powerful, and they had not learned to settle political differences in any other way than by the sword. From 1837 to 1839 there was a lawless and unprincipled intervention on the part of Chili which increased the confusion. Three men, during that period of probation, won a prominent place in their country's history, Generals Gamarra, Salaverry, and Santa Cruz. Gamarra, born at Cuzco in 1785, never accommodated himself to constitutional usages; too often he made his own will the law; but he attached to himself many loyal and devoted friends, and, with all his faults, which were mainly faults of ignorance, he loved his country and sought its welfare according to his lights. Salaverry was a very different character. Born at Lima in 1806, of pure Basque descent, he joined the patriot army before he was fifteen and displayed his audacious valor in many a hard-fought battle. Feeling strongly the necessity that Peru had for repose, and the guilt of civil dissension, he wrote patriotic poems which became very popular. Yet he, too, could only see a remedy in violence. He seized the supreme power, and perished by an iniquitous sentence on February 18, 1836. Andres Santa Cruz was an Indian statesman. His mother was a lady of high rank, of the family of the Yncas, and he was very proud of his descent. Unsuccessful as a general in the field, he nevertheless possessed remarkable administrative ability and for nearly three years (1836-39) realized his lifelong dream of a Peru-Bolivian confederation. But Peruvian history is not confined to the hostilities of these military rulers. Three constitutions were framed, in 1828, 1833, and 1839. There were lawyers, statesmen, and orators who could defend the rights and liberties of the people. On November 7, 1832, Doctor Vijil, the deputy for Tacna, rose in his place in congress and denounced the unconstitutional acts of President Gamarra in a memorable speech of great eloquence. Nor should a much humbler name ever be omitted in writing the history of republican Peru. Juan Rios, a private soldier, was sentry at the door of congress when Gamarra illegally sent his troops to disperse the members. He defended his post against two companies, and fell mortally wounded.

In 1844 General Ramon Castilla restored peace to Peru, and was elected constitutional president on April 20, 1845. Ten years of peace and increasing prosperity followed. In 1849 the regular payment of the interest of the public debt was commenced, steam communication was established along the Pacific coast, and a railroad was made from Lima to Callao. After a regular term of office of six years of peace and moral and material progress Castilla resigned, and General Echenique was elected president. But the proceedings of Echenique's government in connection with the consolidation of the internal debt were disapproved by the nation, and after hostilities which lasted for six months, Castilla returned to power in January, 1855. From December, 1856, to March, 1858, he had to contend with and subdue a local insurrection headed by General Vivanco, but, with these two exceptions, there was peace in Peru from 1844 to 1879, a period of thirty-five years. The existing constitution was framed in 1856, and revised by a commission in 1860. Slavery and the Indian tribute were abolished; by its provisions the president is elected for four years, and there are two vice-presidents. The congress consists of a senate and chamber of deputies. The senators are elected by departments and the deputies by the people, every 30,000 inhabitants having a representative. When congress is not sitting there is a permanent commission of the legislature, elected at the end of each session, and consisting of seven senators and eight deputies. The chamber of deputies may accuse the president of infractions of the constitution and the senate passes judgment. The president appoints the prefects of departments and sub-prefects of provinces; the prefects nominate the governors of districts. In each province there is a judge; a superior court of justice sits at the capital of each department; and there is an appeal to the supreme court at Lima. Castilla retired at the end of his term of office in 1862, and died in 1868. On August 2, 1868, Colonel Balta was elected president. Before his time the public debt had been moderate, amounting to \$21,826,464, and the interest had been regularly paid since 1849. But Balta's government increased it to \$245,000,000, the payment of the interest of which from the ordinary revenues was simply impossible. The creditors, as security, had the whole of the guano and nitrate deposits assigned to them. With the vast sum thus raised, President Balta commenced the execution of public works, principally railroads on a gigantic scale. His period of office was signalized by the opening of an international exhibition at Lima. He was succeeded (August 2, 1872) by Don Manuel Pardo, an honest and enlightened statesman, who did all in his power to retrieve the country from the financial difficulty into which it had been brought by the reckless policy of his predecessor, but the conditions were not capable of solution. He regulated the Chinese immigration to the coast-valleys, which, from 1860 to 1872, had amounted to 58,606. He paid great attention to statistics, promoted the advance of education, and encouraged literature. He was the best president Peru has ever known, and his death in 1878 was a public calamity. On August 2, 1876, General Prado was elected, and his term of office saw the commencement of that calamity which has since overwhelmed his country.

On April 5, 1879, the republic of Chili declared war upon Peru, the alleged pretext being that Peru had made an offensive treaty, directed against Chili, with Bolivia, a country with which Chili had a dispute; but the publication of the text of this treaty made known the fact that it was strictly defensive and contained no just cause for war. The true object of Chili was the conquest of the rich Peruvian province of Tarapaca,

the appropriation of its valuable guano and nitrate deposits, and the spoliation of the rest of the Peruvian coast.

After the capture of the *Huascar* off Point Angamos on October 8, 1879, by two Chilean ironclads and four other vessels, the Peruvian coast was at the mercy of the invaders, and Tarapaca, surrounded by trackless deserts, yet open to the sea, though bravely defended for some time by the Peruvian army, fell into the hands of the enemy after the hotly-contested battle of Tarapaca, on November 17, 1879.

Chili then landed an army farther north, and on May 26, 1880, the battle of Tacna was fought, followed by the capture of the port of Arica on June 7th. In these combats the Peruvians lost 147 officers alone. The possession of the sea enabled the Chilean ships to desolate the whole coast; and, the Peruvian army having been almost annihilated, only a force of volunteers and raw recruits could be assembled for the defense of the capital. After the two desperately-contested battles of Chorrillos and Miraflores on January 13th and 15th, 1881, Lima was entered on the 17th, and was not evacuated by the invaders until October 22, 1883. During that period General Caceres, the hero of the defense, carried on a gallant but unequal struggle in the sierra. At last a provisional government, under General Iglesias, signed a treaty with the Chileans on October 20, 1883, by which the province of Tarapaca was ceded to the conquerors, Tacna and Arica were to be occupied by the Chileans for ten years, and then a vote by plebiscitum is to decide whether they are to belong to Peru or Chili; and there are clauses respecting the sales of guano; while all rights to the nitrate deposits, which are hypothecated to the creditors of Peru, have been appropriated by the Chilean conquerors. This most disastrous war has brought ruin and misery on the country, and has thrown Peru back for many years. The country contains the elements of recovery, but it will be a work of time.

PERU, the county seat of Miami county, Ind., is located on the north bank of the Wabash river and on the Wabash and Erie canal. It is one of those busy, bustling, go-ahead cities indigenous to the West, and equally illustrative of the enterprise and progressive character of the inhabitants of that section. The Wabash Western Railroad passes through the city, to which it is also an important feeder, and, with the transportation conveniences afforded by that line and its connections, Peru is placed in close communication with Indianapolis, Logansport, Fort Wayne and other cities in the State, besides those at a distance. The city contains seven churches, a high school and a well arranged and appointed union school, courthouse, and county buildings, three daily papers, two national banks, three hotels, and many large and handsome stores. In the line of manufactures, it is the location of the Indiana Manufacturing Company's plant, having in addition a large woolen-mill, three planing-mills, three steam saw-mills, one grist-mill, three foundries, two cigar manufactories, one soap factory, one tile factory, one basket factory, gasworks and electric-light works, with other undertakings of a productive character. The city is lighted by electric lights and natural gas, the latter being also employed as a substitute for fuel for domestic, heating, and manufacturing purposes, an innovation upon the established order of things of comparatively recent date, found to be effective, economical and a source of attraction for the removal of industrial enterprises to Peru from distant points. The city's population, in 1890, was 6,731.

PERUGIA, a city of Italy, the chief town of the province of Perugia (formerly Umbria), lies 1,550 feet



above the sea on a beautiful and green-clad hill, which affords a magnificent view over a wide sweep of the Apennines and the great Umbrian plain through which the Tiber flows. Woolens, silks, wax candles, and liqueurs are manufactured on a small scale. The population of the city was 16,708 in 1871, and 17,395 in 1881; that of the commune 49,503 and 51,354 respectively.

PERUGINO, PIETRO, whose correct family name was VANNUCCI, one of the most advanced Italian painters immediately preceding the era of Leonardo da Vinci and Raphael, was born in 1446 at Città della Pieve, in Umbria. Gradually Perugino rose into notice, and in the course of some years he became extremely famous not only throughout all Italy, but even beyond her bounds. He was one of the earliest Italian painters to practice oil-painting, in which he evinced a depth and smoothness of tint which elicited much remark; he transcended his epoch in giving softness to form and a graceful spaciousness to landscape-distances, and in perspective he applied the novel rule of two centers of vision. The Florentine school advanced in amenity under his influence. Some of his early works were extensive frescoes for the Ingesati fathers in their convent, which was destroyed not many years afterward in the course of the siege of Florence; he produced for them also many cartoons, which they executed with brilliant effect in stained glass.

The painting of that part of the Sixtine Chapel which is now immortalized by Michelangelo's *Last Judgment* was assigned to him by the pope; he covered it with frescoes of the *Assumption*, the *Nativity*, and *Moses in the Bulrushes*. These works were ruthlessly destroyed to make place for his successor's more colossal genius, but other works by Perugino still remain in the Sixtine Chapel—*Moses and Zipporah* (often attributed to Signorelli), the *Baptism of Christ*, and *Christ giving the keys to Peter*. The last work is more especially noted, and may be taken as a typical example both of Perugino's merits and of his characteristic defects—such as formal symmetry of composition, set attitudes, and affectation in the design of the extremities. Perugino's last frescoes were painted for the monastery of S. Agnese in Perugia, and in 1522 for the church of Castello di Fontignano hard by. Both series have disappeared from their places, the second being now in the South Kensington Museum. He was still at Fontignano in 1524, when the plague broke out, and he died. He was buried in unconsecrated ground in a field, the precise spot now unknown.

PERUVIAN BARK. See CINCHONA and QUININE.

PERUZZI, BALDASSARE, architect and painter of the Roman school, was born at Ancajano, in 1481. He died in 1536, and was buried by the side of Raphael in the Pantheon.

PERVIGILIUM. See VIGIL.

PERVIGILIUM VENERIS, the Vigil of Venus, a short Latin poem, in praise of spring as the season of love and flowers. Written professedly in early spring on the eve of a three-nights festival (Vigil) in honor of Venus (probably April 1-3), it describes in warm and poetical language the annual awakening of the vegetable and animal world in spring through the all-pervading influence of the foam-born goddess, whose birth and connection with Rome and the Cæsars are also touched upon. The joyous tone which runs through the poem passes suddenly at the close into one of lyric sadness: "The nightingale is singing, but I am silent. When comes my spring?" It consists of ninety-three verses in trochaic tetrameter catalectic, and is divided into strophes of unequal length by the refrain, "Cras amet

qui nunquam amavit; quique amavit cras amet." The author, date, and place of composition are unknown.

PESARO, a city and seaport of Italy, the capital of the province of Pesaro and Urbino, lies on the coast of the Adriatic, thirty-six miles north of Ancona and twenty and one-half south of Rimini, on the right bank of the Foglia, the ancient Pisaurus. The population of the city and port in 1870 was 11,952 and in 1880 12,913; that of the commune 19,691 and 20,909 in the same years.

PESHAWAR, or PESHAWUR, a district in the lieutenant-governorship of the Punjab, with an area of 2,504 square miles, situated in the extreme northwestern corner of British India. The district is naturally fertile and well watered, and the valley is entirely drained by the Cabul river. The temperature ranges from a minimum of 17° in February to a maximum of 137° in July. The average rainfall is about fourteen inches. According to the census of 1881 the population was 592,674. Out of the total area of 2,504 square miles 1,414 are cultivated and 470 are returned as cultivable.

Peshawar in 1881 had five towns with a population exceeding 5,000, namely, Peshawar (see below); Nowshera, 12,963; Tangi, 9,037; Maira Parang, 8,874; and Char-sadda, 8,363.

PESHAWAR, chief town in the above district, is about fourteen miles east of the Khyber Pass, and distant from Lahore 276 miles and from Cabul 190 miles. Its population in 1881 was 79,982 (50,322 males, 29,660 females).

PESSIMISM is a word of very modern coinage, employed to denote a mode of looking at and estimating the world, and especially human life, which is antithetical to the estimate designed by the term (a much older one) "Optimism." Both terms have a general as well as a special application. In their non-technical usage they denote a composite and ill-defined attitude of mind which gives preponderating importance to the good or to the evil, to the joys or to the sorrows, respectively, in the course of experience. The optimist sees everything in *couleur de rose*; the pessimist always turns up the seamy side of things. But in their special and technical employment, optimism and Pessimism denote specific theories elaborated by philosophers—the former to show that the world is the work of an author of infinite goodness and wisdom, and is, all things considered, conducive to the happiness of its sentient life; the latter, that existence, when summed up, has an enormous surplus of pain over pleasure, and that man in particular, recognizing this fact, can find real good only by abnegation and self-sacrifice. As a speculative theory optimism is chiefly associated with the *Théodicée* of Leibnitz (1710), while Pessimism is the work of Schopenhauer and Von Hartmann. In either case, however, the modern doctrines have their predecessors. The Stoics and the Neoplatonists were earlier laborers in the cause of optimism, in their attempt to exhibit the adaptations in nature for the welfare of its supreme product, man. And in the metaphysical dogmas of Brahmanism, as well as in the practical philosophy of the Buddhists, the creed of the modern pessimist, that the world is vanity and life only sorrow, is found precluded with startling sameness of tone. Though later as a philosophical creed in the European world, Pessimism is far earlier than optimism as a mood of feeling in mankind at large.

The pessimistic theories of modern times are in part a commendable protest against the common compromises which slur over the antithesis between the moral and the natural. They show tolerably conclusively that the world is not a felicitous institution, and that he who makes happiness the aim of his life is on the wrong track. But, when they proceed to dogmatize that ex-

istence has a root of bitterness and life is a burden of pain, they fall into the common error of exaggerating a statement relatively true into an absolute principle. You cannot tell if life is worth living, so long as life is held to be the sum or difference of pains and pleasures. If pains and pleasures were only and always such, the argument might be admitted; if they were permanent real entities, not liable to be transformed into each other, not constantly associated in the same act, it might be possible to treat them as ultimate and irreversible standards for our estimate of life and the guidance of our conduct. If pleasure and pain are unequally and unfairly distributed, it is probable that this is a fault which human agency can cure to an unspeakable degree, quite without the desperate remedy of self-torture or cosmic suicide. If Pessimism can teach the world that the highest reward of virtue is self-respect, and that there is no pleasure available anywhere to bribe us to be good, it has done well. It has also done well if it points out the barriers to happiness in this world, so long as these barriers prevent true life and can be removed by wise methods. But in the meanwhile, till the burden of existence has become universally unbearable, it may be well to remember that we shall be as likely to benefit the Absolute by doing our work well as by macerating ourselves, and that the sum of existence is a big thing, of which it were rash to predicate either that it is altogether and supremely good or altogether and supremely bad.

PESSINUS, or PESINUS, an ancient city of Galatia, in Asia Minor, situated on the southern slope of Mount Dindymus. It stood on the left bank of the river Sangarius, about 150 stadia (17 miles) from its source, and 16 miles south of Germa on the road from Ancyra to Amorium. It was the capital of the Tolistobogii, and the chief commercial city of the district. It was famous for its worship of the mother of the gods (Cybele), who here went by the name of Agdistis. The modern town of Sevri-Hissar is built at the height of about 3,000 feet on the southern base of a steep granite rock, half-way up which are the ruins of a castle.

PESTALOZZI, JOHANN HEINRICH, was born in 1746, and died in 1827. (See EDUCATION.)

PESTH, the chief town of Hungary, and the second of the Austrian-Hungarian monarchy, is situated on the left bank of the Danube, 140 miles to the southeast of Vienna. Since 1873 it has formed one municipality with BUDA (*q.v.*) on the opposite bank, and the joint city, officially styled Budapest (Ger. *Pest-Ofen*), is the capital of Hungary, the second residence of the Austrian emperor, the seat of the Hungarian ministry, diet, and supreme courts, and the headquarters of the commander of the Honveds or Hungarian landwehr. On one side of the Danube is a flat sandy plain, in which lies Pesth, modern of aspect, regularly laid out, and presenting a long frontage of handsome white buildings to the river. On the other the ancient town of Buda straggles capriciously over a series of small and steep hills, commanded by the fortress and the Blocksberg, and backed by spurs of the vine-clad mountains beyond. The Danube is crossed by three bridges.

In commerce and industry Budapest is by far the most important town in Hungary, and in the former, if not also in the latter, it is second to Vienna alone in the Austrian-Hungarian monarchy. The chief articles of manufacture are machinery, railway plant, carriages, gold and silver wares, chemicals, cutlery, starch, tobacco, and the usual articles produced in large towns for home consumption. The great staple of trade is grain, of which about four and half million bushels are brought into the town annually. One-fourth of this amount merely passes through Pesth, while most of

the remainder is ground into flour and exported in this form. Other important articles of commerce are wine, wool, cattle, timber, hides, honey, wax, and "slivovitz," an inferior spirit made from plums. The imports, so far as they do not belong to the transit trade, consist chiefly of manufactured articles and colonial produce. The four annual fairs, formerly attended by many thousand customers, have now lost much of their importance.

Few European towns have grown so rapidly as Pesth during the present century, and probably none has witnessed such a thorough transformation in the last twenty years. In 1889 the population of Budapest was 452,907 souls, including a garrison of 10,000 men; more than 70,000 Jews are included in the population, and the Jewish synagogue is the handsomest place of worship in the city.

PETALUMA, a city in Sonoma county, Cal., is located on Petaluma creek, at the head of navigation, and on the San Francisco and North Pacific road. It is situated forty-two miles north of San Francisco, sixteen miles south of Santa Rosa, ten miles west of the village of Sonoma, and about the same distance east of the Pacific ocean and north of San Pablo bay. Its location, surroundings, etc., have combined to make the city an attractive resort for tourists and strangers, not only from the East and abroad, but from all portions of the adjoining States and Territories. The climate is hospitable and the bracing breezes from the Pacific serve to temper the visitations of heat and cold which intrude upon the locality at intervals. It is also well adapted to the cultivation of grapes and fruit, and the beautiful and fertile valleys of the vicinity are productive and highly cultivated. The city contains seven churches, large graded-school buildings, high-school building, one savings and one national bank, five hotels, three flouring-mills, two planing-mills, one sawmill, one foundry, one brewery, a woolen-mill, a daily and weekly newspaper, and superior warehouse facilities. Steamers ply daily between the city and San Francisco, and lumber, dairy products, and cereals are the chief articles of export. Population, in 1890, 5,500.

PETAU, DENYS, better known in some departments of literature under the Latin form of his name as DIONYSIUS PETAVIUS, a highly distinguished Catholic theologian and one of the most learned men of the seventeenth century, was born on August 21, 1583, at Orleans. His death took place on December 11, 1652.

PETER. Simon Peter was "an apostle of Jesus Christ." His two names are both found in two forms: of the one the full form is Symeon (Συμεών, Συμεών),

which is found in the speech of James, Acts xv. 14, and in most MSS. of 2 Peter i. 1), the shorter and more usual form being Simon; the other is found both in its Greek form Peter (Πέτρος) and in the Græcized form Cephas (Κηφᾶς) of the Aramaic Kepha (כִּפְיָ).

Simon is the name by which he is always addressed by Jesus Christ; Peter is that by which he is most commonly spoken of in the Synoptic Gospels, the Acts of the Apostles, and subsequent ecclesiastical literature; the combined name, Simon Peter, is found once in St. Matthew, once in St. Luke, and frequently in St. John; sometimes Peter is expressly stated to be a surname. In John i. 44 he is said to have been of Bethsaida, which was possibly the place of his birth; but it appears from Mark i. 29 that he and his brother Andrew had a house together at Capernaum. With the same brother, and with James and John as partners, he was engaged in what was probably the thriving business of a fisherman on the Lake of Gennesaret; and from the fact that he went back to his business after the resurrection it has been inferred that, at least up to that time, he had

never wholly left it. That he was married is clear from the mention of his wife's mother, and that his wife accompanied him when he finally left his home to preach the gospel is implied by St. Paul; there is an early tradition, which is not inconsistent with probability, that she also suffered martyrdom, and that Peter called out to her as she was being led away, "O wife, remember the Lord!" The statement that he had children is probably only an inference from the fact of his having been married.

Of the beginning of his discipleship there are two accounts which have sometimes, though without sufficient reason, been supposed to be inconsistent with each other.

(1) According to St. John, he was brought to Jesus by his brother Andrew, who had been a follower of John the Baptist, but who, after the Baptist's testimony, recognized in Jesus the promised Messiah.

(2) According to St. Matthew and St. Mark, it was at the beginning of the Galilæan ministry that Jesus called Simon and Andrew to become "fishers of men." The manner of the call seems to imply a previous acquaintance, and is consequently not out of harmony with that of St. John.

From the time of his call Peter has a place in most of the important events of the Gospel narrative. The most important incident which is recorded of him between his call and the crucifixion is that which happened at Cæsarea Philippi. Around the words which St. Matthew records many controversies have raged; nor does it seem possible, with the existing means of investigation, to fix to the sentence "upon this rock I will build My church" a meaning that will be beyond dispute. Whatever may be its precise meaning, it seems at any rate to be in harmony with other passages of the Synoptic Gospels, which indicate, not only that Peter was foremost among the apostles by virtue of natural force of character, but that he was also their ordinary leader and representative.

In the earliest account of the resurrection (that of St. Paul, 1 Cor. xv. 5) it is mentioned that Jesus appeared to Peter before and separately from the twelve; and the last chapter of the Fourth Gospel gives him an especial prominence. These facts undoubtedly confirm the general picture of the relations of Peter to the early church which is drawn in the Acts of the Apostles; at the same time no part of the New Testament has been more strongly attacked by modern writers than the first twelve chapters of that book, in which the "Acts of Peter" are contained, partly on the speeches and partly on the narrative. It is alleged that the Petrine speeches form no exception to the general uniformity of phraseology and style which characterizes the Acts, and that they ignore the marked differences in the conception of Christianity between Peter and Paul. It must be admitted that the coincidences are such as to render it probable that the author of the Acts dealt freely with his materials, but at the same time the peculiarities are sufficiently numerous to support the view that these speeches contain a true representation of the primitive teaching. At the great crisis of early Christianity which is known as the conference or council of Jerusalem Peter advocated (according to the Acts), or accepted (according to Paul), the policy of conciliation. Afterward he went to Antioch, where Paul had preceded him, and there he carried out his acceptance of Gentile Christianity to the further point of eating at the common meals at which Gentiles were present. For this step the members of the original community at Jerusalem were not prepared; and, when a deputation from them came to Antioch, Peter "drew back and separated himself." Thereupon followed an argument and a remon-

strance on the part of Paul which has been fruitful of results to both ancient and modern Christianity. Peter was "withstood to the face" because of (1) inconsistency, (2) practical calumny of Christ, (3) transgression of the law, (4) making void the gift of God. It is altogether too much to assume that this remonstrance led to a permanent alienation of the two apostles from one another; it is more probable that with a character such as Peter's, which had more energy than steadiness of resolution, it may even have been effectual. But it is upon the assumption of such an alienation that the Jewish party in the ancient church pictured Peter as the champion and hero of the faith, and Paul as its vanquished opponent, and also that in modern times the Tübingen school have endeavored to reconstruct not only early church history but also the New Testament.

This incident at Antioch is the last that is certainly known of Peter. The prophecy recorded in John xxi. 18, 19, is in harmony with early tradition in pointing to a violent death. But of the time and place of that death we know nothing with even approximate probability. The only historical mention of him for more than a hundred years afterward is in Clement of Rome, who sets before the Corinthians the example of "Peter, who through zeal undertook not one or two but numerous labors, and so having borne witness went to the place that was due to him." It is sometimes supposed that an indication of the place in which he "bore witness" or "suffered martyrdom" is afforded by the phrase "among us," *i.e.*, among the Romans, in the next chapter; but this, though possible, is quite uncertain. Outside this statement, which if it were more definite would be conclusive, there is only the doubtful interpretation of "Babylon" in 1 Peter v. 13 as meaning "Rome," and the echo of a vague tradition in the apocryphal *Petri et Pauli Prædicatio*.

PETER, EPISTLES OF. 1 *Peter*.—The first of the two canonical epistles which bear the name of St. Peter is addressed "to the elect who are sojourners of the dispersion in Pontus, Galatia, Cappadocia, Asia, and Bithynia." Most commentators in both ancient and modern times (*e.g.*, of the former Athanasius, Jerome, Ephiaphanius; of the latter, Lange, Weiss, and Bey-schlag) have interpreted this phrase to refer primarily to Jewish Christians. But this interpretation creates a difficulty.

The epistle was evidently written at a time when the Christians of Asia Minor were both calumniated and persecuted. It exhorts those to whom it was addressed not only to bear their trials patiently, and even to rejoice inasmuch as they were "partakers of the sufferings of Christ," but also to give no occasion to the hostile world which surrounded them to reproach them as evil-doers, and it specializes this exhortation to well-doing by addressing separately servants, wives, and husbands. This fact that Christianity had come to be persecuted, and also the fact, which is manifested in its whole tone, that Christians were in danger of retrograding, show that the epistle cannot be placed in the earlier part of the apostolic age. The time of the Neronian persecution is the earliest that will satisfy the required conditions, and some have thought that even this is too early for these conditions, and that it must be referred to the time of Trajan.

2 *Peter*.—The second epistle is addressed to a wider circle than the first, *i.e.*, to Christians in general. Its aim is mainly polemical; it is directed partly against a tendency toward libertinism which was growing up and which took for one of its supports the Pauline doctrine of Christian freedom, and partly against the reaction which had set in against the earlier eschatology. It protests in powerful language against the separation of

Christianity from holy living, maintaining that Christianity without holy living is worse than no living at all; and it reasserts the reality of the Second Coming, resting it upon the reality of the supernatural evidence of the First Coming.

The differences of style which distinguish the second from the first epistle have been noted since the time of Jerome. They are sometimes explained on the ground of the epistles having had different purposes, or having been written at different times; they are more commonly used as indications of a difference of authorship; and, although the argument from differences of style in comparatively short documents cannot be held to be decisive where the external evidence in their favor is strong, such is not the case with this epistle. The external evidence for it is singularly weak.

PETER OF BLOIS, otherwise known as PETRUS BLESSENSIS, a writer of the twelfth century, was born at Blois in France about the year 1120. Peter died about 1200. His writings, which cover all the fields of intellectual activity then accessible, show him to have been one of the most widely and deeply learned men of his age.

PETER THE HERMIT, the apostle of the first crusade, was born of good family, it is supposed, in the diocese of Amiens about the year 1050. After the failure of the expedition headed by him in 1096, he founded and became first prior of the abbey of Neufmoustier at Huy, in the diocese of Liège, where he died July 7, 1115.

PETER I., ALEXEIEVICH, surnamed THE GREAT, czar of Russia, was born at Moscow June 11, 1672. His mother, Natalia Narishkina, was the second wife of the czar Alexis. He was taught reading and writing, and the limited range of subjects which then constituted education in Russia, by the deacon Nikita Zotoff. He came to the throne in the year 1682, on the death of his elder brother Feodore. There was another brother, Ivan, who was six years his senior, but he was weak in both body and mind, and a compromise was made whereby Ivan and Peter were to reign jointly. On the death of Ivan in 1696 Peter became sole ruler.

With the aid of Lefort, a Swiss adventurer, and other foreigners, Peter commenced his remarkable reforms, for which see RUSSIA. The czar died January 28, 1725.

The character of Peter exhibits a strange congeries of opposed qualities. According to some he "knouted" Russia into civilization; others see in him the true "father of his country" and the founder of Russian greatness. In spite of his errors, no one will deny that he was a man of great genius; his was the "fiery soul that, working out its way," exhausted prematurely a vigorous physical organization. Although frequently cruel, on many occasions he showed humanity and tenderness, and even in his most violent fits of temper was amenable to advice, as he evinced in enduring the rebukes of Prince James Dolgoruki. All Russia seems but the monument of this strange colossal man. He added six provinces to her dominions, gave her an outlet upon two seas, a regular army trained in European tactics in lieu of the disorderly militia previously existing, a fleet, and a naval academy, and, besides these, galleries of painting and sculpture and libraries. The title of "Great" cannot justly be refused to such a man.

PETER II., ALEXEIEVICH, son of Alexis and grandson of Peter the Great, was born at St. Petersburg in 1715, and ascended the throne in 1727. He was under the guardianship of Menshikoff, to whose daughter Mary he was betrothed. The faction of the Menshikoffs was overthrown, however, by the Dolgorukis, to a daughter of whose house the czar was now to be married. All these political plans were rudely broken

by the death of Peter in January, 1736. During his short reign this youth showed reactionary tendencies, and it seemed as if the capital of Russia was again to be transferred to Moscow. The young czar was buried in the cathedral of the Archangel in that city.

PETER III., FEODOROVICH, was son of Anna, daughter of Peter the Great, who had married the duke of Holstein. He was born at Kiel in 1728, his real name being Karl Peter Ulrich; he went to Russia in 1742 on being named heir to the throne. In 1745 he married Sophia Augusta, princess of Anhalt-Zerbst, who, on entering the Greek Church, took the name of Catherine. They lived very unhappily together. In January, 1762, the czarina Elizabeth died and Peter succeeded her. He soon became unpopular on account of his fondness for the Prussians and the introduction of German regulations in the army. His wife took advantage of his unpopularity and caused herself to be crowned empress, July, 1762. Peter showed great want of energy, and only attempted to stem the insurrection when it was too late. He was removed to Ropsha, in the government of St. Petersburg, and, after having been forced to sign a renunciation of all rights to the throne, was strangled by Orloff and others. He was first buried in the Alexandro-Neviski monastery, but his remains were removed in 1796 by Paul to the Petropavlovski church.

PETERBOROUGH, a city and municipal and parliamentary borough, chiefly in Northamptonshire, but partly in Huntingdonshire, is situated on the river Nene, seventy-six miles north of London by the Great Northern Railway. The town is also a station on the London and Northwestern, the Great Eastern and the Midland systems. It is built chiefly along the river on the north side, the streets being straight and wide, and containing many good houses.

The modern prosperity and growth of the town are chiefly due to the trade caused by the junction of so many railway lines. Adjoining the town are extensive works and sheds connected with the Great Northern and Midland Railways. Important cattle markets and fairs are held, and there is a large transit of meat and cattle to London and elsewhere. An extensive trade in corn, coal, and timber is also carried on. The principal manufacture is that of agricultural implements. The entire parliamentary city of Peterborough has an area of 6,558 acres (of which 6,310 are in Northamptonshire), with a population of 22,394 (of whom 20,123 are in Northamptonshire). The population of the municipal borough (area, 1,818 acres) in 1871 was 16,310, and in 1891 it was 25,172. Since 1841 it has more than trebled.

PETERBOROUGH, capital of the county of Peterborough, in the Province of Ontario and Dominion of Canada, is located on the navigable Otonabee river, and is a station on the Midland railway, thirty miles north of Port Hope, and ninety-five miles northeast of Toronto. It is also on the Canadian Pacific and Grand Trunk roads, and is connected with Ashburnham, on the opposite side of the Otonabee, by a substantial bridge. The city is handsomely laid out and built, the streets being broad, smooth and well maintained, while the structures that line these thoroughfares, particularly in the business and residence districts, are attractive features of the city's growth, as also testimonials to the enterprise and public spirit of citizens. Besides the county buildings, the city contains six churches, four banks, two newspaper offices, some ninety stores and other commercial depots, ten hotels, gas and electric-light works, school buildings public and private, hospitals, etc., etc. The manufacturing resources include broom, mattress, furniture and hosiery factories, sash,

door and blind factories, pottery-works, woolen and planing mills, fanning-mill and pump works, foundries and machine shops, carriage-works, saw and grist mills, and leather and woodenware manufactories. The city does a large export trade in grain, pork and lumber, and in 1890 was credited with a population of 10,000.

**PETERBOROUGH AND MONMOUTH, CHARLES MORDAUNT, EARL OF**, a man whose whole life was passed in the turmoil of excitement, was born about 1658. His father died June 5, 1675, and Charles Mordaunt succeeded to the peerage. On his return from the second expedition to Tangier he plunged into active political life as a zealous Whig and an unswerving opponent of the duke of York. But his continued hostility to James II. forced him to retire to Holland, when he proposed to William of Orange to invade England. His plan was rejected, though the prudent prince of Orange deemed it judicious to retain his fiery adherent by his side. When William sailed to Torbay his friend accompanied him, and when the Dutch prince was safely established on the throne of England honors without stint were showered upon Lord Mordaunt.

From this time till 1735, under the reign of two sovereigns, dignities both civil and military were at his command. In 1705 he was made commander of the allied Dutch and English forces in Spain, in which country he remained for two years, when, indignant at the conduct of other leaders, he quitted the country and went home.

On his return to England he allied himself with the Tories, and received his reward in being contrasted, much to his advantage, with the Whig victor of Blenheim and Malplaquet. A few months before the close of Queen Anne's reign (November, 1713) he was dispatched as ambassador-extraordinary to the king of Sicily, but was recalled by the Whigs as soon as they obtained the reins of power. With the accession of George I. Lord Peterborough's influence was gone. Hatred of Marlborough became the ruling passion of his mind. His last twenty years of life were passed with the recollection of disappointed hopes and with the continual presence of disease. Worn out with suffering, he died at Lisbon, October 25, 1735. His remains were brought to England and buried at Turvey in Bedfordshire, November 21st.

**PETERHEAD**, a seaport, market town, burgh of barony, and parliamentary burgh of Aberdeenshire, Scotland, is situated on a rocky peninsula on the North Sea, about thirty miles north-northeast of Aberdeen and two north of Buchan Ness. It has railway communication by a section of the Great North of Scotland line, opened in 1852. Formerly it was bonding subport to Aberdeen, but was made independent in 1832. The general trade is of considerable importance. The chief exports are herrings, granite, cattle, and agricultural produce. The town possesses ship and boat building yards, sawmills, an iron foundry, cooperages, agricultural-implement works, woolen manufactories, breweries, and a distillery. In the neighborhood there are extensive granite and polishing works. The limits of the police burgh and the parliamentary burgh are identical, with a population in 1871 of 8,535, and in 1891 of 12,198.

**PETERHOF**, a town of European Russia, in the government of St. Petersburg, and eighteen miles west of the capital, on the south coast of the Gulf of Finland, has grown up round the palace built by Peter the Great in 1711, was constituted a district town in 1848, and has increased its population from 7,647 in 1866 to 14,298 in 1881. It is almost exclusively a residential town, but is garrisoned by a cavalry regiment and has

the military schools lodged in its barracks for six weeks in the summer.

**PETERSBURG**, a city of Dinwiddie county, Va., also a port of entry, is advantageously located on the right bank of the Appomattox river, ten miles from its mouth. The river is navigable for vessels of moderate tonnage, while consignments for Petersburg carried in bottoms of more than 100 tons are unladen at City Point and Port Walthal. Petersburg is one of the oldest cities in the State, having been settled by the English in 1733. During the Revolutionary war it was made a rendezvous for the state troops, and when Virginia at the close of hostilities became identified with the Federal Union, Petersburg was regarded with favor as a location for the capital of that commonwealth. Thenceforward, its growth, while not rapid, was permanent, and in 1860 the city contained a population of 18,266 souls. While the civil war lasted Petersburg, on account of its advantages of location, transportation facilities, etc., was esteemed as a coign of vantage by the opposing armies, but remained nearly the entire period in the possession of the Confederates. It was fortified with exceptional care, and the forts and redans of the works resisted all attacks. In June, 1864, a movement against Petersburg was commenced, and after several days' sharp fighting the city was invested by the army of the Potomac. The siege thus inaugurated was conducted with varied success. During the latter part of June, General Burnside began running a mine from the center of his front beneath the Confederate lines, opposite. This was completed in July and ordered to be charged and exploded on the 30th of that month. It was 500 feet long, intersected by a cross gallery 80 feet in length and extending under the enemy's lines. Its explosion followed, as directed, but the effort, according to General Grant, was "a stupendous failure," none of the results anticipated having been realized. The siege, however, was maintained, less vigilance doubtless being exercised by the Union army on account of their successes in the Shenandoah Valley and the Southwest. Early in 1865 hostilities were renewed against the city, continuing until April 3d, when it was evacuated by the Confederates, and taken possession of by the Union army.

It is an important point on the Norfolk and Western, Richmond and Petersburg, and Petersburg and Weldon railroads, contains sixteen churches, one savings, one national, and one private bank, one daily and three weekly papers, a custom-house, public library, city hall, two female colleges, the Petersburg and the Southern, and five hotels. Extensive water-power is furnished by the river, and manufactures of every description are successfully operated, including iron, cotton, lumber, tobacco, sumac, sash, doors, and blinds, straw goods, blank-books, brooms, bags, fireworks, clothing, trunks, soap, baskets, etc. The municipal government is vested in a mayor and board of aldermen, who direct the management of the several city departments, over each of which is an authorized head, responsible for the execution of the trust committed to his custody. During 1889 the total receipts of the city treasurer were \$329,248.74, and the disbursements \$320,667.15, of which \$7,308 were paid for the support of the fire department, \$15,511.98 for the maintenance of the police, \$24,500 for the schools and \$5,000 for charities; the almshouse, electric lights, water-works, etc., being supported by funds appropriated to each service respectively. The bonded debt of the city was, January 1, 1890, \$1,223,200; the value of property listed for taxation, \$9,706,445; and the rate \$1.60 per \$100. The population of the city at the last census was 22,650.

**PETERS, or PETER, HUGH**, a man whose name has

for three centuries been rarely mentioned except in terms of infamy, was the son of Thomas Dyckwoode, *alias* Peters, by Martha, daughter of John Treffry of Fowey, Cornwall, and was baptized in Fowey parish church, June 29, 1598. His shrewd judgment, his ready wit, and his zeal for the cause of the Parliament endeared him to the army and its leaders; he accompanied Fairfax and Cromwell on their campaigns, and described their achievements in numerous letters to the House of Commons. To the adherents of the vanquished cause Hugh Peters always lent his good offices. At the Restoration he was seized and imprisoned in the Tower of London, where he composed his affecting tract, "A Dying Father's Last Legacy to an Only Child." His trial as a regicide took place on October 13, 1660, and he was, of course, condemned to death. Four days later he was drawn on a sledge to Charing Cross and there hanged and quartered, his head being set on a pole on London Bridge.

PETERWARDEIN, a town and strong fortress of Hungary, is situated on a promontory formed by a loop of the Danube, forty-five miles to the northwest of Belgrade. It is connected with Neusatz, on the opposite bank, by a bridge of boats 800 feet long. The fortifications consist of the upper fortress, on a lofty serpentine rock rising abruptly from the plain on three sides, and of the lower fortress at the northern base of the rock. The latter includes the town, which contains (1890) 3,603 inhabitants, engaged in wine-growing, agriculture, and the manufacture of liqueurs (*rosoglio*), and vinegar. The two fortresses can accommodate a garrison of 10,000 men. The arsenal contains interesting trophies of the Turkish wars.

PÉTION DE VILLENEUVE, JÉRÔME, was the son of a *procureur* at Chartres, where he was born in 1753. He himself became an *avocat* in his native place in 1778, and when the elections to the States-General took place in 1789 he was elected a deputy to the Tiers État for Chartres. Both in the assembly of the Tiers État and in the Constituent Assembly Pétion showed himself a radical leader. After the last meeting of the assembly on September 30, 1791, Robespierre and Pétion were made the popular heroes and were crowned by the populace with civic crowns. On November 14, 1791, he was elected second mayor of Paris in succession to Bailly. In his mayoralty he exhibited clearly his republican tendency and his hatred of the old monarchy, especially on June 20, 1792, when he allowed the mob to overrun the Tuilleries and insult the royal family. He was still mayor of Paris when the massacres of September in the prisons took place, and must bear the blame of not having endeavored to interfere. He was elected to the convention for Eure-et-Loire, and became its first president. His jealousy of Robespierre allied him to the Girondin party, as did also his assiduous attention at Madame Roland's salon. With the Girondins he voted for the king's death and for the appeal to the people, as one of them he was elected to the first committee of general defense in March, 1793, as their representative he attacked Robespierre on April 12th, and it is no matter of wonder, therefore, that his name was among those of the twenty-two Girondin deputies proscribed on June 2d. Pétion was one of those who escaped to Caen and raised the standard of provincial insurrection against the Convention; and when the Norman rising failed he fled with Gaudet, Buzot, Barbaroux, Salle, and Louvet to the Gironde, and hid in a grotto at St. Émilion. At last, but a month before Robespierre's fall in June, 1794, the escaped deputies felt themselves tracked down, and deserted the grotto; Louvet found his way to Paris, Salle and Gaudet to Bordeaux, where they were soon

taken; Barbaroux committed suicide; and the bodies of Pétion and Buzot were found in a field, half-eaten by wolves.

PETIS DE LA CROIX, FRANÇOIS, the best representative of Oriental learning in France during the last decades of the seventeenth century and the beginning of the eighteenth century, was born in Paris about 1653. In capacity of interpreter he conducted the negotiations with Tunis and Tripoli in 1685 and those with Morocco in 1687; and the zeal, tact, and linguistic knowledge he manifested in these and other transactions with Eastern courts were at last rewarded in 1692 by his appointment to the Arabic chair in the Collège Royal de France, which he filled until his death in 1713.

PETITION is an application for redress by a person aggrieved to an authority capable of relieving him. It may be made in the United Kingdom to the crown or its delegate, or to one of the houses of parliament.

The right of petitioning the crown was recognized indirectly as early as Magna Charta in the famous clause, *Nulli vendemus, nulli negabimus aut differemus, recitum aut justitiam*, and directly at various periods later. Petitions to the crown appear to have been at first for the redress of private and local grievances, or for remedies beyond those possessed by the courts. As equity grew into a system, petitions of this kind tended to become superseded by bills in chancery (see CHANCERY).

In the United States the right of petition is secured by Art. I of the amended Constitution, which enacts that "Congress shall make no law abridging \* \* \* the right of the people peaceably to assemble and to petition the Government for a redress of grievances."

*Petitions to a Court of Justice.*—Strictly speaking these are no doubt an indirect mode of petitioning the crown, for in the theory of English law the crown is the fountain of justice. But it is more convenient to treat them separately, as they now form a part of the practice of the courts. Appeals to the House of Lords and the privy council are prosecuted by petition of appeal. The House of Lords has now no original jurisdiction in judicial matters; the original jurisdiction of the privy council in such matters is confined to petitions under certain statutes, such as the Endowed Schools Acts 1867 and 1873, the Public Schools Act 1868, the Universities Act 1877, and the Patents Act 1883. In most cases the petitions are referred to the judicial committee of the privy council. Petitions may be addressed to the lord chancellor in a few instances, such as the sealing of patents and the removal of coroners and county court judges. The most important use of petitions in England is in the Chancery Division of the High Court of Justice. They may be presented either as interlocutory proceedings in the course of an action, or as original proceedings where no litigation exists—a petition being generally a more cheap and speedy form of remedy than an action. Petitions in the course of an action are usually presented to the court in which the action is brought.

In the United States petitions can be presented to the courts under much the same circumstances as in England. It is a general rule in such cases that an affidavit should be made that the facts therein contained are true as far as known to the petitioner, and that those facts which he states as knowing from others he believes to be true.

*Petition of Right* is a term confined to English law. It is used in two senses. (1) It denotes the statute 3 Car. I. c. 1, a parliamentary declaration of the liberties of the people. (See ENGLAND.) (2) It denotes a mode of prosecuting a claim against the crown by a subject. This remedy is said to owe its origin to Edward I. It lies as a rule for obtaining possession of real or personal

property, or for breach of contract, not for breach of public duty, as failure to perform treaty obligations, or for trespass, or for negligence of crown servants.

PETRA, the capital city of the NABATÆANS (*q.v.*), and the great center of their caravan trade, is described as lying in a level place, well supplied with water for horticulture and other uses, but encircled by a girdle of rocks, abrupt toward the outer side. The surrounding country was barren, especially toward Judæa; the distance from Jericho was from three to four days' journey, and from Phœnicum on the Red Sea coast five. According to Pliny the little valley of Petra is not quite two miles across, and lies at the junction of two roads, from Palmyra and Gaza respectively, 600 miles from the latter. These and other ancient notices leave no doubt as to the identity of the site with the modern Wády Músá, in the mountains which form the eastern wall of the great valley between the Dead Sea and the Gulf of Akaba. Wády Músá lies just north of the watershed between the two seas.

The Nabatæans, as we see from Diodorus, used Petra as a place of refuge and a safe storehouse for their treasures of frankincense, myrrh, and silver before they gave up their nomadic habits. But Petra was not only safe and well watered, it lay close to the most important lines of trade. Thus Petra became a center for all the main lines of overland trade between the East and West, and it was not till the fall of the Nabatæan kingdom that PALMYRA (*q.v.*) superseded it as the chief emporium of North Arabia. Many Roman and other foreign merchants were settled here even in the time of Strabo, and he describes the caravans which passed between it and Leuce Come on the Red Sea coast as comparable to armies.

PETRARCH. Francesco Petrarca, eminent in the history of literature both as one of the four classical Italian poets, and also as the first true reviver of learning in mediæval Europe, was born at Arezzo on July 20, 1304.

Petrarch's real name, according to Tuscan usage, was Francesco di Petracco. But he altered this patronymic, for the sake of euphony, to Petrarca, proving by this slight change his emancipation from usages which, had he dwelt at Florence, would most probably have been imposed on him. Notwithstanding Petrarch's firm determination to make himself a scholar and a man of letters rather than a lawyer, he so far submitted to his father's wishes as to remove, about the year 1323, to Bologna, which was then the headquarters of juristic learning. There he stayed with his brother Gherardo until 1326, when his father died, and he returned to Avignon.

On April 6, 1327, happened the most famous event of Petrarch's history. He saw Laura for the first time in the church of St. Clara, at Avignon. Who Laura was remains uncertain still. That she was the daughter of Audibert de Noves and the wife of Hugh de Sade rests partly on tradition and partly on documents which the abbé de Sade professed to have copied from originals in the last century.

Petrarch's inner life after this date is mainly occupied with a passion which he celebrated in his Italian poems, and with the friendships which his Latin epistles dimly reveal to us.

It was some time in the year 1337 that he established himself at Vacluse and began that life of solitary study, heightened by communion with nature in her loneliest and wildest moods, which distinguished him in so remarkable a degree from the common herd of mediæval scholars. A desire for glory was one of the most deeply-rooted passions of his nature, and one of the points in which he most strikingly anticipated the

humanistic scholars who succeeded him. It is not, therefore, surprising to find that he exerted his influence in several quarters with the view to obtaining the honors of a public coronation. The result of his intrigues was that on a single day in 1340, September 1st, he received two invitations, from the university of Paris and from King Robert of Naples respectively. He chose to accept the latter, journeyed in February, 1341, to Naples, was honorably entertained by the king, and, after some formal disputations on matters touching the poet's art, was sent with magnificent credentials to Rome. There, in the month of April, Petrarch assumed the poet's crown upon the Capitol from the hand of the Roman senator amid the plaudits of the people and the patricians.

With the coronation in Rome a fresh chapter in the biography of Petrarch may be said to have begun. Henceforth he ranked as a rhetorician and a poet of European celebrity, the guest of princes, and the ambassador to royal courts. In January, 1343, his old friend and patron Robert, king of Naples, died, and Petrarch was sent on an embassy from the papal court to his successor Joan. The notices which he has left us of Neapolitan society at this epoch are interesting, and it was now, perhaps, that he met Boccaccio for the first time.

In the month of May, 1347, Cola di Rienzi accomplished that extraordinary revolution which for a short space revived the republic in Rome, and raised this enthusiast to titular equality with kings. Petrarch, who in politics was no less visionary than Rienzi, hailed the advent of a founder and deliverer in the self-styled tribune. Without considering the impossibility of restoring the majesty of ancient Rome, or the absurdity of dignifying the mediæval Roman rabble by the name of *Populus Romanus*, he threw himself with passion into the republican movement, and sacrificed his old friends of the Colonna family to what he judged a patriotic duty.

Petrarch built himself a house at Parma in the autumn of 1347. Here he hoped to pursue the tranquil avocations of a poet honored by men of the world and men of letters throughout Europe, and of an idealistic politician, whose effusions on the questions of the day were read with pleasure for their style. But in the course of the next two years this agreeable prospect was overclouded by a series of calamities. Laura died of the plague on April 6, 1348. Francisco degli Albizzi, Mainardo Accursio, Roberto de' Bardi, Sennuccio del Bene, Luchino Visconti, the cardinal Giovanni Colonna, and several other friends followed to the grave in rapid succession. All of these had been intimate acquaintances and correspondents of the poet. Friendship with him was a passion; or what is more true perhaps, he needed friends for the maintenance of his intellectual activity at the highest point of its effectiveness. Therefore he felt the loss of these men acutely. We may say with certainty that Laura's death, accompanied by that of so many distinguished associates, was the turning-point in Petrarch's inner life.

When the jubilee of 1350 was proclaimed, Petrarch made a pilgrimage to Rome, passing and returning through Florence, where he established a firm friendship with Boccaccio. It has been well remarked that, while all his other friendships are shadowy and dim, this one alone stands out with clearness. Each of the two friends had a distinguished personality. Each played a foremost part in the revival of learning. Boccaccio carried his admiration for Petrarch to the point of worship. Petrarch repaid him with sympathy, counsel in literary studies, and moral support which helped to elevate the younger poet's over-sensuous nature. To

ward the close of the long struggle between Genoa and the republic of St. Mark, the Genoese entreated Giovanni Visconti to mediate on their behalf with the Venetians. Petrarch was intrusted with the office; and on November 8th he delivered a studied oration before the doge, Andrea Dandolo, and the great council. His eloquence had no effect; but the orator entered into relations with the Venetian aristocracy, which were afterward extended and confirmed. Charles IV. passed through Mantua in the autumn of 1354. There Petrarch made his acquaintance, and, finding him a man unfit for any noble enterprise, declined attending him to Rome. When Charles returned to Germany, after assuming the crowns in Rome and Milan, Petrarch addressed a letter of vehement invective and reproach to the emperor who was so negligent of the duties imposed on him by his high office. This did not prevent the Visconti sending him on an embassy to Charles in 1356. Petrarch found him at Prague, and, after pleading the cause of his masters, was dispatched with honor and the diploma of count palatine. His student's life at Milan was again interrupted, in 1360, by a mission on which Galeazzo Visconti sent him to King John of France.

The remaining years of Petrarch's life, important as they were for the furtherance of humanistic studies, may be briefly condensed. On May 11, 1362, he settled at Padua, from the neighborhood of which he never moved again to any great distance. On July 18, 1374, his people found the old poet and scholar dead among his books in the library of that little house which looks across the hills and lowlands toward the Adriatic.

As an author Petrarch must be considered from two points of view—first as a writer of Latin verse and prose, secondly as an Italian lyricist. In the former capacity he was speedily outstripped by more fortunate scholars. His eclogues and epistles and the epic of *Africa*, on which he set such store, exhibit a comparatively limited command of Latin meter. His treatises, orations, and familiar letters, though remarkable for a prose style which is eminently characteristic of the man, are not distinguished by purity of diction. With regard to his Italian poetry Petrarch occupies a very different position.

PETREL, the name applied in a general way to a group of birds (of which more than 100 species are recognized) from the habit which some of them possess of apparently walking on the surface of the water as the apostle St. Peter (of whose name the word is a diminutive form) is recorded to have done. For a long while the Petrels were ranked as a Family, under the name of *Procellariidæ*, and thought to be either very nearly allied to the gulls, *Laridæ*, or intermediate between that Family and the *Steganopodes*; but this opinion has gradually given way, and it is now hard to resist the conclusion that they have to be regarded as an "Order," to which the name *Tubinares* has been applied.

Petrels are dispersed throughout all the seas and oceans of the world, and some species apparently never resort to land except for the purpose of nidification, though nearly all are liable at times to be driven ashore, and often very far inland, by gales of wind. It would also seem that during the breeding-season many of them are wholly nocturnal in their habits, passing the day in holes of the ground, or in clefts of the rocks, in which they generally nestle, the hen of each pair laying a single white egg, sparsely speckled in a few species with fine reddish dots. Of those species that frequent the North Atlantic, the common Storm-Petrel, *Procellaria pelagica*, a little bird which has to the ordinary eye rather the look of a swift or swallow, is the "Mother Carey's chicken" of sailors, and is widely believed to be

the harbinger of bad weather; but seamen hardly discriminate between this and others nearly resembling it in appearance, such as Leach's or the Fork-tailed Petrel *Cymochorea leucorrhœa*, a rather larger but less common bird, and Wilson's Petrel, *Oceanites oceanicus*, the type of the Family *Oceanitidæ* mentioned above, which is more common on the American side. But it is in the Southern Ocean that Petrels most abound, both as species and as individuals.

PETRIE, GEORGE, Irish antiquary, was the son of James Petrie, a native of Aberdeen, who had settled in Dublin as a portrait and miniature painter. He was born in Dublin, in January, 1790, and died January 17, 1866.

PETROLEUM. The word "petroleum" (*rock-oil*) is used to designate the forms of bitumen that are of an oily consistence. It passes by insensible gradation into the volatile and ethereal naphthas on the one hand and the semi-fluid malthas or mineral tars on the other.

*History*—Petroleum has been known by civilized man from the dawn of history. Herodotus wrote of the springs of Zacynthus (Zante), and the fountains of Hit have been celebrated by the Arabs and Persians. Pliny and Dioscorides describe the oil of Agrigentum, which was used in lamps under the name of "Sicilian oil," and mention is made of petroleum springs in China in the earliest records of that ancient people. Petroleum was observed and described as early as 1814 in Washington county, Ohio, in wells at that time being bored for brine. In 1819 a well bored for brine in Wayne county, Ky., yielded so much black petroleum that it was abandoned. It has continued to yield small quantities until the present time. In 1829 a well drilled for brine near Burkesville, Cumberland county, Ky., yielded such a flow of petroleum that it was regarded as a wonderful natural phenomenon. This well is estimated to have yielded, up to 1860, 50,000 barrels of oil, the larger part of which was wasted. Of the rest a few barrels were bottled and sold as a liniment in the United States and Europe under the name of "American oil."

About the year 1847 E. W. Binney, of Manchester, England, called attention to the petroleum discovered at Riddings, near Alfreton, in Derbyshire, and a few years later he, together with James Young and others, commenced the manufacture of illuminating and other oils from it. The supply of crude material from this source soon became inadequate, and they then commenced distilling the Boghead mineral that had been found near Bathgate in Scotland. The success attending this enterprise soon attracted attention in the United States of America, and a number of establishments were in operation in the course of a few years, some of them being licensed under Young's patents. In 1851, when petroleum on Oil Creek was worth seventy-five cents a gallon in the crude state, it was tested as a crude material for the manufacture of illuminating oil by Messrs. William and Luther Attwood, and Joshua Merrill, at the United States Chemical Manufacturing Company's works at Waltham, near Boston, Mass., and its merits for that purpose fully established. But its scarcity at that time prevented its use in commercial quantities, and the establishments at Boston and at Portland, Me., under the charge of Messrs. Merrill and William Attwood, continued to use Boghead mineral and albertite for a number of years after petroleum was produced in sufficient quantity. Petroleum was refined and offered for sale in Pittsburgh, Penn., as early as 1855, but the quantity was too small to influence even the local trade; it, however, created a small demand for the crude oil. The well-known fact that brine-wells often produced petroleum led those



who sold the "American oil" to embellish the label on the bottles with a derrick and other accompaniments of a brine-well; and the story is told that the projector of the first well drilled exclusively for petroleum was led to undertake it through reflecting upon this picture. Some oil from one of the natural springs near Titusville, Penn., was sent to Prof. B. Silliman, Jr., of Yale College, and he made a report upon it which has become a classic in the literature of petroleum. This report was so satisfactory that a company was organized in New Haven, and E. L. Drake was sent to drill a well upon land that was leased in the valley of Oil Creek, a short distance below the spot where the city of Titusville now stands. The region was then almost a wilderness, and many delays were experienced before he succeeded in getting his men and machinery in operation. He was at first thwarted by quicksands and water, but he finally drove an iron pipe thirty-six feet down to the rock. This device, said to have been original with Drake, has been of great value in artesian boring ever since he used it. After drilling thirty-three feet on August 28, 1859, the drill fell suddenly six inches into a crevice, and was left until the next day, when the drill-hole was found to be nearly filled with petroleum. No spot in the entire territory where petroleum has since been obtained could have been selected where the oil was to be obtained nearer the surface. The success of this enterprise led to the immediate drilling of other wells, first in the valley of Oil Creek and its tributaries, and later over the higher land between Oil Creek and the Alleghany river below Tidioute. As this territory began to be exhausted, the region of the lower Alleghany, in Butler and Clarion counties, yielded wells of great richness, and finally the Bradford field in McKean county became the center of production. A careful comparison of the situations of some of the most productive wells led to the discovery that the areas yielding oil were not irregular in outline, but extended across the country in narrow belts, without regard to the present configuration of the surface. The areas of these belts were in general parallel, and extended in a northeast and southwest direction, 15° to 20° from the meridian. As the exhaustion of the oil-fields of Butler and Clarion counties led producers to seek a more productive locality, lines were run by compass on the supposed axis of the oil-belt over forest-covered hills for many miles, until they reached the town of Bradford, near which wells had previously been drilled without success. Deeper wells were drilled, and oil was obtained, resulting in the development, since 1875, of the most uniformly productive and extensive oil-territory yet discovered.

In the province of Ontario, Canada, principally in the vicinity of Enniskillen, a territory of limited extent but great productiveness has been under development for the last twenty years. In the region about Baku and in the valley of the Kuban, at the eastern and western extremities of the Caucasus, petroleum has been obtained for an unknown period, and is now being produced from artesian borings in large quantities. In Galicia and Roumania it is also obtained in commercial quantities. These regions, with the United States, furnish the petroleum of commerce. Japan, China, Burmah, and Italy have yielded petroleum in quantities sufficient to supply a local demand, but the vast quantity of the American oil and low prices at which it is furnished have rendered the production in these countries unprofitable.

*Geographical Distribution.*—Petroleum "was found about one hundred years since in making the duke of Bridgewater's tunnel at Worsley, at Wigan, and West Leigh in the Lancashire coal-fields. at Coalbrookdale

and Wellington in Shropshire and Riddings in Derbyshire, two other coal-fields; also in a peat-bog at Down Holland, near Ormskirk, in Lancashire, but never in commercial quantities. The greatest supply has not been more than fifty gallons a day, and even that soon diminished." A tar-spring was known at Coalport, in Shropshire, early in the present century. Although there are extensive deposits of solid bitumen in eastern France and Switzerland, the petroleum springs that occur at Saint Boès, Basses Pyrénées, are unimportant. In Alsace, at Lobsann and Bechelbronn, petroleum has been obtained for many years for local uses. Although reported from many localities in Germany, the only point that has promised to be of any importance is the Lüneburg heath, south of Hamburg. Petroleum is also reported near Hölle, in Dithmarschen, Schleswig-Holstein. On the eastern shores of the Adriatic—in Dalmatia and Albania—and in the Ionian Islands, petroleum springs have been mentioned by the writers of classical antiquity. In Armenia and Persia petroleum has been used for unknown centuries, and it appears to be widely distributed in the mountains that surround the table-land of Iran. In Algeria, Egypt, Kashmir, the Punjab, Assam, Java, and other East Indian islands petroleum is reported. In North America the successful development of the petroleum-fields of northwest Pennsylvania following the completion of Drake's well led in a few years to the drilling of wells in a great many localities where petroleum springs had been observed. The following so-called "petroleum-fields" have, according to last census, produced oil in commercial quantities more or less valuable:—

NAME.	Maximum production in	Yield in barrels to 1880.
Oil Creek, Venango county, Penn.....	1862	35,517,297
Pithole, Venango county, Penn.....	1866	8,816,289
Central Alleghany, Venango county, Penn.	1871	6,182,900
Lower Alleghany, Butler and Clarion counties, Penn.....	1874	37,342,978
Tidioute, Venango and Warren counties, Penn.....	1874	4,674,345
Bullion, Venango county, Penn.....	1877	2,312,090
Bradford, McKean county, Penn.....	1881	44,574,921
Warren, Warren county, Penn.....	1878	448,213
Smith's Ferry, Beaver county, Penn.....	1879	339,631
Mecca, Trumbull county, Ohio.....	} A continuous small production since 1865. No record.	
Grafton, Lorain county, Ohio.....		
Macksburg, Washington county, Ohio...		
Horse Neck, Pleasants county, W. Va...		
Volcano, Wood county, W. Va.....		
Burning Spring, Wirt county, W. Va ...		
Glasgow, Barren county, Ky.....		
Santa Clara Valley, Ventura county, Cal.		

Besides these localities petroleum has been observed over an area 1,500 miles long by an unknown breadth in the valleys of the Mackenzie and its tributaries, and in New Brunswick, Newfoundland, and other portions of eastern Canada. It also occurs at many different points along the Appalachian system of mountains from Point Gaspé, on the St. Lawrence, to northern Alabama. It has been noticed in Kansas, Missouri, Wyoming, Colorado, and Texas in the United States, in southern Mexico, in the West India Islands, and in the northern states of South America. Petroleum is one of the most widely distributed substances occurring in nature, but an examination of the geographical localities in which it chiefly occurs will show them to be intimately connected with the principal mountain-chains of the world.

In both Galicia and the Caucasus, which, with Canada and the United States, now furnish the petroleum of commerce, the ancient methods of production are being

rapidly superseded by those employed in America. In the United States the development of oil-territory has acquired a habit that has become well defined, and has been repeatedly exemplified during the last twenty years. The first step is the sinking of a test or "wildcat" well outside the limits of any proved productive territory, the progress of such well being eagerly watched not only by those who pay for it but also by many others who hope to profit by the experiment. The striking of oil in such a well is the signal for a grand rush, and a speculative floating population invades the place. After a time the speculative phase is succeeded by that of settled development. The oil-territory has become outlined. The sagacious ones have secured control of the most profitable tracts, while the floating element has moved on to a new field. Between the period of active development and absolute exhaustion comes that of decay, when the derricks are rotting and falling to wreck, and when property that has ceased to be productive has been sold at an extravagant price, and after accumulating debts has been abandoned. Finally the wave passes over and nature restores as she restores after the ruin of battle-fields. A visit to Pithole City, which in 1865 was, next to Philadelphia, the largest postoffice in Pennsylvania, showed in 1881 fields of maize and timothy where some of the most famous wells had been, and of the city a score of houses tumbling to decay and not an inhabitant. It is not to be inferred, however, that any of the sections into which the oil regions have been divided entirely cease to produce oil. There are wells now producing within sight of the spot where Drake drilled the first well; but large tracts cease to be centers of speculative investment, the old wells cease to be remunerative, and the new wells no longer hold out the possibilities of a grand lottery.

*Technology.*—The technology of petroleum is quite simple. In the crude state it enters largely into mixtures with other oils, tallow, lead, soap, graphite, etc., that are chiefly used for lubrication. Crude petroleum is also filtered through charcoal. Crude oils that are too fluid for lubrication are reduced to the required consistency by partial evaporation, both by exposure to the sun in shallow tanks and also by distillation of the more volatile portion in stills. Such oils are called "reduced oils."

*Lubricating Oils.*—Crude petroleum and the heavy distillates from petroleum, finished either by treatment or by filtration, have been slowly winning their way with consumers of lubricating oils for the last twenty years, and may now be said to have a recognized value. This result has been due as much to improved processes of manufacture, and consequently to improved quality of the products, as to a recognition of their merits. When properly prepared, and exempt from volatile matter and offensive odor, they are found to be possessed of great endurance, to be free from a tendency to gum, and to be incapable of spontaneous combustion. When mixed with animal and vegetable oils liable to spontaneous combustion, these oils prevent it. They are therefore now in large demand, a demand which is likely to increase as new applications are found for them and their quality is improved.

*Illuminating Oils.*—Oils of this class manufactured from petroleum have nearly superseded the use of other illuminating fluids throughout the world. They are largely sold in Great Britain under the name of "paraffin oils;" in the United States they are called "kerosene," and on the European continent "refined petroleum." The different qualities are known as "water white," "standard," and "prime," and are further distinguished as "low test" and "high test" oils. The characters chiefly relied on in the trade are "color" and

"test." The color should be as light and free from opalescence as possible. Color is, however, a matter of little importance, except as it indicates unskillful manufacture of the oil. The "test" is of paramount importance, and indicates the temperature Fahr. at which the oil will give off a sufficient amount of vapor to ignite explosively when the oil is properly tested.

*The Uses of Naphtha.*—The lightest products obtained from petroleum are rhigolene, which is used in surgery, and cymogene, which is used as the volatile fluid in ice-machines. Gasolene is the lightest fluid obtained in considerable quantity, and is used in automatic gas-machines for the carburation of gas or air. The question of increasing the illuminating power of gas (see GAS) by causing it to absorb fluid hydrocarbons, was discussed as early as 1832, but it was only after petroleum furnished a cheap and suitable fluid that inventors succeeded in securing results of any value. While hundreds of machines have been patented in England, America, and continental Europe for accomplishing this purpose, it is only quite recently that an American inventor, Dr. Walter M. Jackson, has succeeded in constructing a machine that satisfactorily meets all the requirements of the problem. His metrical carbureter measures both the fluid and the gas or air in such a manner that the least amount of the hydrocarbon fluid required to produce the effect sought is furnished to the gas, and the whole is immediately absorbed. By this means a uniform carburation is secured, furnishing a gas of uniform quality, that never contains a sufficient amount of fluid to admit of condensation in any part of the apparatus. Both crude petroleum and the products of its manufacture have been used as a material for the manufacture of gas by distillation. The different qualities of naphtha are used in mixing paint, in the manufacture of oil-cloths for floors and of varnishes, as a solvent for gums and resins, in the preparation of alkaloids, in the manufacture of india-rubber, in washing wool, and in removing oils and grease from seeds and textile fabrics.

*Petroleum as Fuel.*—In the region of the Caucasus and on the Caspian Sea, where other fuel is scarce and dear and petroleum is plentiful and cheap, the latter is used with complete success on both steamships and locomotives. Petroleum and its products have been used with practical success in the manufacture of iron in the United States. Both illuminating oil and naphtha are now very widely used in stoves; but naphtha-stoves are extremely dangerous, and their use should be prohibited by law. In the valley of the Euphrates, near Mosul, petroleum is used as a fuel in burning lime.

*Petroleum in Medicine.*—Although petroleum has been used as a remedial agent for an unknown period in the countries where it is a natural product, its physiological effects have never been fully investigated. Barbados tar, Haarlem oil, Seneca oil, and American oil, all consisting wholly or in large part of crude petroleum, were sold by apothecaries for years before petroleum was obtained by boring. They were mainly used as liniments for external application, particularly in rheumatism. The oil of the Alleghany valley early had a local reputation as an internal remedy for consumption, and it has lately been prescribed for bronchitis. The most volatile product of petroleum obtained by distillation, called rhigolene, has been used to produce local insensibility, by means of the intense cold resulting from its rapid evaporation; and the same fluid when inhaled as vapor or the gas escaping from fresh oil will produce an intoxication or insensibility resembling the effects of laughing-gas, resulting in death if its action is prolonged. The products of petroleum that have proved most valuable in medicine are the filtered paraffin residues sold

under the names of cosmoline, vaseline, etc., that are now so widely used as ointments, either plain or medicated. They are of about the consistence of butter, with very little taste or odor, and will keep indefinitely without becoming rancid. These valuable properties have caused them to almost entirely supersede all other preparations containing animal or vegetable fat.

Looking toward the past, it may be said that petroleum has attained universal diffusion as a lighting agent; it is fast displacing animal and vegetable oils as a lubricator on all classes of bearings, from railroad-axles to mule-spindles, and also where other oils are liable to spontaneous combustion; it is very largely used as fuel for stoves, both for heating and cooking; it is very successfully used for steam purposes when other fuel is scarce and petroleum plentiful; it is likely to be used for the production of pure iron for special purposes; and it has become a necessity to the apothecary as petroleum ointment. Looking toward the future, what assurance have we that these varied wants, the creation of a quarter of a century, will be satisfied? While it is not probable that the deposits of petroleum in the crust of the earth are being practically increased at the present time, there is reason to believe that the supply is ample for an indefinite period. Yet the fact is worthy of serious consideration that the production of petroleum as at present conducted is everywhere wasteful in the extreme.

PETROLOGY. See ROCKS.

PETRONIUS. Petronius Arbiter, although excluded from the list of classical writers available for the purposes of education, is one who enjoyed a great reputation, especially in France, at a time when Latin authors were more read as literature than they are in the present day. A recent critic of Petronius has stated, though with evident exaggeration, that no ancient writer except Aristotle has found so many interpreters as has his *Satire*. But there is perhaps none about whose history and era there has been so much controversy, nor is the controversy yet settled with absolute certainty. His place of residence, in his later years at least, was not Marseilles but Rome. There is nothing, however, in what Tacitus says incompatible with the supposition that Marseilles was his birthplace.

The account given of C. Petronius is "that he spent his days in sleep, his nights in attending to his official duties or in amusement, that by his dissolute life he had become as famous as other men by a life of energy, and that he was regarded as no ordinary profligate, but as an accomplished voluptuary. His reckless freedom of speech, being regarded as frankness, procured him popularity. Yet during his provincial government, and later when he held the office of consul, he had shown vigor and capacity for affairs. Afterward returning to his life of vicious indulgence, he became one of the chosen circle of Nero's intimates, and was looked upon as an absolute authority on questions of taste in connection with the science of luxurious living." This excited the jealousy of Tigellinus, and led to his condemnation. Petronius' death is then described, which was in keeping with his mode of life and character. He selected the slow process of opening his veins and having them bound up again, while in conversing with his friends he avoided the serious subjects natural at such a time, and listened to their recitation of light odes and trifling verses. He then dined luxuriously, slept for some time, and, so far from imitating the practice of others by flattering Nero or Tigellinus in his will, he wrote, sealed, and sent to the emperor a document which professed to give, with the names of the partners of his vices, a detailed account of the scandalous life of the court.

PETROPAVLOVSK, a district town of western Siberia, in the government of Akmolinsk, is situated on

the right bank of the Ishim river, 185 miles to the west of Omsk. The fertile steppes to the east, west, and south of the town largely supply it with corn and cattle, and at the same time give great facilities for trade with the Kirghiz, with Turkestan, and with Bokhara. The town has several tallow-melting houses, tanneries, and glue and soap works; and its industries are steadily increasing. The population (7,850 in 1865) now exceeds 11,500.

PETROPOLIS, a town of Brazil, in the province of Rio de Janeiro, lies at a height of 2,400 feet above the sea on a beautiful and healthy plateau, surrounded by the wooded heights of the Serra da Estrella, which lie between it and the coast region. It is about twenty-five miles almost due north from Rio de Janeiro, and is reached by a railway (twenty-two miles) from Maua; the last ten and one-half miles are on the Rigi system. Founded by the emperor of Brazil as a colony for distressed German immigrants, Petropolis has grown into an elegant and thriving town of 8,000 or 10,000 inhabitants, and, besides the royal palace and park, has a number of good hotels and public buildings.

PETROVSK, a town of European Russia, in the province of Saratoff, lies on both banks of the Medveditza, a tributary of the Don, sixty-four miles north-northwest of Saratoff on the Volga by the highway to Moscow. It was founded by Peter I. in 1698 to defend the district from the encroachments of the Kuban Tartars, and by the beginning of the nineteenth century it had become a place of 6,921 inhabitants, with ten churches and a monastery (St. Nicholas). In 1864 the population was 10,128, and it has since increased to upward of 15,000.

PETROZAVODSK, a town of Russia, capital of the government of Olonetz, lies on the western shore of Lake Onega, 300 miles to the northeast of St. Petersburg. The government cannon-foundry can turn out annually more than 5,000 tons of pig-iron, and the same weight of guns, gun-carriages, and ammunition, but its actual production is subject to great fluctuations. Within the district there are a few private iron-works as well as important sawmills. The inhabitants engage in agriculture and fishing, and there is some trade with St. Petersburg—timber, fish, and furs being exported in exchange for corn, groceries, and manufactured wares. The population (11,027 in 1865) was 11,970 in 1881.

PETTY, SIR WILLIAM, statistician and political economist, and author of the *Down Survey of Irish Lands*, was born on May 26, 1623. His first publication was a letter to Samuel Hartlib in 1648, entitled *Advice for the Advancement of some Particular Parts of Learning*. In 1649 he obtained the degree of doctor of physic, and was soon after elected a fellow of Brasenose College. He gained some notoriety in 1650 by restoring to life a woman who had been hanged for infanticide. In 1663 he attracted much notice by the success of his invention of a double-bottomed ship, which twice made the passage between Dublin and Holyhead, but was afterward lost in a violent storm. He was one of the first members of the Royal Society, and sat on its council. He died at London on December 16, 1687, and was buried in the church of his native place.

PETUNIA. See HORTICULTURE.

PEUTINGER, CONRAD, born in 1465, died in 1547, a prominent and useful citizen of Augsburg, remembered for his services to the new learning. He was one of the first to publish Roman inscriptions, and his name remains associated with the famous *Tabula Peutingeriana*, which was in his hands when he died, and was found again among his MSS. in 1714.

PEWTER is a generic term for a variety of alloys

which all agree in this, that tin forms the predominating component. The finest pewter (sometimes called "tin and temper") is simply tin hardened by the addition of a trifle of copper. Ordinary pewter is tin alloyed with lead, which latter ingredient is added chiefly on account of its cheapness, and therefore often in excessive proportion. The law of France restricts the percentage of lead to 16.5, with a toleration of 1.5 per cent. of error, an alloy of this or higher degree of richness in tin being, according to an old investigation by Vauquelin, as proof against sour wine or vinegar as pure tin is. Higher percentages of lead are dangerous, and besides spoil the appearance of the alloy. The composition of an alloy containing only these two components can be ascertained approximately by determining the specific gravity.

Plate Pewter is a hard variety much used for plates and dishes; a good quality is composed of 100 parts of tin, 8 of antimony, 2 of bismuth, and 2 of copper. Closely allied to it is the silver-white alloy called "Britannia metal," which is much used in Great Britain for the making of teapots more especially.

PFAFF, CHRISTIAN HEINRICH (born 1773, died 1852), chemist and physicist, younger brother of J. F. Pfaff, noticed below, took his degree as doctor of medicine at Stuttgart, in 1793. His work in chemistry was chiefly analytical and mineralogical. In physics he was distinguished as one of the earlier experimenters with the voltaic current, and had a considerable share in the experimental investigation of its properties. He also made important researches on the carrying power of magnets, more particularly on the effect of the extent of the attracting surface.

PFAFF, JOHANN FREIDRICH, German mathematician, was born December 22, 1765, at Stuttgart. In 1788 Pfaff became professor of mathematics in Helmstädt, and so continued until that university was abolished in 1810. From that time till his death (April 20, 1825), he held the chair of mathematics at Halle.

Another brother of this family, JOHANN WILHELM ANDREAS PFAFF, who was born in 1774 and died in 1835, was professor of pure and applied mathematics successively at Dorpat, Nuremberg, Würzburg, and Erlangen.

PFALZBURG, a town of German Lorraine, lies high on the west slopes of the Vosges, twenty-five miles to the north-northwest of Strasburg. In 1880 it contained 3,379 inhabitants (mainly Roman Catholics).

PFEIFFER, FRANZ, an eminent writer on mediæval German literature, and on old forms of the German language, was born at Solothurn, Switzerland, on February 27, 1815. In 1857, having established his fame as one of the foremost authorities on his special subject, he was appointed professor of German literature and language at the university of Vienna; and in 1860 he was made a member of the Imperial Academy of Sciences. He died on May 29, 1868.

PFEIFFER, IDA LAURA, traveler, was born at Vienna, the daughter of a merchant named Reyer, October 14, 1797. Ida was the only sister of six brothers, and in her youth acquired masculine habits. Her training was Spartan, and accustomed her to the endurance of hardships and deprivations. On May 1, 1820, she married Doctor Pfeiffer, a prosperous advocate of Lemberg, twenty-four years older than herself. In 1842 Madame Pfeiffer visited Egypt and Palestine, and, with considerable hesitation, published an account of her journey in three small volumes, *Reise einer Wienerin in das Heilige Land*, in 1845. In the same year she set out again, this time to Scandinavia and Iceland, describing her tour in two volumes. In 1846 she started on her first journey round the world. The results were

published in three volumes at Vienna in 1850, under the title *Eine Frauenfahrt um die Welt*. For her next and most extensive journey she received the support of the Austrian Government to the small extent of \$625. Starting in 1851 she reached home in 1854. Her narrative, *Meine zweite Weltreise*, was published in four volumes at Vienna in 1856. After being detained by her sufferings in Mauritius for some months, Ida returned by England to Vienna, where she died October 27, 1858. The *Reise nach Madagascar* was issued in 1861, with a biography by her son.

PFORZHEIM, one of the chief industrial towns in the grand-duchy of Baden, is pleasantly situated at the confluence of the Nagold, the Würm and the Enz, on the northern margin of the Black Forest, fifteen miles to the southeast of Carlsruhe. The staple industry is the manufacture of gold and silver ware and jewelry, which gives employment to nearly 10,000 workmen, besides which there are iron and copper works, and manufactures of chemicals, paper, leather, cloth, and other articles. A brisk trade is maintained in timber, cattle, and agricultural produce. In 1890 the population was 29,508.

Pforzheim (Porta Hercyniæ) is of Roman origin, and has belonged to Baden for 600 years.

PIÆDRUS, the author of five books of Latin fables in verse, lived in the reigns of Augustus, Tiberius, Caligula, and Claudius. To his literary vanity we owe most of our scanty knowledge of his life. He was born on the Pierian Mountain, in Macedonia, but seems to have been brought at an early age to Italy, for he mentions that he read a verse of Ennius as a boy at school. According to the heading of the chief MS. he was a slave and was freed by Augustus. He incurred the wrath of Sejanus, the powerful minister of Tiberius, but on what grounds is not known. Devoting himself to literature, he lived in poverty and died at an advanced age.

PHAETHON ("the shining one"), in Homer an epithet of the sun, and used by later writers as a name for the sun, is more generally known in classical mythology as a son of the Sun and the ocean nymph Clymene. He persuaded his father to let him drive the chariot of the sun across the sky, but he lost control of the horses, and driving too near the earth scorched it; mountains were set on fire, rivers and seas dried up, Libya became a desert, and the Æthiopians were blackened by the heat. To save the earth from utter destruction Zeus killed Phaethon with a thunderbolt. He fell to earth at the mouth of the Eridanus, a river of northern Europe (identified in later times with the Po), on the banks of which his weeping sisters were transformed into poplars and their tears into amber.

PHAGEDÆNA (Gr. from φαγείν, *phagein*, to eat or corrode) designates a variety of ulceration in which there is much infiltration, and at the same time rapid destruction of the affected part. The sore presents an irregular outline, and a yellowish surface; it gives off a profuse bloody or ichorish discharge, and is extremely painful. It usually attacks persons whose constitutions are vitiated by scrofula, by congenital syphilis, by the abuse of mercury, by intemperance, etc. It not very infrequently appears in the throat after scarlatina in a severe form. If relief is not afforded by the internal administration of opium (to allay the pain), and of quinia, or some other preparation of cinchona, wine, beef-tea, etc., to improve the tone of the constitution, together with astringent and sedative local applications, subacetate of lead, kino, tannate of iron, etc., recourse must be had to the destruction of the part by chloride of zinc (Canquoin's paste) or in some cases actual cautery (white-hot iron). Nitric acid should not be used, as it frequently induces phagedæna, and care should be taken that all parts of the ulcer are cauterized, else the

uncauterized portions will speedily reinfect the whole sore.

**PHALANGER.** Phalangers as a whole are small woolly-coated animals, with long, powerful, and often prehensile tails, large claws, and, as in the American opossums, with opposable nailless great toes. Their expression seems in the day to be dull and sleepy, but by night they appear to decidedly greater advantage. They live mostly upon fruit, leaves, and blossoms, although some few feed habitually upon insects, and all relish, when in confinement, an occasional bird or other small animal. Several of the phalangers possess flying membranes stretched between their fore and hind limbs, by the help of which they can make long and sustained leaps through the air, like the flying squirrels; but it is interesting to notice that the possession of these flying membranes does not seem to be any indication of special affinity, the characters of the skull and teeth sharply dividing the flying forms, and uniting them with other species of the non-flying groups. Their skulls are as a rule broad and flattened, with the posterior part swollen out laterally, owing to the numerous air-cells situated in the substance of the squamosals. The dental formula is very variable, especially as regards the pre-molars, of which some at least in each genus are reduced to mere functionless rudiments, and may even vary in number on the two sides of the jaw of the same individual. The incisors are always  $\frac{3}{1}$ , the lower one very large and proclivous, and the canines normally  $\frac{1}{1}$ , of which the inferior is always minute, and in one genus generally absent. The true molars number either  $\frac{4}{3}$  or  $\frac{3}{3}$ .

The true phalangers, or opossums as they are called by the Australian colonists, consist of four or five hardly separable species, of which the best known is the Vulpine Phalanger (*Ph. vulpecula*), so common in zoölogical gardens, where, however, it is seldom seen, owing to its nocturnal habits. It is of about the size and general build of a small fox, whence its name; its color is gray, with a yellowish-white belly, white ears, and a black tail. It is a native of the greater part of the continent of Australia, but is replaced in Tasmania by the closely allied Brown Phalanger (*Ph. fuliginosa*). Its habits are very similar to those of the Yellow-bellied Flying-Phalanger (*Petaurus australis*), except that, of course, it is unable to take the wonderful flying leaps so characteristic of that animal. Like all the other phalangers, its flesh is freely eaten both by the natives and by the lower class of settlers.

**PHALARIS**, a Greek tyrant, who ruled Agrigentum (Acragas), in Sicily, for sixteen years (probably between c. 571 and 549 B.C.), was the son of Laodamas, and his family belonged to the Dorian island of Astypakæa, near Cnidus. As a leading man in the new city (for Agrigentum had been founded by the neighboring city of Gela only a few years before, 582 B.C.), Phalaris was intrusted with the building of the temple of Zeus Atabyrius on the citadel, and he took advantage of his position to make himself master of the city. Under his rule Agrigentum seems to have attained a considerable pitch of external prosperity.

**PHALLUS**, a representation of the male generative organs, used at certain Dionysian festivals in ancient Greece as a symbol of the powers of procreation. The bearers of the phallus, which generally consisted of red leather, and was attached to an enormous pole, were the Phallophoroi. Phalli were on those occasions worn as ornaments around the neck, or attached to the body. Phalli were often attached to statues, and of a prodigious size; sometimes they were even movable.

**PHARAOH**, which the Old Testament often uses as if it were a proper name, applicable to any king of

Egypt, though sometimes such a distinguishing name as Hophra or Nechoh (Nekos) is added, is really an Egyptian title of the monarch (Perāa or Phuro), often found on the monuments. Apart from Hophra and Necho the Biblical Pharaohs cannot, in the present state of Hebrew and Egyptian chronology, be identified with any certainty.

**PHARISEES**, the Jewish party of the scribes, the opponents of the Sadducees. (See ISRAEL and MESSIAH.)

**PHARMACOPŒIA** (lit. the art of the drug compounder) in its modern technical sense denotes a book containing directions for the identification of simples and the preparation of compound medicines, and published by the authority of a government or of a medical or pharmaceutical society. The name has also been applied to similar compendiums issued by private individuals.

National pharmacopœias now exist in the following countries:—Austria, Belgium, Denmark, France, Germany, Great Britain, Greece, Holland, Hungary, India, Mexico, Norway, Portugal, Russia, Spain, Sweden, and the United States. The Argentine Republic, Chili, and Japan have each a pharmacopœia in preparation. All the above-mentioned were issued under the authority of government, and their instructions have the force of law in their respective countries, except those of the United States and Mexico, which were prepared by commissioners appointed by medical or pharmaceutical societies, and have no other authority, although generally accepted as the national textbooks. Italy has no national pharmacopœia, the authorities used in the different States prior to the unification being still retained. Sardinia, for example, has a pharmacopœia dating from 1853; Modena, Parma, and Piacenza have one in common, published in 1839; in the States of the Church as well as in Tuscany and Lucca, an unofficial compilation is in use entitled *Orosi Farmacologia technica practica ovvero Farmacologia Italiana*; Naples has its *Ricettario Farmaceutico Napolitano* (1859); and Lombardy and Venice use the Austrian pharmacopœia. Although Switzerland has a national pharmacopœia, this does not possess government authority, the French *Codex* being recognized in Geneva, and the canton of Ticino having a pharmacopœia.

The French *Codex* has probably a more extended use than any other pharmacopœia outside the limits of its own country, being, in connection with Dorvault's *L'Officine*, the standard for druggists in a large portion of Central and South America; it is also official in Turkey. The sum-total of the drugs and preparations it contains is about 2,000, or more than double the average of other modern pharmacopœias. The progress of medical knowledge during the last two hundred years has led to a gradual but very perceptible alteration in the contents of the various pharmacopœias. The original very complex formulæ have been gradually simplified until only the most active ingredients have been retained, and in many cases the active principles have to a large extent replaced the crude drugs from which they were derived. From time to time such secret remedies of druggists or physicians as have met with popular or professional approval have been represented by simpler official preparations.

*International Pharmacopœia.*—The increased facilities for travel during the last fifty years have brought into greater prominence the importance of an approach to uniformity in the formulæ of the more powerful remedies, such as the tinctures of aconite, opium, and nux vomica, in order to avoid danger to patients when a prescription is dispensed in a different country from that in which it was written. Attempts had been made during the

last few years by international pharmaceutical and medical conferences to settle a basis on which an international pharmacopœia could be prepared, but, owing to national jealousies and the attempt to include too many preparations in such a work, it had not as yet been produced. At the fifth International Pharmaceutical Congress, held in London in 1881, however, a resolution was passed to the effect that it was necessary that such a pharmacopœia should be prepared, and a commission, consisting of two delegates from each of the countries represented, was recommended to be appointed in order to prepare within the shortest possible time a compilation in which the strength of all potent drugs and their preparations should be equalized—the work, when complete, to be handed over to their respective governments or to their pharmacopœia committees. This has since been done and the various tinctures and fluids are now of uniform strength.

**PHEASANT**, Middle-English *Fesaunt* and *Fesaun*, German *Fasan* and anciently *Fasant*, French *Faisan*—all from the Latin *Phasianus* or *Phasiana* (*sc. avis*), the bird brought from the banks of the river Phasis, now the Rioni, in Colchis, where it is still abundant, and introduced by the Argonauts, it is said, in what passes for history, into Europe. As a matter of fact nothing is known on this point.

Within recent years the practice of bringing up Pheasants by hand has been extensively followed, and the numbers so reared vastly exceed those that are bred at large. The eggs are collected from birds that are either running wild or kept in a mew, and are placed under domestic hens; but, though these prove most attentive foster-mothers, much additional care on the part of their keepers is needed to insure the arrival at maturity of the poults; for, being necessarily crowded in a comparatively small space, they are subject to several diseases which often carry off a large proportion, to say nothing of the risk they run by not being provided with proper food, or by meeting an early death from various predatory animals attracted by the assemblage of so many helpless victims. As they advance in age the young pheasants readily take to a wild life, and indeed can only be kept from wandering in every direction by being plentifully supplied with food, which has to be scattered for them in the coverts in which it is desired that they should stay.

Of the many other species of the genus *Phasianus*, two only can be dwelt upon here. These are the King-necked Pheasant of China, *P. torquatus*, easily known by the broad white collar, whence it has its name, as well as by the pale grayish-blue of its upper wing-coverts and the light buff of its flanks, and the *P. versicolor* of Japan, often called the Green Pheasant from the beautiful tinge of that color that in certain lights pervades almost the whole of its plumage, and, deepening into dark emerald, occupies all the breast and lower surface that in the common and Chinese birds is bay barred with glossy black scallops. Both of these species have been to a considerable extent introduced into England, and cross freely with *P. colchicus*, while the hybrids of each with the older inhabitants of the woods are not only perfectly fertile *inter se*, but cross as freely with the other hybrids, so that birds are frequently found in which the blood of the three species is mingled. The hybrids of the first cross are generally larger than either of their parents, but the superiority of size does not seem to be maintained by their descendants. White and pied varieties of the common Pheasant, as of most birds, often occur, and with a little care a race or breed of each can be perpetuated. A much rarer variety is sometimes seen; this is known as the Bohemian Pheasant.

**PHENOL**. See CARBOLIC ACID.

**PHERECRATES**, one of the chief poets of the Old Attic Comedy, was a contemporary of Cratinus, Crates, and Aristophanes, being older than the last and younger than the two former. At first an actor, he seems to have gained a prize for a play in 438 B. C. The only other ascertained date in his life is 420, when he produced his play *The Wild Men*. Like Crates, whom he imitated, he abandoned personal satire for more general themes.

**PHERECYDES OF SYROS**, one of the earliest Greek philosophers, was the son of Babys and a native of the island of Syros. The dates of his life are variously stated, but there seems to be no doubt that he lived in the sixth century B. C.; among his contemporaries were Thales and Anaximander. He was sometimes reckoned one of the Seven Wise Men, and a very uniform tradition represented him as the teacher of Pythagoras.

**PHIDIAS**, the most famous of Greek sculptors, was born about 500 B. C., and began his artistic career, probably under the guidance of his father, Charmides of Athens, with the study of painting, an art which at that time had attained a singular largeness and dignity of style, while in sculpture these qualities were as yet being sought for with only a somewhat bold and rude result, as may be seen from the remains of it now at Olympia.

To obtain something like a fair judgment of the style of Phidias it is to the sculptures of the Parthenon now in the British Museum that we must turn. Though executed in what was to him an inferior material, marble, it yet happened that the elevated position which these sculptures were to occupy on the temple was such as to give scope for the highest powers of composition, and so far they may be regarded as a worthy monument of his genius. He must, however, have found finer opportunities in the colossal statues of gold and ivory, where the greater difficulty of duly distributing light and shade was rewarded with greater splendor of effect. In these statues the nude parts, such as the face, hands, and feet, were of ivory, the drapery of gold; and in the statue of *Zeus* at Olympia the gold was enriched with enameled colors, and the impression of the whole is described by ancient writers with unbounded praise. Of the *Athena* in the Parthenon there exist two small copies in marble found in Athens, but so rude in execution as to be of no service in conveying a notion of the style of the original. On the acropolis, and not far from the Parthenon, stood a colossal bronze statue of *Athena Promachos* by Phidias, the attitude and to some extent the type of which may be gathered from the small bronze found at Athens. In Elis he executed a statue of *Aphrodite* in gold and ivory, and at Plataea a colossal *Athena* of wood gilt, with the face, hands, and feet of Pentelic marble. Bright but simple colors had been traditional in art before the time of Phidias. It is not supposed that he had sought to refine upon them as a colorist. What he did was to combine with their simplicity and brightness the ideal largeness and dignity of conception which he shared with the great painters of his day, and the perfection of execution which he shared with the greatest of contemporary sculptors.

**PHIGALIA**, a city in the southwest angle of Arcadia, situated on an elevated rocky site, among some of the highest mountains in the Peloponnesus—the most conspicuous being Mount Cotylium and Mount Elæum; the identification of the latter is uncertain.

**PHILADELPHIA**, the name of several cities of antiquity, of which the two most important have been noticed under ALA-SHEHR and AMMONITES.

**PHILADELPHIA**, the chief city of Pennsylvania, and the third city in the United States, is situated on the west bank of the Delaware river, 96 miles

from the Atlantic and in a direct line 125 miles northeast of Washington, D. C., and 85 miles southwest of the city of New York. Its greatest length north-northeast is 22 miles, its breadth from 5 to 10 miles, and its area 82,603 acres, or about 129 square miles (greater than that of any other city in America except Chicago). The surface of the city between the rivers Delaware and Schuylkill—the latter running parallel with the Delaware and dividing the city about in half, east and west—is remarkably level. It varies, however, in elevation from 24½ feet above the sea to 440 feet, the latter in the northern and suburban sections. The eastern and western sections of the city are connected by eight bridges. The length of the river-front on the Delaware is nearly twenty miles, and the length of wharves five miles. On both sides of the Schuylkill, to Fairmount dam, the front is sixteen miles and the length of wharves four miles. The mean low-water mark of the Delaware is twenty-four feet, and the tide rises six feet, while the average depth of water at the city wharves is fifty feet. The wharf-line, which varies from fourteen feet to sixty-eight feet, gives extraordinary accommodation for shipping. The Delaware is navigable at all seasons of the year for vessels of the heaviest burden, and Philadelphia affords one of the best protected harbors in the country. The substratum of the city is a clay soil mixed with more or less sand and gravel.

The site of the present Philadelphia was originally settled by the Swedes, and so Penn found it when he came to lay out the city; and many of the original patentees for town lots under him were descendants of these first settlers. The original city limits were from east to west 10,922 feet 5 inches, and from north to south 5,370 feet 8 inches, or more than two square miles. The boundaries were Vine street on the north, Cedar (now South) street on the south, the Delaware river on the east, and the Schuylkill river on the west. And this was the city of Philadelphia from its foundation until February 2, 1854, when what is known as the Consolidation Act was passed by the legislature of the State, and the old limits of the city proper were extended to take in all the territory embraced within the then county of Philadelphia. This legislation abolished the districts of Southwark, Northern Liberties, Kensington, Spring Garden, Moyamensing, Penn, Richmond, West Philadelphia, and Belmont; the boroughs of Frankford, Germantown, Manayunk, White-Hall, Bridesburg, and Aramingo; and the townships of Passyunk, Blockley, Kingsessing, Roxborough, Germantown, Bristol, Oxford, Lower Dublin, Moreland, Bybery, Delaware, and Penn; and it transferred all their franchises and property to the consolidated city of Philadelphia under one municipal government. The present boundaries of the city are: on the east the Delaware, on the northeast Bucks county, on the north-northwest and west Montgomery county, and on the west and south Delaware county and the Delaware. The greater part is laid out in parallelograms, with streets at right angles to each other. Each main parallelogram contains about four acres, or is 400 feet on each of its sides, divided by one or more small thoroughfares. Upon the city plans there are plotted 191,928 square town lots. The main streets running north and south are numbered from First or Front to Sixty-third street, and those running east and west were formerly named after the trees and shrubs found in the province. Thus, while the principal street in the city is named Market street, other main streets are named Chestnut, Walnut, Spruce, Pine, etc. The main streets of Philadelphia are 50 feet wide, with some few exceptions; Broad or Fourteenth street is 113 feet wide, and Market

street is 100 feet wide. The streets are generally paved with rubble stone, although square or Belgian blocks of granite are being extensively introduced. There are laid down on the city plans upward of 2,000 miles of streets, but at present (1884) only 1,060½ miles are opened, of which 573.54 miles are paved and 44.28 macadamized. The pavements are chiefly of brick, but some of the more prominent streets have flagstone sidewalks. Market street and Chestnut street, below Eighth street, and Front street are the localities where the main wholesale business of the city is located. Most of the retail stores are situated in the upper part of Chestnut street and Eighth street. The principal banking institutions are in Chestnut street, between Second and Fifth streets, and in Third street between Walnut and Chestnut streets. Walnut street in the southern section of the city, and Spring Garden and Broad streets in the northern section of the city, are the chief streets for large and luxurious private residences. There is not a street of any consequence which has not a tramway along it; and the tramway system has done a great deal to increase building, until now Philadelphia is emphatically "the city of homes." There are upward of 160,000 dwelling-houses, of which at least 110,000 are owned by the occupants. According to the returns for the census of 1880, there were 146,412 dwelling-houses in the city, which, taking the population as given by that census, 847,170, gave 5.79 persons to each house, while the number of dwellings in New York to the population gave 16.37 to each house. On the original plan of the city five squares, equidistant, were reserved for public parks. One of these, called Center square, situated at the intersection of Broad and Market streets, has been taken for the erection of the city-hall, and the remaining four, situated at Sixth and Walnut, Sixth and Race, Eighteenth and Walnut, and Eighteenth and Race, and named respectively Washington, Franklin, Rittenhouse, and Logan, have a combined area of 29.06 acres. There are six other public squares in the city, with a total area of 18.90 acres. In addition to these public squares, Fairmount Park, with an area of 2,791 1-5 acres, including 373 acres of the water-surface of the Schuylkill river, is the most extensive public park in the United States. It lies in the northwestern section of the city, and the Schuylkill river and Wissahickon creek wind through the greater portion of it. In the park Horticultural Hall and Memorial Hall remain as mementoes of the Centennial Exhibition held there in 1876. The garden of the Zoölogical Society, covering 33 acres, on the outskirts of the park, was opened July 1, 1874, as the pioneer of such enterprises in the United States. Until within the last score of years the buildings in Philadelphia bore a singular resemblance to each other, especially the dwelling-houses. The predominant material for building was, and is, red brick, the soil affording the finest clay for brick found in the United States. The desire for uniformity in buildings, in both style and material, has happily undergone a change in recent years, although the danger now is of running to the other extreme, and thus giving the streets a decidedly bizarre appearance.

*Buildings.*—The old brick Swedes Church in Swanson street in the southeastern section, dedicated on the first Sunday after Trinity, 1700, is the oldest building of character now standing in the city. When it was completed it was looked upon as a great masterpiece, and nothing was then equal to it in the town. The four other colonial buildings of importance still standing are Christ (Protestant Episcopal) Church, the State House (Independence Hall), the Pennsylvania Hospital and Carpenter's Hall, all of them built of red brick with

black glazed headers. Dr. John Kearsley, a physician, was the architect of the first-mentioned, and Andrew Hamilton, a lawyer, the architect of the second. Christ Church stands on the west side of Second street between Market and Arch streets, and its erection was begun in 1727, but it was not finished, as it now appears with tower and spire, until 1754. It was built on the site of a still older Christ Church, which was also of brick, erected in 1695. Queen Anne in 1708 presented a set of communion plate to the church, which is now used on great occasions. During his presidency Washington worshiped at this church, and his pew is still preserved, as is also that of Franklin. In 1882 the interior of the church was restored to its ancient character at an expense of about \$10,000. The nave is 75 feet long by 61 feet in width and 47 feet high; the chancel is 15 feet by 24; and the spire is 196 feet 9 inches high. The old State House or Independence Hall, on the south side of Chestnut street between Fifth and Sixth streets, was commenced in 1731, and was ready for occupancy by the Assembly toward the close of 1735. It was the scene of almost all the great civil events of the Revolutionary War. It is 100 feet in length on Chestnut street by 44 feet in depth; and prior to the Centennial celebration its exterior and interior were restored as nearly as possible to their original appearance. The Pennsylvania Hospital occupies the square of ground bounded by Spruce, Pine, Eighth, and Ninth streets, and the cornerstone of the building was laid on May 28, 1755. Carpenter's Hall, where the first Congress met, stands back from Chestnut street, east of Fourth street, and was begun in January, 1770. These four buildings are all very simple in their construction, but substantial and imposing, and are interesting specimens of colonial architecture. Among the notably fine buildings in Philadelphia are the old United States bank, now the United States custom-house, the Girard bank, the United States mint, and the Girard College, all of which, with the exception of the last-named, were built more than half a century ago. They are all of white marble and of the different orders of Grecian architecture, with porticoes and high fluted columns. Other fine buildings are the Masonic Temple, the Ridgway branch of the Philadelphia library, the Pennsylvania Academy of Fine Arts, and the Academy of Natural Sciences. There are also many very beautiful churches. The two newest buildings of magnitude are the new United States postoffice, at the corner of Ninth and Chestnut streets, which was completed in 1884, at the cost of \$8,000,000, and the new municipal buildings for the city, at the intersection of Broad and Market streets. The postoffice, which is Romanesque, is of granite, and was more than ten years in building, from October, 1873, to March, 1884. It has a frontage of 425 feet, a depth of 175 feet, and a height of 164 feet. The annual sales of stamps amount to \$1,600,000. About half a million of letters, etc., pass through the post-office each day. The new public building, as it is called, or city-hall, forms the largest single building in America. It covers an area, including courtyards, of nearly four and one-half acres, the dimensions being 470 feet east and west, and 486 feet north and south. The building contains 520 rooms, and the topmost point of the dome, on the tower, is 537 feet 4 inches above the courtyard, one of the highest artificial constructions in the world. The architecture is rather rococo in character.

*Population.*—Previous to the census of 1830 Philadelphia was the most populous American city, but since then New York has taken the first place. In 1683 it was estimated that Philadelphia had 80 houses and 500 inhabitants. The next year the population in-

creased 2,000, and by the beginning of the last century there were 700 dwelling-houses and 4,500 people. In 1800 there were 9,868 dwellings and 81,009 inhabitants, and in 1820, the last census when Philadelphia stood first, she had a population of 119,325. By the census of 1880 the population of the city was placed at 847,170 (males 405,022, females 441,181), while in 1870 it was 674,022, and in 1860 565,529. About one-third of the population in 1880 were foreign-born. The enumerated population in 1890 is 1,046,964. The city has 644 places of worship, viz., Baptist 83, Hebrew 11, Lutheran 32, Methodist 131, Moravian 5, Presbyterian 110, Protestant Episcopal 96, Quaker 15, Reformed Dutch 20, Reformed Episcopal 10, Roman Catholic 47, Swedenborgian 3, Unitarian 3, Universalist 4, and 74 among 23 other different denominations. There are 183 cemeteries and burial-grounds in the city.

*Municipal Government.*—By Penn's charter of October 25, 1701, Philadelphia was first created a borough city with a government of its own, separate from that of the province and county. Under this charter, with many modifications, the city was governed until the act of the legislature of the State incorporating the city was passed, March 11, 1789. This is the fundamental law governing the city to-day, but with such changes as have become necessary by the altered condition of affairs and the development of the entire country. The most important change was the Consolidation Act of February 2, 1854, already mentioned, whereby the old county of Philadelphia became the city of Philadelphia, the county of Philadelphia being at the same time continued as one of the counties of the State. The city is divided territorially and politically into thirty-three wards, and is governed by a mayor, elected by the people for four years, and by two bodies, called the select and common council. The upper branch is composed of one member from each ward elected for three years, who must have attained the age of twenty-five years and have been a citizen and inhabitant of the State for four years next before his election, and the last year thereof an inhabitant of the ward for which he shall be chosen. Each ward has a member of common council, elected for two years, for every 2,000 taxable inhabitants; he must be twenty-one years of age and have the other qualifications required for the upper body. The mayor has the right of veto upon the acts of the councils. Councils in joint meeting appoint all heads of department not elected, establish the rate at which all taxes shall be levied that are authorized by law, and fix the salaries of all municipal officers elected by the people, as well as those they appoint. The city can make no binding contract or incur any debt unless authorized by law or ordinance and an appropriation sufficient to pay the same be previously made by councils. The present city charter came in force April 1, 1887. Under this the executive power is vested in the mayor and departments. The mayor is elected for four years, and is not eligible for reëlection. The funded debt of the city on January 1, 1889, was \$57,146,095. The revenues from all sources in 1889 were \$20,529,146, and the expenditures for all purposes were \$20,667,681. The city builds up each year about one square mile, and great improvements are made each year in public buildings, paving, and lighting. The electric system is being placed underground. In 1889 there were 12,000 building permits issued. The city owns its water-works, and within the past three years has greatly improved the service and quality. Edward Shippen was named in the charter of 1701 as first mayor of the city. The last mayor under the English crown was Samuel Powel, elected October 3, 1775, and he was also the first mayor under the United



States, being reelected April 13, 1789. During the interim of the Revolutionary War the municipal government was suspended, and the affairs of the city were carried on by the councils of safety and other local bodies.

*Police, Fire, Water.*—The mayor is the nominal head of the police of the city, and all the appointments and removals are in his hands. The force consists of 1,717 men, of whom 1,425 are patrolmen. There are 4 captains and 1 chief of police; and the fire marshal is attached to the police department.

The fire department is governed by a board of fire commissioners elected by councils, and consists of a chief engineer, 6 assistant engineers, and 502 men. They are divided into 40 steam engine-companies and 10 hook and ladder companies, with the addition of hose and hose-carriage to each.

The largest portion of Philadelphia is supplied with water from the Schuylkill, and it was in great part for the preservation of the purity of this water-supply that Fairmount Park was created. The park has not, however, served its purpose in this respect, and of recent years improvements have been made. The supply also is hardly adequate to the demand, and many other sources have been suggested. The capacity of the present water-works allows a daily average pumpage of 116,500,000 gallons, and the nine reservoirs have a total capacity of 891,491,454 gallons. The dwellings are charged for water according to the number and character of appliances in use, irrespective of the amount of water used or the number of the occupants of the house. The streets have a number of fountains, erected by the Philadelphia Fountain Society, for the use of horses, dogs, and men; and there are also hydrants for the use of the fire department.

The various trust funds of the city are under the control of a board of directors of city trusts, composed of twelve prominent citizens appointed by the judges of the Court of Common Pleas. The board has charge of the Girard Fund; the Wills Hospital Fund, for the relief of indigent blind and lame; the Franklin fund, for aiding young married artificers; and sundry funds for furnishing the poor with fuel and other purposes.

*Finances.*—There are 32 national banks in Philadelphia, with an aggregate capital of \$17,578,000. In addition to the national banks there are 6 banks chartered by the State with an aggregate capital of \$714,600; 8 trust and safe deposit companies, where deposits are received and a *quasi* banking business done, with a total capital of \$8,625,000, and 3 saving funds without any capital, but where all the depositors are interested in the profits. Philadelphia has numerous joint-stock fire insurance companies, joint-stock fire and marine companies, mutual fire insurance companies, and life insurance companies. In addition to these there are a real-estate-title insurance company and a plate-glass insurance company, their objects being expressed in their titles.

*Commerce.*—Until within the last sixty years Philadelphia was the commercial emporium of the United States, but since that time her commerce has been gradually declining, until now she ranks sixth in the order of ports, being preceded by New York, Boston, Chicago, San Francisco, and New Orleans. At the same time her manufactures have been steadily increasing, until she has become the great manufacturing center of the country. Lines of steamers run to Liverpool, Glasgow, New York, Boston, Baltimore, Savannah, Charleston, and other ports. Philadelphia is also the center of the three great internal carrying lines of the State, the Pennsylvania Railroad, the Lehigh Valley Railroad, and the Reading Railroad. The last two are principally coal-roads from the great anthracite coal-fields of Pennsylvania, while the first, with its numerous branches, is

the main artery from the west for the transportation of its agricultural products.

*Industries.*—The largest single classes of manufactures are the iron and steel and the textile industries. The first-named includes all forms of machinery and of iron and steel articles. The manufactures of wool, cotton, silk, etc., employ over 60,000 persons in 1,018 establishments, producing textile fabrics to the value of \$102,087,128; and these figures are rather below than above the actual facts. In the carpet manufacture alone, for which there are 216 establishments, there are 35,000,000 yards of carpet made annually. The census for 1880 gave Philadelphia 8,567 manufacturing establishments, with a capital of \$187,148,857, employing 185,527 hands and producing articles valued at \$324,342,935 per annum. The seven classes producing over \$10,000,000 a year were—sugar-refineries (11), \$24,294,929; factories of woolen goods (89), \$21,349,810; men's clothing manufactories (426), \$18,506,748; cotton-mills (145), \$14,268,696; carpet manufactories (170), \$14,263,510; foundry and machine shops (226), \$13,455,238; drug and chemical manufactories (54), \$11,804,793. Since then, however, Philadelphia has made great strides. The large and important industry of brick-making, for which there are 63 yards, produces annually about 350,000,000 bricks, of a market value of at least \$3,500,000. The fine "pressed brick" of Philadelphia is used in all parts of the country, and of late years molded bricks of various designs and of any size have been extensively and successfully made.

*Charities.*—There are not less than 300 charities proper in Philadelphia, leaving out institutions of learning which come within the legal definition of the word. A few of them are municipal, but the majority are wholly private in their origin and conduct. Among the former may be classed the Blockley Almshouse for the care of the indigent poor of the city, and the house of correction, employment and reformation at Holmesburg. This last is a mixed institution, being a work-house for both criminals and paupers. The city bath-houses are another important municipal charity. There are twenty-two hospitals in Philadelphia, the most important being the Pennsylvania Hospital, projected in 1751 by Benjamin Franklin and Dr. Thomas Bond. It is governed principally by the Quakers, and is supported wholly by voluntary contributions. It has a capacity for 230 patients, and recent accident cases are always admitted. The insane department of this hospital is located at Haverford road, and was opened in 1841. In addition to this hospital for the insane there is an insane department attached to the City Hospital at the Almshouse, and a Friends' Asylum for the Insane at Frankford. Other important charities are the Philadelphia Dispensary, Home for Consumptives, Home for Incurables, Preston Retreat (lying-in charity), Orphans' Society, Philadelphia Working Home for Blind Men, Sheltering Arms for Infants, the Sick Diet Kitchen, and the House of Refuge for Juvenile Delinquents. This last receives children committed by the Court of Oyer and Terminer upon conviction of a criminal offense, also vagrant, incorrigible, or vicious children committed by magistrates on complaint of the parent or any other person that the parent or guardian is incapable or unwilling to control them.

*Education.*—Penn, in his frame of government, provided that a committee of manners, education, and art should be appointed, so that all "wicked and scandalous living may be prevented, and that youth may be trained up in virtue, and useful arts and knowledge." The first school in Philadelphia of which we have knowledge was opened the year following the foundation of the colony. At a meeting of the provincial

council, held in Philadelphia "ye 26th of 10th month, 1683," the governor and council, "having taken into serious consideration the great necessity there is of a schoolmaster for the instruction—and sober instruction—of youth in the town of Philadelphia, sent for Enoch Flower, an inhabitant of the said town, who for twenty years past hath been exercised in that care and employment in England," and engaged him to instruct the youth of the city. In the year 1689 the first public school in Pennsylvania was established at Philadelphia under the care of the celebrated George Keith. It was incorporated by the provincial council February 12, 1698, and was entitled "The Overseers of the Public Schools founded in Philadelphia at the request, costs, and charges of the people of God called Quakers," and in 1711 received a charter from Penn. This school, although supported by the Quakers, was open to all, and for more than sixty years continued to be the only public place for instruction in the province. It thrived and was held in high estimation, and its legitimate successor is still in operation in Philadelphia, where it maintains its ancient reputation. In 1749 Franklin published his *Proposals Relative to the Education of Youth in Pennsylvania*, which resulted the next year in the establishment of the academy and charitable school, which became a college in 1755, and in 1779 was incorporated as the University of Pennsylvania. The university at present occupies a site in Woodland avenue, in what was formerly West Philadelphia, and gives instruction in ten departments (Arts, Music, Medicine, Law, Dentistry, Philosophy, Auxiliary of Medicine, Veterinary Medicine, Towne Scientific School, and Wharton School of Finance and Economy). The faculty consists of 132 professors, lecturers, and instructors in the various departments.

The public school system of Pennsylvania was not really firmly fixed until 1818, when by an act of the legislature Philadelphia was made the first school district of Pennsylvania with a distinct educational system from that of the State in general. This district is governed by a board of education composed of thirty-one members, one from each ward of the city, who are appointed, one-third each year for three years, by the Judges of the Courts of Common Pleas of the county. They have the financial control and general supervision of schools, the selection of the books to be used, the oversight of the teachers, and the building of the schoolhouses. In addition to this board there are the directors of the public schools, twelve from each ward, who have the local supervision of the schools in their respective sections. They are elected by the people, one-third each year for three years. The schools are divided into primary, secondary, and grammar schools, in addition to which there is a central high school, a finishing school for boys, and a normal school which is a finishing school for girls, and where they can also be qualified to become teachers. There are 465 public schools in Philadelphia and 236 school buildings of a value of \$4,186,200. Another noted educational institution in Philadelphia is Girard College for orphans, endowed by Stephen Girard in 1831 for the benefit of poor white male orphan children. By the will a preference is given first to orphans born in Philadelphia, second to those born in Pennsylvania, third to those born in New York City, and fourth to those born in New Orleans. To be qualified for admission the orphans must be between six and ten years of age; and a child without a father, while the mother is living, is held to be an orphan entitled to admission. The buildings cost \$1,933,821.78, and were formally opened in January, 1848. At Philadelphia are also the Pennsylvania Institution for the Instruction of the Deaf and

Dumb; the Pennsylvania Institution for the Instruction of the Blind; the Pennsylvania Academy of the Fine Arts, founded in 1805, and the first art school in America; the School of Design for women; the Pennsylvania Museum and School of Industrial Art; and the Jefferson Medical College.

*Libraries.*—Philadelphia was for many years not only the first city commercially in the country, but it was also the seat of letters. When the poet Moore visited America in 1804 he wrote to his mother, of Philadelphia, "it is the only place in America that can boast of a literary society." Unfortunately it has much degenerated in this respect in eighty years and to-day but little attention is paid by its people to letters and literature. To Franklin, again, its first library is due. It grew out of the Junto, and in 1731 the Library Company of Philadelphia was established. In 1769 it absorbed the Union Library Company, which had been formed some few years before; and in 1792 the Loganian Library, a valuable collection of classical and other works provided under the will of James Logan, a friend of Penn, was transferred to the Philadelphia library. It subsequently acquired, by bequest, the libraries of the Rev. Samuel Preston of London and of William Mackenzie of Philadelphia. Among the rarities in the latter was a copy of Caxton's *Golden Legend*, 1486. In 1869 it was made the beneficiary, under the will of Dr. James Rush, of an estate valued at over a million dollars. It has two library buildings and possesses about 145,000 volumes, as well as valuable manuscripts and broadsides. The Mercantile Library Association is the popular circulating library of the city, and contains 149,000 volumes. Other libraries are the Athenæum, Apprentices' Library, Library of the Law Association, and Friends' Library.

*Learned Societies.*—The American Philosophical Society is the oldest organized body for the pursuit of philosophical investigation in its broadest sense in America. It was founded also by Franklin, May 25, 1743, and incorporated March 15, 1780, with its founder as president. It began the publication of its transactions in 1773, and the twenty-second volume has been recently issued. The publication of the proceedings of this society was commenced in 1838, and still continues. Its library contains about 23,000 volumes, and the society also possesses valuable manuscript correspondence of Franklin. The Academy of Natural Sciences was organized in 1812, and its ornithological collection, which contains over 25,000 specimens, is claimed to be the finest in the world. It has a fine library of works on the natural sciences, and publishes a journal and its proceedings. The Franklin Institute for the promotion of the mechanic arts started in 1824. It has a valuable library of over 20,000 volumes devoted to mechanics and kindred subjects, and has ever since its organization published a monthly journal. The Historical Society of Pennsylvania was founded in 1824, and is devoted to the preservation of material relating to the history of the State. Its collections are of great historical value, and its library contains more than 20,000 volumes. The Numismatic and Antiquarian Society of Philadelphia, founded in 1858, was the first organization on the American continent to engage in the pursuit of numismatic science. It has a fine collection of coins and a good library. Another notable body is the College of Physicians and Surgeons with a medical library of 23,000 volumes and a fine museum of prepared specimens.

*Newspapers.*—The *American Weekly Mercury* was the first newspaper published in Philadelphia and the third in the colonies. It was started on December 22, 1719, by Andrew Bradford, a son of William Bradford,

the first printer in the middle colonies, and this paper was the first newspaper in the same section. On September 21, 1784, the first daily newspaper in the United States was issued at Philadelphia. It was the *American Daily Advertiser*, subsequently published as *Poulson's Daily Advertiser*, and later merged into the *North American and United States Gazette*, which is thus by succession the oldest daily newspaper in the United States. There are at present twenty daily newspapers published in Philadelphia, eight of them being afternoon papers, with an average circulation of 375,000, and seventy-seven weekly newspapers, chiefly religious and Sunday secular papers.

*Social Life.*—Among Philadelphia's claims to priority she has in her midst one of the oldest purely social clubs in existence—the Colony or State in Schuylkill, which was formed in 1732. The other purely social clubs in the city are the Philadelphia Club, Social Art Club, and University Club. The Union League (Republican) and Commonwealth (Democratic) are mixed social and political clubs. There are some organizations of a mixed social and charitable character, such as the St. George Society (1772), the St. David Society (1729), the St. Andrew Society (1749), and the Sons of St. Patrick or Hibernian Society (1771). The First Troop of Philadelphia City Cavalry, formed in 1774, is a military organization of high social standing. There are also a gentlemen's driving park or racecourse and innumerable cricket and boat clubs. There is an opera-house capable of accommodating 3,500 persons, and five first-class theaters, but Philadelphia as a community seems not to be a theater-going people.

*History.*—Down to the War of Independence the history of Philadelphia is virtually that of PENNSYLVANIA, (*q.v.*) The patent granted to William Penn (see PENN) for the territory embraced within the present Commonwealth of Pennsylvania was signed by Charles II. on March 24, 1681, and in the autumn of that year Penn appointed three commissioners to proceed to the new province and lay out a great city. This seems to have been his chief thought in settling the province, and his instructions to his commissioners were to select a site on the Delaware where "it is most navigable, high, dry, and healthy; that is where most ships can best ride, of deepest draught of water, if possible to load or unload at the bank or key side without boating or lightering of it." These commissioners were William Crispen, Nathaniel Allen, John Bezar, and William Heage. Crispen, who was a kinsman of the proprietor, died on the voyage out, and the remaining commissioners arrived toward the close of the year. They had been preceded by Penn's cousin, Capt. William Markham, as deputy-governor, and were soon followed by the surveyor-general of the province, Thomas Holme, who, as may be understood from his office, was one of the most important men in the early history of the city and State. The site of the city was speedily determined upon, and Holme proceeded to lay it out according to the modified instructions of Penn, and his *Portraiture of the City of Philadelphia in the Province of Pennsylvania in America* was published and sold by Andrew Sowle in Shoreditch, London, in 1683. This plan shows the old part of the city as it is to-day, covering between 1,200 and 1,300 acres. Unfortunately no date can be fixed, even approximately, for the founding of the city; nor is the date known of Penn's first visit to the capital of his province. He landed at Newcastle, on the Delaware, on October 27, 1682, and two days later came up as far as Upland, now Chester, thirteen miles south of Philadelphia. He probably did not remain long so near his pet scheme

without viewing it, but when he did first come to Philadelphia is now unknown.

The seat of government was fixed in Philadelphia by the meeting of the governor and council on March 10, 1683, and the General Assembly met two days later. For 117 years the city continued to be the capital of Pennsylvania, and was the most important town, commercially, politically, and socially, in the colonies during nearly the whole of this period. In October, 1685, the first printing press established in the middle colonies was set up here by William Bradford; the earliest specimen of his work which has survived to our day is his *Kalendarium Pennsylvaniense or America's Messenger, being an Almanack for the year of Grace 1686*. The printing press was followed in 1690 by a paper-mill, erected by William Rittenhouse, a Mennonite preacher, on the Wissahickon creek, a locality which has ever since remained a favorite for the manufacture of paper. The one man, next to William Penn, whose influence was most deeply impressed upon Philadelphia as upon the affairs of the colony, was Benjamin Franklin, whose power was felt almost on his first landing in October, 1723, when in his eighteenth year, and its impress is seen to-day. Four years after he settled here he formed a club for mutual improvement, which he called the "Junto," out of which subsequently grew the American Philosophical Society for the promotion of useful knowledge, and the Library Company of Philadelphia. He also originated the present University of Pennsylvania, organized the first fire-engine company in the city, and was instrumental in founding the Pennsylvania Hospital. In March, 1753, the first Arctic expedition ever sent out from America sailed from Philadelphia. The vessel, called the *Argo*, was commanded by Captain Swaine, but her voyage accomplished nothing of importance. In 1770 the first factory for the manufacture of fine porcelain in the colonies was established at Philadelphia by a Swiss and an Englishman, but the difficulty of obtaining competent workmen forced its abandonment two years later. During the war of the revolution Philadelphia was the virtual capital of the colonies and the scene of all the prominent civil events of those stirring times. The first Congress met at Carpenter's Hall on September 4, 1774; on May 24, 1775, Congress reconvened in the old State House and here continued its sittings, except when the city was threatened by the enemy and in his possession. On July 2, 1776, the "resolutions respecting independency" were passed, and on July 4, 1776, Philadelphia was the scene of the adoption of the Declaration of Independence; and the old State House became ever afterward Independence Hall. On July 9, 1778, "the articles of confederation and perpetual union between the independent States of America" were here adopted and signed, and in the same place the convention to frame a constitution for the United States of America met on May 14, 1787, with Washington as presiding officer, and continued its sessions until September 17th, when the work was finished and the fundamental law of the land given to the world. The affairs of state were thus placed on a firm foundation, while the affairs of the church had received the attention of the people the previous year. In June, 1786, the clerical and lay delegates from the Protestant Episcopal churches in the United States met in Philadelphia and formally organized "the Protestant Episcopal Church in North America." The Congress of the United States had held its opening session in New York, but in December, 1790, it reassembled at Philadelphia; and for ten years the seat of government was at Philadelphia, until it was permanently removed to the District of Columbia. Here Washington delivered his farewell

address to the people of the United States, and here he retired from public life. As in Philadelphia the first bank in the colonies had been opened—the bank of North America in 1781—so in Philadelphia the first mint for the coinage of the money of the United States was established in 1792. Both of these institutions are still in full operation. In April, 1816, Congress incorporated the bank of the United States, which was the second banking institution of that name chartered by the government, and fixed it at Philadelphia. The affairs of this institution form a very important chapter in the history of the city, as indeed in the history of the whole country. It had an unsettled existence, until the final blow came from President Jackson, in the beginning of his second term of office, in 1833. Being opposed to the continuance of the bank, he withdrew the public deposits, amounting to about \$8,000,000, the result of which was widespread ruin and business depression, not only in Philadelphia but elsewhere.

The two events of greatest note which have taken place in the city in recent years have been the centennial celebration of the independence of the colonies in 1876, and the bi-centennial celebration of the landing of William Penn in 1882. The centennial celebration was of the greatest moment, owing to the Exposition of the Industries of all Nations, which was open from May 10th to November 10th; the total admissions reached the number of 9,910,966 persons.

PHILÆ. See EGYPT.

PHILEMON, the oldest poet of the New Attic Comedy, was the son of Damon, and was born at Soli in Cilicia, or, according to others, at Syracuse; but early in life he settled at Athens. Since he died in 262 B.C. at an age variously stated at from 96 to 101 years, he must have been born somewhere about 360. In its absence of poetical idealism and restriction to the prosaic realism of daily life the New Comedy stands to the Old somewhat as the comedies of Molière or Sheridan stand to those of Shakespeare. Its repertoire was limited to a few stock characters—the imprudent lover, the designing fair, the stingy father, the greedy parasite, the blustering swashbuckler—and its plots rang the changes on the well-worn theme of thwarted but faithful love, rescued from its difficulties by the discovery of a long-lost relative and ending in marriage. In the many fragments of Philemon preserved by Stobæus, Athenæus, and other writers there is much wit and good sense.

PHILEMON, EPISTLE TO. This, which is the shortest of the extant epistles of St. Paul, stands to the other books of the New Testament in a relation similar to that of the book of Ruth to the other books of the Old Testament. It is an idyl of domestic life. Onesimus, the slave of one of Paul's converts in Asia Minor, had run away from his master, probably, as was often the case with runaways, after stealing some of his money. He had come to Paul, more probably at Rome than, as some have thought, at Cæsarea, and Paul had converted him. Paul sends him back to his master, begging that he may be kindly treated as being now a brother Christian, and formally undertaking to repay what he owed. The epistle is addressed not only to Philemon but to Apphia, who was probably his wife, to Archippus (possibly the head of the community at Colossæ or Laodicea, Col. iv. 17), and to the community which either, like some of the Roman *collegia*, consisted of Philemon's household or held its meetings in his house. The genuineness of the epistle is almost universally admitted.

PHILETAS, a distinguished poet and critic of the Alexandrian school, was the son of Telephus, and a na-

tive of the island of Cos. He lived in the reigns of Philip, Alexander the Great, and Ptolemy I. of Egypt, the last of whom appointed him tutor to his son Ptolemy Philadelphus. The story runs that he died from the excessive assiduity with which he sought the answer to the sophistical problem called "The Liar" (*i.e.*, If a man says he is telling a lie, does he speak truly or falsely?). A bronze statue of him was erected in Cos.

The fame of Philetas rested chiefly on his elegiac verses, in which, however, he was esteemed inferior to the younger poet Callimachus.

PHILIDOR, FRANÇOIS ANDRÉ DANICAN, was born in 1726, and died in 1795. See CHESS.

PHILIP, one of the twelve apostles, mentioned fifth in all the lists, is a mere name in the Synoptists, but a figure of some prominence in the Fourth Gospel. There he is said to have been "of Bethsaida, the city of Andrew and Peter," and to have received his call to follow Jesus at Bethany, having previously been, it would seem, a disciple of the Baptist. Philip was at that time the means of bringing Nathanael to Jesus, and at a later date he, along with Andrew, carried the request of the inquiring Greeks to the Master. Philip and Andrew alone are mentioned by name in connection with the feeding of the 5,000, and Philip is also one of the few interlocutors in John xiv. After the resurrection he was present at the election of Matthias as successor to Judas, but he does not again appear in the New Testament history; it is, however, implied that he still continued in Jerusalem after the outbreak of the first persecution.

PHILIP, "the evangelist," is first mentioned in the Acts as one of "the seven" who were chosen to attend to certain temporal affairs of the church in Jerusalem in consequence of the murmurings of the Hellenists against the Hebrews. After the martyrdom of Stephen he went to Samaria, where he preached with much success, Simon Magus being one of his converts. He afterward instructed and baptized the Ethiopian eunuch on the road between Jerusalem and Gaza; next he was "caught away" by the Spirit and "found at Azotus" (Ashdod), whence "passing through he preached in all the cities till he came to Cæsarea." Here some years afterward, according to Acts xxi. 8, 9, he entertained Paul and his companion on their way to Jerusalem; at that time "he had four daughters which did prophesy."

PHILIP, tetrarch of Ituræa. See HEROD PHILIP.

PHILIP, the name of five kings of Macedon. The greatest of those was PHILIP II. (382–336 B.C.), the first founder of the MACEDONIAN EMPIRE, (*q.v.*) After the death of Alexander the Great, Arrhidæus, a bastard of Philip II., reigned as PHILIP III., till he was put to death by Olympias in 317. PHILIP IV., son of Cassander, reigned only for a few months in 296. PHILIP V., the last but one of the kings of Macedon and son of Demetrius II., was born in 237, and came to the throne on the death of his uncle, Antigonus Doseon, in 220.

PHILIP I., king of France, was the son of Henry I. and Anne of Russia, and was born in 1052. He was associated with his father on the throne in 1059, the consecration taking place at Rheims (May 23d), and he succeeded to the undivided sovereignty in the following year (August 4, 1060), first under regency of his mother, and afterward from 1062 to 1067, under that of Baldwin V. count of Flanders. In 1100 he made his son Louis (afterward Louis VI.) joint king, and his death took place at Melun July 29, 1108. (See FRANCE.)

PHILIP II., surnamed "Augustus," king of France, was the son of Louis VII. and was born in August, 1165. When fifteen years old he was crowned joint king at Rheims on November 1, 1179. In the following year he was again crowned along with his newly wedded wife, Margaret of Hainault, at St. Denis (May

29, 1180); the death of his father took place a few months afterward. For an account of Philip's character and of the leading events of his reign the reader is referred to FRANCE. He died at Mantua July 14, 1223.

PHILIP III., surnamed "the Rash," king of France, was born in 1245 and succeeded his father Louis IX. on August 25, 1270, at Tunis, where, after continuing the siege for some time, he made a truce of ten years and embarked for France in the following November. He was twice married, first to Isabella of Aragon in 1258, and subsequently to Mary of Brabant. He died at Perpignan on October 5, 1285. See FRANCE.

PHILIP IV., surnamed "the Fair," son of the preceding, was born at Fontainebleau in 1268, was married to Joanna, queen of Navarre, in 1284, accompanied his father into Aragon in 1285, and was proclaimed king of France at Perpignan on October 6th of that year. See FRANCE. He died at Fontainebleau November 29, 1314.

PHILIP V., surnamed "the Tall," second son of the preceding, born in 1293, succeeded his elder brother, Louis X., in January, 1317, and was succeeded by his younger brother, Charles IV., in January, 1322.

PHILIP VI. was the eldest son of Charles, count of Valois, the younger brother of Philip IV., and was born in 1293. He succeeded his cousin, Charles IV., in 1328, and died at Nogent-le-Roi, near Chartres, on August 22, 1350. (See FRANCE.)

PHILIP I., of Castile and Aragon, surnamed "the Handsome," was the son of the emperor Maximilian I. and Mary, the only child of Charles the Bold, last prince of the house of Burgundy, and was born at Bruges on July 22, 1478. Philip died (September 25, 1506) at Burgos.

PHILIP II., king of Spain, was the son of the emperor Charles V. and Isabella of Portugal, and was born at Valladolid on May 21, 1527. He was brought up in Castile under the care of his mother, who died when he was twelve years old. As Philip grew up, his father, though he rarely saw his son, watched carefully over his education and strove to fit him for political life. In 1543 Philip married Mary of Portugal, who died in 1545, soon after the birth of a son, Don Carlos. In 1548 Charles V. summoned Philip to Brussels, that he might gain some experience of the peoples whom he would be called upon to rule. He was not, however, popular with his future subjects. He had already formed his character upon the model of Spanish haughtiness. He was cold, reserved, punctilious about decorum, and wanting in geniality. The Italians did not care for him, the Flemings disliked him, the Germans hated him. His appearance and manner did not further his father's plan of securing his election to the empire. The scheme failed, and Philip's presence was in no way helpful. In 1551 he returned to the more congenial task of governing Spain.

The death of Edward VI. of England opened out to Charles V. new prospects for his son. Queen Mary regarded the emperor as her only friend, and submitted herself entirely to his guidance. She received with joy a proposal for her marriage with Philip. The English opposition broke down with the failure of Wyatt's rebellion, and in 1554 Philip came to England to claim his bride. Charles V. resigned to him Naples and Sicily that he might not come as a needy prince. Philip was well supplied with Spanish gold, and was charged by his father to spare no pains in conciliating the English. He tried his best; but his cold, ungenial manner was a hopeless obstacle to his success. Mary was devotedly attached to her husband, who exercised a moderating influence over the queen's zeal for the re-establishment of Catholicism. Charles V. wished to

secure England as an ally, and subordinated religious to political considerations. Philip was not naturally fitted for conciliatory action, and was not happy in England. He found that his wife was destined to be childless and that he had no prospect of succeeding to the English crown. At the end of 1555 he joyfully obeyed his father's summons to go to Brussels. Charles V., worn out by the fatigue of a long reign, resolved to abdicate in favor of his son, and this he did on January 16, 1556.

Philip began his reign with glory, and Europe saw that Charles V. had no unworthy successor. Yet Philip was not anxious for military glory. His finances were embarrassed and he felt the need of a period of peace. For the purpose of maintaining his political supremacy he proposed to continue his English alliance by marrying Elizabeth when she succeeded Mary on the English throne. Elizabeth did not at once reject the proposal; but she gradually entered upon a religious policy which made marriage with Philip impossible. The Spanish king rapidly changed his plans and cemented his alliance with France by a union (June 24, 1559) with Isabella, daughter of Henry II. He made arrangements for the government of the Netherlands, and at the end of 1559 returned to Spain, where he remained for the rest of his life.

The policy of Philip was steadily directed toward welding his dominions together in dependence on himself, and extending his influence over Europe. The power of Charles V. had had no definite center. The emperor had recognized the claims of his separate dominions upon him, and had striven to be neither German, Spanish, Flemish, nor Italian. Philip identified himself entirely with Spain. Castile was to be the seat of his monarchy, and that monarchy was to be absolute. He was devoted to Catholicism, and during his reign superseded the pope as the head of the Catholic party in Europe. But the interests of Catholicism were in his mind identified with his own personal interests, and under the cover of zeal for the church he pursued the aggrandizement of Spain. In Spain itself his care for the maintenance of the Catholic faith accorded with the temper of the people. The long continuance of war against the Moors had identified orthodoxy with purity of race, and heresy was regarded as a taint in the blood. The rigor of the Inquisition preserved the national honor; the *auto-da-fé* was a means of ridding the land of dangerous elements. This uncompromising spirit of Spain in religious matters its king wished to extend to the rest of his dominions. He died at the Escorial in September, 1598.

PHILIP III., king of Spain, son of Philip II. by his fourth wife, Anne of Austria, was born at Madrid on April 14, 1578, succeeded his father on September 13, 1598, married Margaret of Austria on April 18, 1599, and died at Madrid on March 31, 1621.

PHILIP IV., king of Spain, son of Philip III., was born at Valladolid on April 8, 1605, was married to Isabella of France on November 25, 1615, succeeded his father on March 31, 1621, and died on September 17, 1665.

PHILIP V., king of Spain, was the second son of the French dauphin, Louis, by his wife Maria Anna of Bavaria, and was born at Versailles on December 19, 1683. In 1702 he married Maria Louisa, daughter of Victor Amadeus, duke of Savoy; shortly after her death in February, 1714, which he felt deeply, he married Elizabeth Farnese (December). Philip died on July 9, 1746, and was succeeded by his son, Ferdinand VI. (See SPAIN.)

PHILIP. For the dukes of Burgundy of this name, surnamed respectively "the Bold" (1342-1404) and "the

Good" (1396-1467), see BURGUNDY and FRANCE. For Archduke Philip, "the Handsome," see PHILIP I. of Castile and Aragon.

PHILIP OF SWABIA, rival of the emperor OTHO IV. (*q.v.*), and younger son of the emperor Frederick I., was born about 1170 A.D. The coronation of Otho at Aix-la-Chapelle in July was soon followed by that of his rival at Mainz, and a civil war ensued, which, carried on with varying fortunes for ten years, was only brought to an end by the murder of Philip by Otho of Wittelsbach, at Bamberg, on June 21, 1208.

PHILIPPI, a city of ancient Macedonia, on a steep hill near the river Gangites (now the Angista), overlooking an extensive plain and at no great distance from the coast of the Ægean, on the highway between Neapolis (Kavalla) and Thessalonica. Originally called Crenides, or "Fountains," it took the name by which it has become famous from Philip of Macedon, who made himself master of the neighboring gold-mines of the Hill of Dionysus, and fortified the city as one of his frontier towns. Octavius and Antony having, in 42 B.C., gained a great victory over Brutus and Cassius in the plain of Philippi, the place received a Roman colony, *Colonia Julia Philippensis*, which was probably increased after the battle of Actium.

PHILIPPIANS, EPISTLE TO THE. This is one of the most characteristic of the letters of St. Paul. It was addressed to the community at PHILIPPI (see above), the first important European city which St. Paul had visited, where he had formed a community with the apparently new organization of "bishops" and "deacons," and with which he had relations of especial intimacy. The immediate occasion of his writing the letter was his receipt of money which the Philippians had sent by Epaphroditus to supply St. Paul's personal wants. They were probably wealthier than some of the other communities which he had founded, and consequently he had not the reluctance which he felt elsewhere to receive money from them; the money so sent was no doubt part of the offerings of the community which constituted the Christian sacrifice, a fund which was administered by the officers of administration, *i.e.*, the bishops and deacons. It was consequently to those officers that he especially addressed his acknowledgment of it.

The genuineness of the epistle was attacked by Baur on three grounds, which he himself states to be (1) the appearance of gnostic ideas in ii. 6-11, (2) the want of anything distinctively Pauline, (3) the questionableness of some of the historical data. The attack has been renewed by one section of his followers; but it is generally admitted, even by critics who reject the epistles to the Ephesians and Colossians, that the attack upon this epistle has failed. The doctrinal importance of the epistle is considerable.

PHILIPPICUS, or PHILEPICUS, emperor of Constantinople from December, 711, to June, 713, was the son of the patrician Nicephorus, and became distinguished as a soldier under Justinian II. The short reign of Philippicus was brought to a close through a conspiracy headed by two of his generals, who caused him to be blinded in the hippodrome in June, 713. Of the remainder of his life nothing is known. He was succeeded by his secretary, Artemius, known as Anastasius II.

PHILIPPINE ISLANDS (Span. *Islas Filipinas*), PHILIPPINES, an archipelago in the southeast of Asia. On the west and northwest it is separated by the China Sea from China and the Indo-Chinese peninsula; toward the east lies the Pacific; on the north a number of smaller islands stretch out toward Formosa; and on the south, while a double connection with Borneo is formed by the lines of the Palawan and Balabac and

the Sulu Islands, the basin of the Celebes Sea, with a central depth of from 1,000 to 2,600 fathoms, extends, for a distance of 300 miles, between its southernmost island (Mindanao) and Celebes. As the number of the Philippines is believed to exceed 1,400, and the larger islands are in several cases only beginning to be properly explored, it is impossible to give a definite statement of their aggregate land-area. A measurement on Dommann's map (1882) resulted in 114,356 square miles. Nor is it in regard to the area alone that our knowledge is defective. Though for three centuries the greater part of the territory has been nominally in Spanish possession, the interior of some of the larger islands has never been surveyed; several of the native tribes, especially in Mindanao, are altogether independent. The geology of Luzon, the best known of all the archipelago, is to a large extent matter of conjecture; and the visit of a passing botanist or naturalist is enough to add facts of primary importance to the register of flora and fauna. While none of the summits, with the exception, perhaps, of Apo in Mindanao, exceed 9,000 feet—the loftiest probably being Halcon in Mindoro (8,865 feet), Malindang in Mindanao (8,685 feet), Mayon in Luzon (8,275 feet), and Malaspina in Negros (8,190 feet)—all the islands may be described in general as mountainous and hilly. The principal ranges have a tendency to run north and south, with a certain amount of deflexion east or west, as the case may be, so that the orographic diagram of the archipelago as a whole would have a certain similarity to a fan with northern Luzon as its center of radiation.

Volcanic forces have had a great share in shaping the archipelago, and a large number of the mountains bear the stamp of their former activity. But those that still have the credit of being working volcanoes are comparatively few.

Earthquakes are sufficiently frequent and violent in the Philippines to affect the style adopted in the erection of buildings; in 1874, for instance, they were very numerous throughout the archipelago, and in Manila and the adjacent provinces shocks were felt daily for several weeks. The most violent earthquakes on record in the Philippines occurred in July, 1880, when the destruction of property was immense, both in the capital and in other important towns of central Luzon.

*Minerals.*—Though hitherto little advantage has been taken of its existence, there appears to be in several of the islands a fair amount of mineral wealth. Two coal-fields are known to exist, one beginning in Caransan in the south of Luzon, and probably extending southward across the Strait of San Bernardino to Catbalongan in Samar, and another occupying the western slopes of Cebu and the eastern slopes of Negros, and thus probably passing under the Strait of Tañon. Iron-ore of excellent purity occurs in various parts of Luzon, in Laguna, Bulacan, Pampanga, Camarines, Norte, and notably in the Camachin mountains between the Bulaon and the Garlan; but, with the exception of a few small foundries in Bulacan province, there are no iron-works in the country. In this department there was actually more activity a century ago. Copper-mines are worked at Mancayan, Suyuc, Bumucum, and Agbao in the province of Lepanto, by the Cantabro-Philippine Company, founded in 1862; and the heathen natives of that region (perhaps having learned the art from Chinese or Japanese strangers) appear to have long been accustomed to manufacture copper utensils for their own use and for sale in the Christian settlements.

*Climate.*—As the north part of Luzon is as far from the south of the Sulu Islands as the north of England from the south of Italy, and as the archipelago is

divided by the line of the ecliptic, the climate of one region differs considerably from that of another, though the general characteristics are everywhere tropical. The northern islands lie in the region of the typhoons. Three seasons are usually recognized—a cold, a hot, and a wet. The first extends from November to February or March; the winds are northerly, and, though there is no need for fire, woolen garments can be worn with comfort in the mornings; the sky is for the most part clear and the atmosphere bracing; and Europeans look forward to this period as the most enjoyable of the year. The hot season lasts from March to June, and the heat becomes very oppressive before the beginning of the southerly monsoon. Thunder-storms, often of terrific violence, are of frequent occurrence in May and June. The wet season is usually ushered in by the heavy rains locally known as “collas.” During July, August, September, and October the rain comes down in torrents, and large tracts of the lower country are flooded.

*Fauna.*—The mammals of the Philippines are strikingly few, especially when contrasted with those of such an island as Java; but their number may yet be slightly increased, and nine-tenths of them are peculiar species. Since *Cynopithecus niger* was struck out of the list, the only monkey known to science is *Macacus cynomolgus* (chongo of the Tagals), found in all the islands; but there are also pure white monkeys (not albinos) in Mindanao, and specimens are occasionally sold at Manila. The lemuroids are represented by the strange little *Tarsius spectrum*, the insectivora proper by *Galeopithecus philippensis* and a “tupaia,” or squirrel-shrew. Of carnivora there are three species, two civets and a wild cat, as well as the ordinary domestic animal. The rodents comprise only a few squirrels, *Sciurus philippensis*, etc., a porcupine, and two or three rats. Of bats there are between twenty and thirty species. The wild boar is regularly hunted in all the islands; the natives throughout the archipelago keep large numbers of black pigs; and the Babuyanes group take their name from *babuy*, “a pig.” Of deer there are three species, *Cervus mariannus*, *C. philippensis*, and *C. Alfreddi*; and a chevrotain or mouse-deer (*Tragulus*) is found, more especially in Bataan. Tapa, or sun-dried deer's flesh, is a favorite food with the natives. The statement that the horse has become wild in the interior of several islands is founded on a mistake. The ordinary domestic variety, probably of Spanish, Chinese, and Japanese origin, is “generally small, but well shaped and hardy, the largest and best breeds coming from Batangas, Albay, and Camarines, the smallest and probably the hardiest from Ilocos.” For all kinds of fieldwork the buffalo (“carabao”) is employed; ordinary cattle and goats are common enough, and some of the former are of great excellence. As there is a Tagalog name for it, it has been supposed that the elephant was at one time to be met with in the Philippines; and in the Sulu Islands, at least, it is said to have existed in the seventeenth century.

The birds of the Philippines proper show the isolated character of the group by the absence of a large number of ordinary Malayan forms, and at the same time there is a considerable proportion of genera from Australia, India, and China. Viscount Warden found the known species numbered 219, and R. B. Sharpe, by the assistance of Professor Steere's collections, brought the total up to 287 species, of which 151 were peculiar to the Philippines. To these must be added several species hitherto only found in the Sulu Islands. Palawan has a strong Bornean element. It is enough here to mention a number of peculiar woodpeckers, beautiful little parakeets (*Loriculus*), a number of pigeons (including

at least one peculiar genus, *Phapitreron*), cockatoos, mound-builders, and a peculiar hornbill, *Penelopides*, known from its note as “calao” to the natives, who frequently tame it. The principal game bird is the jungle-fowl (*Gallus bankiva*).

Alligators abound in some of the lakes and rivers; and turtles, tortoises, and various kinds of lizards are familiar enough forms; one of the last, the “chacon,” is believed by the natives to be a defense against earthquakes. The beauty and variety of the butterflies and the destructiveness of the termites are obtrusive features of the insect life; the land-shells are peculiar, numerous, and remarkable for delicacy of form and color. Some of the mollusks attain gigantic dimensions; the “taclobo” shell sometimes weighs 200 pounds, and is used for baptismal fonts. One of the most valuable kinds of fish is the “dalag” (*Ophiocephalus vagus*), and one of the most peculiar the *Hemiramphus vivipara*.

*Flora.*—The flora of the Philippines is essentially Malayan, intermixed with a Chinese element, but with sufficient individuality to constitute a sub-region. According to Llanos' edition of Manuel Blanco's *Flora de Filipinas*, 4,479 species are known, belonging to 1,223 genera and 155 orders.

*Products.*—Mangoes, plantains, mangosteen, jack-fruit, medlars, and in general most of the Malayan fruits are to be met with; the lanzon occurs in the north, and the durian in the south, more especially in the Sulu Islands. Rice is the staple food of the natives, but, though it is extensively cultivated, the supply is not always equal to the demand. Sweet potatoes (camote), a kind of yam (palawan), the groundnut, and gourds are pretty generally grown, as well as occasionally peas, potatoes, and in the higher regions even wheat. The plants which are of primary commercial importance are tobacco, Manila hemp, sugar-cane, coffee, and cocoa.

Tobacco was made a government monopoly by Captain-General José Basco y Vargas in 1781, and remained so till July 1, 1882. Though it was free to anyone to grow the plant to any extent he pleased, the government was the only purchaser, fixed its own price, and, paying its debts according to its own convenience, was sometimes three or four years in arrear. Besides, certain districts were bound to furnish a certain quantity of the leaf, and the peasant was thus often forced under severe penalties to devote himself to the tobacco crop when he would have obtained better results from something else. The best tobacco comes from the provinces of Isabel and Cagayan, and it is there that the cultivation is most systematically carried on; but the plant is also grown in other provinces of Luzon (Union, Ilocos, Lepanto, etc.), as well as in the Visayas Islands. Abacá, or MANILA HEMP (*G. v.*), is best grown in the south-east of Luzon, in Samar, Leyte and Bohol. Coffee was introduced, probably from Brazil, in the latter part of the eighteenth century, but the first plantation on a large scale was formed only in 1826. Sugar is extensively cultivated, and the export had increased from 1,399,434 piculs in 1871 to 3,382,664 in 1881.

*Trade.*—Before the conquest there was considerable commercial intercourse between the Philippines and China and Japan, but this, which would naturally have developed enormously if the Spanish trade between Manila and America (Navidad and Acapulco) had been left free, was interrupted, and at times almost completely stopped, by a series of absurd restrictions, devised in the supposed interest of the trade between Spain and America. For a long period only a single galleon, under government supervision, was allowed to proceed yearly from Manila to Acapulco, the value of the cargo each way being bound not to exceed a certain sum. Direct trade with Europe *via* the Cape was commenced

in 1764; but, as if the exclusion of all except Spanish ships was not sufficient, a practical monopoly of this field of enterprise was, in 1785, bestowed on the Royal Company of the Philippines. With the close of the eighteenth century a certain amount of liberty began to be conceded to foreign vessels; the first English commercial house was established at Manila in 1809; and in 1834 the monopoly of the Royal Company expired. Manila remained the only port for foreign trade till 1842, when Cebu was also opened; Zamboanga (Mindanao), Iloio (Panay), Sual (Luzon); Legazpi or Albay (Luzon), and Tacloban (Leyte) are now in the same category, but only Manila, Iloilo, and Cebu have proved of real importance, as they are the only ports where foreign-bound vessels have hitherto loaded.

*Administration, Etc.*—The Philippines are subject to a governor-general with supreme powers, assisted by (1) a "junta of authorities" instituted in 1850, and consisting of the archbishop, the commander of the forces, the admiral, the president of the supreme court, etc.; (2) a central junta of agriculture, industry, and commerce (dating from 1866); and (3) a council of administration. In the provinces and districts the chief power is in the hands of *alcaldes mayores* and civic-military governors. The chief magistrate of a commune is known as the *gobernadorcillo* or captain; the native who is responsible for the collection of the tribute of a certain group of families is the *cabeça de barangay*. Every Indian between the ages of sixteen and sixty subject to Spain has to pay tribute to the amount of \$1.17—descendants of the first Christians of Cebu, new converts, *gobernadorcillos*, etc., being exempted. Chinese are subject to special taxes; and by a law of 1883 Europeans and Spanish half-castes are required to pay a poll-tax of \$2.50.

Ecclesiastically the Philippines comprise the archbishopric of Manila and the suffragan bishoprics of Nueva-Caceres, Nueva-Segovia, Cebu, and Santa Isabel de Jaro, which were all constituted by the bull of Clement VIII., August 14, 1595, with the exception of the last, whose separation from Cebu dates only from the bull of Pius IX., May 27, 1865. The Agustinos Calzados were established in the Philippines in the year 1565, the first prelate being Andres Urdaneta, and they have convents in Manila, Cebu, and Guadalupe. The Franciscans date from 1577, and have convents at Manila and San Francisco del Monte; the Dominicans (1587) at Manila and San Juan del Monte; the Recollects or strict Franciscans (1606) at Manila, Cavite, and Cebu. The Jesuits, restored in 1852, maintain the missions of Mindanao and Sulu; and they have charge in Manila of the municipal athenæum, the normal school for primary teachers, and an excellent meteorological observatory. There are also Sisters of Charity, and nuns of the royal monastery of Santa Clara, founded in 1621.

*Education.*—A good deal has been done for the diffusion of primary education among the natives (every pueblo is bound to have a school), but the standard is not a high one. The press is under strict civil and ecclesiastical control, and all discussion of Spanish or general European politics is forbidden. Several daily papers, however, are published at Manila, *El Diario de Manila* dating from 1848.

There are no accurate statistics of the whole population of the Philippines; and even the number of the Spanish subjects was, up till 1877, only estimated according to the number of those who paid tribute. Diaz Arenas in 1833 stated the total at 3,153,290, the ecclesiastical census of 1876 at 6,173,632, and the civil census of 1877 at 5,561,232. Moya y Jimenez, founding on certain calculations by Del Pan, and admitting an an-

nual increase of 2 per cent., brings the number up to 10,426,000 in 1882.

*History.*—The Philippine or, as he called them, the St. Lazarus Islands were discovered by Magellan March 12, 1521, the first place at which he touched being Jomonjol, now Malhou, an islet in the Strait of Surigao, between Samar and Dinagat. By April 27th, he had lost his life on the island of Mactan off the coast of Cebu. The surrender of the Moluccas by Charles V., in 1529, tended to lessen the interest of the Spaniards in the *Islas de Poniente*, as they generally called their discovery, and the Portuguese were too busy in the new southern parts of the Indian Archipelago to trouble about the *Islas de Oriente*, as they preferred to call them. Villalobos, who had sailed from Navidad in Mexico with five ships and 370 men in February, 1543, accomplished little (though it was he who suggested the present name of the archipelago by calling Samar Filipina); but in 1565 Legazpi founded the Spanish settlement of San Miguel at the town of Cebu, which afterward became the Villa de Santissimo Nombre de Jesus, and in 1571 determined in large measure the future lines of conquest by fixing the capital at Manila. It is in a letter of Legazpi's in 1567 that the name *Islas Filipinas* appears for the first time. The subjugation of the islands, thanks to the exertions of the Roman Catholic missionaries and to the large powers which were placed in their hands by Philip, was effected, not, of course, without fighting and bloodshed, but without those appalling massacres and depopulations which characterized the conquest of South America. Contests with frontier rebellious tribes, attacks by pirates and reprisals on the part of the Spaniards, combine with volcanic eruptions, earthquakes, and tornadoes to break the comparative monotony of the subsequent history. Manila was captured by the English under Draper and Cornish in 1762, and ransomed for \$5,000,000; but it was restored in 1764.

PHILIPPOPOLIS, FILIPPOPEL, and (Turkish) FELIBE, a city of Thracia, previous to 1878 the chief town of a sanjak in the Turkish vilayet of Adrianople, and now the capital of the independent province of Eastern Roumelia and the chief town of one of the six departments, lies 112 miles west-northwest of Adrianople by rail and thus 309 miles from Constantinople, mainly on the right bank of the Maritza (the ancient Hebrus). The population, estimated at 24,000 to 28,000, consists of Bulgarians, and, in smaller proportions, of Greeks, Turks, Armenians, Jews and Gipsies.

PHILIPPSBURG, a small town of the grand-duchy of Baden, situated on a sluggish arm of the Rhine, fifteen miles to the north of Carlsruhe, was formerly an important fortress of the German empire, and played a somewhat conspicuous part in the wars of the seventeenth century. The population in 1880 was 2,549.

PHILIPPUS, M. JULIUS, Roman emperor from 244 to 249 A.D., often called "Philip the Arab," was a native of Bostra or the Trachonitis, who exchanging the predatory life of the Arabs who hung on the desert borders of the empire for Roman military service, rose to be prætorian prefect in the Persian campaign of Gordian III., and inspiring the soldiers to mutiny and to slay the young emperor, was raised by them to the purple (244). Of his reign little is known except that he celebrated the secular games with great pomp in 248.

PHILIPS, AMBROSE, English man of letters, was born of a good Leicester family in 1671. He died in 1749.

PHILIPS, JOHN, English man of letters, son of Dr. Stephen Philips, archdeacon of Salop, was born at Bampton, in Oxfordshire, in 1676. He died in 1708.



**PHILISTINES**, the name of a people which, in the latter part of the age of the Judges and up to the time of David, disputed the sovereignty of Canaan with the Israelites (see ISRAEL). The Philistine country embraced the rich lowlands on the Mediterranean coast (the Shephelah) from somewhere near Joppa to the Egyptian desert south of Gaza, and was divided between five chief cities, Ashdod or AZOTUS (*q.v.*), GAZA (*q.v.*), and Askelon (Ashkelon, ASCALON, *q.v.*) on or near the coast, and GATH (*q.v.*) and EKRON (*q.v.*) inland. The five cities, of all of which except Gath the sites are known, formed a confederation under five "lords" (Serānīm). Ashdod was probably the foremost city of the confederation in the time of Philistine supremacy; for it heads the list in 1 Sam. vi. 17, and it was to the temple of Dagon in Ashdod that the ark was brought after the battle of Aphek or Ebenezer. Hebrew tradition recognizes the Philistines as immigrants into Canaan within historical times, like the Israelites and the Aramæans, but unlike the Canaanites. They came, according to Amos, from Caphtor, and Deut. ii. 23 relates that the Caphtorim from Caphtor displaced an earlier race, the 'Avvīm, who were not city-dwellers like the Canaanites, but lived in scattered villages. The very name of Philistines probably comes from a Semitic root meaning "to wander;" the Septuagint calls them "aliens." The date of their immigration cannot be determined with certainty.

**PHILLIP, JOHN**, subject and portrait painter, was born at Aberdeen, Scotland, on April 19, 1817. In 1857 Phillip was elected an associate of the Royal Academy, and in 1859 a full member. In the end of 1866 his excessive application to work for the next year's exhibition induced an attack of bilious fever, which was succeeded by paralysis, and the genial and talented artist expired at London on February 27, 1867, at the age of fifty.

**PHILLIPS, JOHN**, one of the foremost of the early geologists of England, was born December 25, 1800, at Marden, in Wiltshire. From school he went to the house of the Rev. B. Richardson, an accomplished naturalist, in whose charge he remained a year, and from whom he obtained not only much knowledge but the strong bent toward the study of nature which henceforth became the master-pursuit of his life. His uncle, "Strata Smith," at that time lived in London, where he exercised the profession of a civil and mining engineer, though a very large part of his time and earnings were given to the preparation of those maps of England and the English counties on which his fame now rests. A youth so trained could not fail to become a geologist. In the spring of 1824 Smith went to York to deliver a course of lectures on geology, and his nephew accompanied him. This was the starting-point in Phillips' career. His extensive knowledge of natural science and especially of fossils was now turned to account. He accepted engagements in the principal Yorkshire towns to arrange their museums and give courses of lectures on the collections contained therein. York became his residence, where he obtained the situation of keeper of the Yorkshire Museum and secretary of the Yorkshire Philosophical Society. From that center he extended his operations to other towns beyond the county; and in 1831 he included University College, London, in the sphere of his activity. In that year the British Association for the Advancement of Science was founded at York, and Phillips was one of the active minds who organized its machinery.

This arrangement lasted for six years, until, in 1840, he resigned his charge of the York Museum and was appointed one of the staff of the Geological Survey of Great Britain under De la Beche. Nine years later, on

the death of Strickland, who had acted as substitute for Doctor Buckland in the readership of geology in the university of Oxford, Phillips succeeded to the post of deputy, and eventually, at the dean's death, became himself reader, a post singularly congenial to him, and which he held up to the time of his own death, which was almost tragic in its suddenness. He dined at All Souls' College on April 23, 1874, but in retiring slipped and fell headlong down a flight of stairs. Paralysis at once ensued, and he expired on the afternoon of the next day. In 1864 he had been elected president of the British Association.

**PHILLIPS, SAMUEL**, an industrious and successful *littérateur*, was the son of a Jewish tradesman in Regent street, London, and was born in 1815, and died in 1854.

**PHILLIPS, THOMAS**, portrait and subject painter, was born at Dudley, in Warwickshire, on October 18, 1770, and died in 1845.

**PHILLIPS, WILLIAM**, an able British mineralogist and geologist, who did much to foster in Britain the study of the sciences to which he was devoted, was born May, 1775, and died in 1828.

**PHILLIPSBURG**, a city of the United States, on the Delaware river, in Warren county, N. J., is opposite Easton, Penn., and at the western terminus of the Morris canal, about fifty miles to the northwest of Trenton, the capital of the State. It is also on the Belvidere division of the Pennsylvania Central, which here connects with the Morris and Essex and the Central Railroad of New Jersey, and on the Philadelphia and Reading, Lehigh Valley, and Delaware, Lackawanna and Western roads, all of which occupy separate depots. The river at this point is crossed by two fine bridges, owned by the railway interests located here. The principal business of the city is connected with manufacturing industries, which are of a varied and comprehensive character, embracing sheet and malleable iron works, tileworks, sawmills, stoveworks, carriage factories, silkmills, locomotive and boiler works, furniture factories, pulpmills, foundries and machine-shops, brick and marble works, and mower and reaper factories. It contains six churches, high-school and graded-school buildings, two banks, a newspaper office, twelve hotels, and between one and two hundred stores, wholesale and retail. Iron-ore and limestone are mined in close proximity to the city. The population, in 1890, was 8,644.

**PHILO**, often called **PHILO JUDÆUS**, Jewish philosopher, appears to have spent his whole life at Alexandria, where he was probably born *c.* 20-10 B.C. His brother Alexander was alabarch or arabarch (that is, probably, chief farmer of taxes on the Arabic side of the Nile), from which it may be concluded that the family was influential and wealthy. Jerome's statement that he was of priestly race is confirmed by no older authority. The only event of his life which can be exactly dated belongs to 40 A.D., when Philo, then a man of advanced years, went from Alexandria to Rome, at the head of a Jewish embassy, to persuade the emperor Caius to abstain from claiming divine honor of the Jews. Of this embassy Philo has left a full and vivid account. Various fathers and theologians of the church state that in the time of Claudius he met St. Peter in Rome; but this legend has no historic value, and probably arose because the book *De vita contemplativa*, falsely ascribed to Philo, in which Eusebius already recognized a glorification of Christian monasticism, seemed to indicate a disposition toward Christianity.

Though we know so little of Philo's own life, his numerous extant writings give the fullest information as to his views of the universe and of life, and his religious and scientific aims, and so enable us adequately to esti-

mate his position and importance in the history of thought. He is quite the most important representative of Hellenistic Judaism, and his writings give us the clearest view of what this development of Judaism was and aimed at.

PHILO. A Jewish Hellenist of this name is the author of an epic poem in Greek hexameters on the history of Jerusalem, and lived at an earlier date than the philosopher, Alexander Polyhistor quoting several passages of his book about 80-60 B.C.

PHILO BYBLIUS, *i.e.*, Philo of Byblus (Gebal, Jubeil), was born, according to Suidas, in 42 A.D., and lived into the reign of Hadrian, about which he wrote a book now wholly lost. He was a grammarian by profession and author of many books, of which those oftenest cited are: (1) a work *About Cities and the Famous Men they have Produced*, which was epitomized by Serenus, and (2) *Phœnician History*.

PHILO OF BYZANTIUM, author of a treatise on mechanics, of which only two books now remain, flourished in the second or third century A.D.

PHILOLAUS, next to Archytas the most illustrious of the Pythagorean philosophers, was born at Tarentum or, according to Diogenes Laertius, at Crotona. He was said to have been intimate with Democritus, and was probably one of his teachers.

Philolaus was the first to propound the doctrine of the motion of the earth; some, however, attribute this doctrine to Pythagoras, but there is no evidence in support of their view. Philolaus supposed that the sphere of the fixed stars, the five planets, the sun, moon, and earth, all moved around the central fire, which he called the hearth of the universe, the house of Zeus, and the mother of the gods; but as these made up only nine revolving bodies he conceived, in accordance with his number theory, a tenth, which he called counter-earth. He was the first who published a book on the Pythagorean doctrines, a treatise of which Plato made use in the composition of his *Timæus*.

PHILOLOGY. *Part I. Science of Language in General.*—Philology is the generally accepted comprehensive name for the study of the word; it designates that branch of knowledge which deals with human speech, and with all that speech discloses as to the nature and history of man. Philology has two principal divisions, corresponding to the two uses of "word" or "speech," as signifying either what is said or the language in which it is said, as either the thought expressed—which, when recorded, takes the form of literature—or the instrumentality of its expression: these divisions are the literary and the linguistic.

Philology, in all its departments, began and grew up as classical; the history of our civilization made the study of Greek and Latin long the exclusive, still longer the predominant and regulating, occupation of secular scholarship. The Hebrew and its literature were held apart, as something of a different order, as sacred. It was not imagined that any tongue to which culture and literature did not lend importance was worthy of serious attention from scholars. The first essays in comparison, likewise, were made upon the classical tongues, and were as erroneous in method and fertile in false conclusions as was to be expected, considering the narrowness of view and the controlling prejudices of those who made them; and the admission of Hebrew to the comparison only added to the confusion. The change which this century has seen has been a part of the general scientific movement of the age, which has brought about the establishment of so many new branches of knowledge, both historical and physical, by the abandonment of shackling prejudices, the freedom of inquiry, the recognition of the dignity of all knowledge, the

wide-reaching assemblage of facts and their objective comparison, and the resulting constant improvement of method. Literary philology has had its full share of advantage from this movement; but linguistic philology has been actually created by it out of the crude observations and wild deductions of earlier times, as truly as chemistry out of alchemy, or geology out of diluvianism.

The study of language is a division of the general science of anthropology, and is akin to all the rest in respect of its objects and its methods. Man as we now see him is a two-fold being; in part the child of nature, as to his capacities and desires, his endowments of mind and body; in part the creature of education, by training in the knowledge, the arts, the social conduct, of which his predecessors have gained possession. And the problem of anthropology is this: how natural man has become cultivated man; how a being thus endowed by nature should have begun and carried on the processes of acquisition which have brought him to his present state.

How long man, after he came into being such as he now is, physically and intellectually, continued to communicate with imitative signs of direct significance, when the production of traditional signs began, how rapidly they were accumulated, and how long any traces of their imitative origin clung to them—these and the like questions it is at present idle to try to answer even conjecturally; just as it is to seek to determine when the first instruments were used, how soon they were shaped instead of being left crude, at what epoch fire was reduced to service, and so on. The stages of development and their succession are clear enough; to fix their chronology will doubtless never be found practicable. There is much reason for holding, as some do, that the very first items of culture were hardest to win and cost most time, the rate of accumulation (as in the case of capital) increasing with the amount accumulated. Beyond all reasonable question, however, there was a positively long period of purely imitative signs, and a longer one of mixed imitative and traditional ones, the latter gradually gaining upon the former, before the present condition of things was reached, when the production of new signs by imitation is only sporadic and of the utmost rarity, and all language-signs besides are traditional, their increase in any community being solely by variation and combination, and by borrowing from other communities.

Of what nature, in various respects, this earliest language-material was is sufficiently clear. The signs, in the first place, were of the sort that we call "roots." By this is only meant that they were integral signs, significant in their entirety, not divisible into parts, of which one signified one thing and another another thing, or of which one gave the main significance, while another was an added sign of a kind or relation. In a language of developed structure like our own, we arrive at such "roots" mainly by an artificial stripping-off of the signs of relation which almost every word still has, or can be shown to have once had.

Of what phonetic form were the earliest traditional speech-signs is, so far as essentials are concerned, to be inferred with reasonable certainty. They were doubtless articulate: that is to say, composed of alternating consonant and vowel sounds, like our present speech; and they probably contained a part of the same sounds which we now use. All human language is of this character; there are no sounds in any tongue which are not learned and reproduced as easily by children of one race as of another; all dialects admit a like phonetic analysis, and are representable by alphabetic signs; and the leading sounds, consonant and vowel, are even

practically the same in all; though every dialect has its own (for the most part, readily definable and imitable) niceties of their pronunciation, while certain sounds are rare, or even met with only in a single group of languages, or in a single language. Articulate sounds are such as are capable of being combined with others into that succession of distinct yet connectable syllables which is the characteristic of human speech-utterance. The name "articulate" belongs to this utterance, as distinguished from inarticulate human sounds and cries, and from the sounds made by the lower animals. The word itself is Latin, by translation from the Greek, and, though very widely misunderstood, and even deliberately misapplied in some languages to designate all sound, of whatever kind, uttered by any living creature, is a most happily chosen and truly descriptive term. It signifies "jointed," or broken up into successive parts, like a limb or stem; the joints are the syllables; and the syllabic structure is mainly effected by the alternation of closer or consonant sounds with opener or vowel sounds. The simplest syllabic combination (as the facts of language show) is that of a single consonant with a following vowel; and there are languages even now existing which reject any other. Hence there is much plausibility in the view that the first speech-signs will have had this phonetic form, and been monosyllabic, or dissyllabic only by repetition (reduplication) of one syllable, such as the speech of very young children shows to have a peculiar ease and naturalness.

As regards their significant value, the first language-signs must have denoted those physical acts and qualities which are directly apprehensible by the senses; both because these alone are directly signifiable, and because it was only they that untrained human beings had the power to deal with or the occasion to use. Such signs would then be applied to more intellectual uses as fast as there was occasion for it. The whole history of language, down to our own day, is full of examples of the reduction of physical terms and phrases to the expression of non-physical conceptions and relations; we can hardly write a line without giving illustrations of this kind of linguistic growth. So pervading is it, that we never regard ourselves as having read the history of any intellectual or moral term till we have traced it back to a physical origin. And we are still all the time drawing figurative comparisons between material and moral things and processes, and calling the latter by the names of the former. There has never been any difficulty in providing for new knowledge and more refined thought by putting to new uses the earlier and grosser materials of speech.

As a matter of course, whatever we now signify by our simple expressions for simple acts, wants, and the like was intended to be signified through the first speech-signs by the users of them. But to us, with our elaborated apparatus of speech, the sentence, composed of subject and predicate, with a verb or special predicative word to signify the predication, is established as the form of expression, and we regard everything else as an abbreviated sentence, or as involving a virtual sentence. With a view to this, we must have "parts of speech:" that is, words held apart in office from one another, each usable for such and such a purpose and no other, and answering a due variety of purposes, so that when they are combined they fit together, as parts composing a whole, and the desired meaning is made clear. Inflections, too, lend their aid; or else auxiliary words of various kinds answering the same purpose—namely, of determining the relations of the members of the sentence. But all our success in understanding the earliest stages of language depends upon

our power to conceive a state of things where none of these distinctions were established, where one speech-sign was like another, calling up a conception in its indefinite entirety, and leaving the circumstances of the case to limit its application. Such a language is far below ours in explicitness; but it would suffice for a great deal of successful communication: indeed, there are many languages even now in existence which are little better off. So a look of approval or disgust, a gesture of beckoning or repulsion, a grunt of assent or inquiry, is as significant as a sentence, means a sentence, is translatable into a sentence, and hence may even in a certain way be called a sentence; and in the same way, but only so, the original roots of language may be said to have been sentences. In point of fact, between the holophrastic gesture or uttered sign and the sentence which we can now substitute for it—for example, between the sign of beckoning and the equivalent sentence, "I want you to come here"—lies the whole history of development of inflective speech.

What has been this history of development, how the first scanty and formless signs have been changed into the immense variety and fullness of existing speech, it is of course impossible to point out in detail, or by demonstration of facts, because nearly the whole process is hidden in the darkness of an impenetrable past. The only way to cast any light upon it is by careful induction from the change and growth which are seen to have been going on in the recent periods for which we have recorded evidence, or which are going on at the present time. Of some groups of related languages we can read the life for 3,000 or 4,000 years back, and by comparison can infer it much farther; and the knowledge thus won is what we have to apply to the explanation of periods and languages otherwise unknown. Nothing has a right to be admitted as a factor in language-growth of which the action is not demonstrable in recorded language.

*Part II. Comparative Philology of the Aryan Languages.*—The study of Aryan comparative philology has from its outset necessarily been in close connection with the study of Sanskrit, a language unparalleled among its cognates in antiquity and distinctness of structure, and consequently the natural basis of comparison in this field. It is therefore not to be wondered at that we find no clear views of the mutual relationship of the individual members of the Aryan family or their position with regard to other languages until Sanskrit began to attract the attention of European philologists, or that the introduction of Sanskrit as an object of study was closely followed by the discovery of the original community of a vast range of languages and dialects hitherto not brought into connection at all, or only made the objects of baseless speculations. We meet with the first clear conception of this idea of an Indo-European community of languages in the distinguished English scholar Sir William Jones, who, as early as 1786, expressed himself as follows: "The Sanskrit language, whatever may be its antiquity, is of wonderful structure; more perfect than the Greek, more copious than the Latin, and more exquisitely refined than either, yet bearing to both of them a stronger affinity, both in the roots of verbs and in the forms of grammar, than could have been produced by accident; so strong that no philologist could examine all the three without believing them to have sprung from some common source which, perhaps, no longer exists. There is a similar reason, though not quite so forcible, for supposing that both the Gothic and the Celtic, though blended with a different idiom, had the same origin with the Sanskrit." But neither Sir William Jones nor any of his older contemporaries who had arrived at similar con-

clusions ever raised this important discovery from a brilliant *aperçu* into a valid scientific theory through a detailed and systematic comparison of the languages in question. To have achieved this is the undoubted merit of the German, Franz BOPP (*q.v.*), the founder of scientific philology of the Aryan languages, and subsequently through this example also the founder of comparative philology in general. Next to him Jacob GRIMM (*q.v.*) must be mentioned here as the father of historical grammar. The first part of his famous *Deutsche Grammatik* appeared in 1819, three years after Bopp had published his first epoch-making book, *Ueber das Conjugations-system der Sanskritsprache*. Bopp's results were here at once utilized, yet Grimm's whole system was entirely independent of that of Bopp, and had no doubt been worked out before Grimm knew of his illustrious predecessor. In fact, their scientific aims and methods were totally different. Bopp's interest was not concentrated in comparison as such, but chiefly inclined toward the explanation of the origin of grammatical forms, and comparison to him was only a means of approaching that end.

In this more or less speculative turn of his interest Bopp showed himself the true son of a philosophical period when general linguistics received its characteristic stamp from the labors and endeavors of men like the two Schlegels and Wilhelm von Humboldt. Jacob Grimm's aims were of a less lofty character than those of Bopp, whose work, to his own mind, was crowned by his theory of the origin of inflection through agglutination. In confining his task to a more limited range than the vast field of Aryan languages embraced in Bopp's researches, and thus fixing his attention on a group of idioms exhibiting a striking regularity in their mutual relationship, both where they coincide and where they differ, he made it his foremost object to investigate and illustrate the continuous progress, subject to definite laws, by which these languages had been developed from their common source. He thus raised the hitherto neglected study of the development of sounds to an equal level with the study of grammatical forms, which had so far almost exclusively absorbed all the interest of linguistic research. Grimm's discovery of the so-called "Lautverschiebung," or Law of the Permutation of Consonants in the Teutonic languages (which, however, had been partly found and proclaimed before Grimm by the Danish scholar Rask), became especially important as a stimulus for further investigation in this line. Grimm's influence on comparative philology (which is secondary only to that of Bopp, although he was never a comparative philologist in the sense that Bopp was, and did not always derive the benefit from Bopp's works which they might have afforded him) is clearly traceable in the work of Bopp's successors, among whom Friedrich August Pott is universally judged to hold the foremost rank. In his great work, *Etymologische Forschungen auf dem Gebiete der indo-germanischen Sprachen, mit besonderem Bezug auf die Lautumwandlung im Sanskrit, Griechischen, Lateinischen, Littauischen, und Gothischen* (Lemgo, 1833-36), we find Indo-Germanic etymology for the first time based on a scientific investigation of general Indo-Germanic phonology. Among Pott's contemporaries Theodor Bensey deserves mention on account of his *Griechisches Wurzellexicon* (Berlin, 1839), a work equally remarkable for copiousness of contents and power of combination, yet showing no advance on Bopp's standpoint in its conception of phonetic changes.

The most prominent achievement of the researches of Bopp and his followers was to prove that the majority of the European languages and dialects, together with a certain number of important languages spoken in Asia, form one great family—that is, that they have

sprung from one common source or parent-language. The name now mostly used in England for this community is *Aryan languages*. American and French scholars generally prefer to say *Indo-European languages*, while the name of *Indo-Germanic languages* is still almost universally used in Germany. It is hard to decide for or against any of these names from a scientific point of view. The word *Indo-Germanic* was not inappropriately coined by combining the names of the most easterly and westerly members of the family, the Indian and the Germanic or Teutonic group. *Indo-European* seems to be a less lucky invention, as this combination of geographical names would erroneously point to all the languages of India and Europe as the constituents of our family, while a large number both of Indian and European idioms belong to entirely unrelated groups of languages. *Aryan* would no doubt be the best name in itself, for it seems that the primitive forefathers of the Aryan nations used the word *Aria* as a national name themselves. We find at least the Sanskrit *Ārya* thus used in India, and similarly the Old Persian *Ariya* (in the cuneiform inscriptions of Darius), Zend *Airya* in Persia (whence the later *Ērān*, *Īrān*), and perhaps *Ériu*, gen. *Érenn*, as the national name for Ireland. But before the word *Aryan* came to be applied in the sense defined above it had for some time been used, and it is still largely used, in a more restricted sense as the special collective name for the languages of the Indian and Persian or Iranian groups of the Indo-Germanic family. This ambiguity renders the use of the word *Aryan* less recommendable than it would be had its name been properly fixed from the beginning. It seems that outside of England *Aryan* will hardly gain ground; some recent attempts to introduce the name into Germany have utterly failed, and in the same way the other nations who share in scientific research in this demesne cling to the older names.

This large Indo-Germanic or Aryan family, then, to revert to our principal task, consists of ten groups or sub-families of languages, three of which are located in Asia, while the rest belong to Europe.

1. The *Indian Family*, in which Sanskrit, especially in its oldest form, preserved in the Vedic texts, stands foremost in rank. Of the older stages of the language Prākṛit and Pāli may be mentioned here—the former, in its various branches, being the mother of the modern Indian dialects of Aryan descent (including also the Gipsy language), the latter (see Pāli) the idiom of the sacred books of the southern Buddhists.

2. The *Iranian or Persian Family*, represented in the earliest period by Old Persian, scanty remnants of which have come down to us in the Achæmenian cuneiform inscriptions, and Zend, or, as it is also called, Old Bactrian, the language of the *Zend-Avesta*, the sacred books of the Zoroastrians. The chief modern representatives of this group are Persian, Afghan, Kurdish, and Ossetic.

3. The *Armenian Family*, consisting of the different living dialects of Armenian. Armenian has but recently been proved to be an independent member of the Aryan family. It partakes of many peculiarities of the Iranian group, but at the same time shares several important characteristics of the European languages, so that it cannot be classed as a subdivision of either of these groups.

4. The *Greek Family*, comprising the various old dialects of Greek, and the modern Romaic idioms, which have been developed out of the later *Koine* that had gradually superseded the old dialectal varieties.

5. A fifth family, which may once have had a far larger extension, is now only represented by one surviving member, the *Albanian language*. As we have no old

sources for this idiom, and only know it in its modern state of utter decay, it is extremely difficult to obtain definite results concerning its origin and position relatively to the surrounding languages. Bopp seems to have proved, however, that Albanian actually is an Aryan idiom. It is also certain that it belongs to the European type of Aryan, yet it is not particularly closely allied with Greek, as has often been assumed, but shows some remarkable coincidences with the northern European languages.

6. The *Italic Family*. Its most important representative is Latin, from which the modern Romance languages have sprung. Closely connected with Latin was the Faliscan dialect, which is preserved in a few inscriptions only. A second branch of Italic is formed by Umbrian and Oscan, both of which soon became extinct through the overpowering influence of Latin, like the other less widely diffused idioms once spoken in Italy.

7. The *Celtic Family*, once covering a large part of western Europe, but now reduced to comparatively scanty remnants in the northwest of France and in the British islands. Among its extinct members the language of the Galatians in Asia Minor may be mentioned, of which little more is known than that it was Celtic. The earliest documents of Celtic speech we possess are some inscriptions in the idiom of the Gallic inhabitants of France and northern Italy. The surviving branches of Gallic show a clear division into two groups: the Northern or Gaelic group, formed by Irish, Gaelic or Scotch, and Manx, and a Southern or Brittonic group, consisting of Welsh or Cymric, Cornish (extinct since 1778), and Armorican or Bas Breton in Brittany.

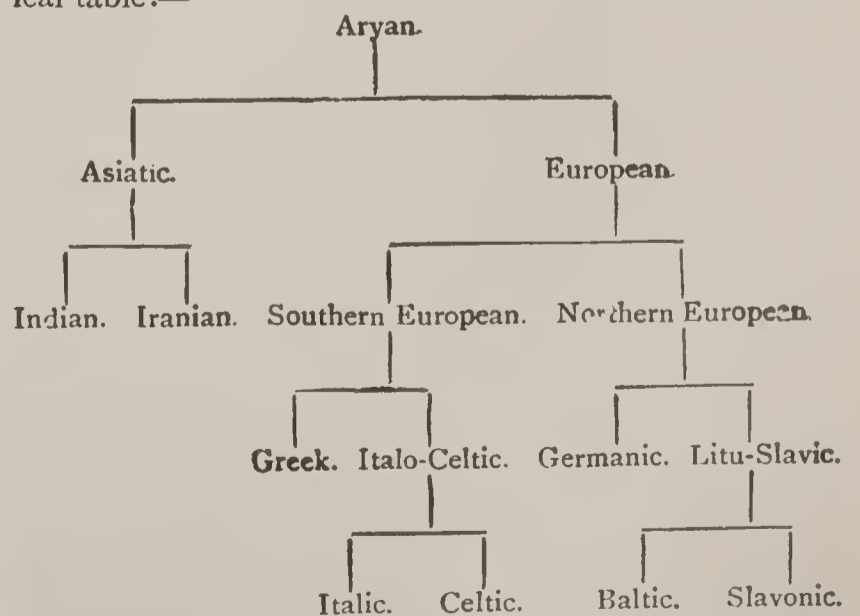
8. The *Germanic or Teutonic Family*. This well developed family is divided into two main groups, which are now commonly denoted Eastern and Western Germanic. The members of the former are Gothic (see GOTHIC LANGUAGE) and Scandinavian, with an eastern and western subdivision, the former comprising Swedish and Danish, the latter Norse and Icelandic. Western Germanic, on the other hand, consists of English, Frisian (these two seem to form a separate branch), Saxon or Low German, Frankish (including Dutch), and Upper German (see article GERMAN LANGUAGE). The dialects of the numerous other Teutonic tribes not mentioned here have died out without leaving sufficient materials for linguistic classification.

9. The *Baltic Family*, comprising three distinct idioms—Prussian, Lithuanian, and Lettish. Prussian became extinct in the sixteenth century.

10. The *Slavonic Family*. There are two main branches of Slavonic. The so-called Southern or Southeastern branch embraces Russian, Ruthenian (in Galicia), Bulgarian, Servian, Croatian, and Slovenian. The second branch is generally designated by the name of Western Slavonic. It is chiefly represented by Cechish or Bohemian and Polish. With the former the Sorbian dialects spoken in Lusatia are very closely connected. Polish, again, is subdivided into Eastern Polish or Polish Proper and Western Polish, a few remnants of which now survive in the Kassubian dialects of Prussia.

The mutual relationship of these ten families may be shortly characterized by saying that they are dialects of the primitive Aryan parent-speech, which at an early period of its existence must have formed a linguistic unity, but subsequently became dissolved into these subdivisions. This fundamental view now seems to be universally admitted to be correct. But it is extremely difficult to go beyond it in attempts to trace out the history of the process of dissolution. One problem offering itself at the very outset of such an attempt (although

more of an ethnological than philological character) must at once be dismissed as insoluble—the question of the original home of our Aryan forefathers and the directions of the wanderings that brought the single members of the great original tribe to the seats occupied in historical times by the several Aryan nations. There exist, indeed, no means for deciding whether they came from the northeastern part of the Iranian plateau near the Hindu-Kush Mountains, as was once generally assumed, or whether Europe may boast of being the mother of the Aryan nationality, as some authors are now inclined to believe. The chief philological difficulty lies in the fact that some of these ten families stand in closer relationship with certain others than with the rest, so that they seem to form separate independent groups, and yet these groups cannot be severed from the rest without overlooking important linguistic facts which seem to speak for the existence of a closer connection between single members of one group and single members or the whole of another. Before attention was drawn to this latter point it was easy enough to account for the origin of the grouping alluded to. If everything that is common to all Aryan languages must have originated in the common parent-speech—and the correctness of this assumption can hardly be doubted—then everything that is common to all the families of one particular group, but strange to the others, must be assigned to a period when these families formed a unity by themselves and were disconnected with the other stock. The fact, for instance, that all the European languages possess the three vowels *a*, *e*, *o*, where the Indian and Iranian group show the uniform *a*, which was then believed to be the primitive sound, seemed to indicate that the primitive Aryan stock had once been split into two halves, one of which remained in Asia and retained the primitive *a*-sound, while the other half emigrated to Europe and there developed the new vowel-system, before any new divisions took place. The Aryan parent-speech would thus appear to have been split into a European and an Asiatic “base-language.” Similar facts in the history of the single European languages then led to the further assumption of a southern European base as the parent of Greek, Italic, and Celtic, and a northern European base for Germanic, Baltic, and Slavonic, and, with further subdivision, an Italo-Celtic and a Litu-Slavic base for Italic and Celtic on the one hand and for Baltic and Slavonic on the other. The prehistoric development of Aryan, according to this genealogical theory (which makes division of language dependent on division of nations), may be illustrated by the following genealogical table:—



It may still be admitted that at least the mutual position of the ten families is not the same in all cases. It can

not be doubted that Indian and Iranian resemble each other more than either of them does any other family. The same may also be said of Baltic and Slavonic, and even of Italic and Celtic, however different the latter two may appear to be at first sight. But it is impossible to carry this system of genealogical grouping through. It will be observed that not all the ten families are represented in the genealogical tree given above; Albanian and Armenian have not found a place in it, nor could they be introduced without disturbing the entire table. If we look at Armenian, for instance, we find that its structure and phonology on the whole follow the Asiatic type, and yet Armenian shares the European vowel-system alluded to before; compare, for instance, Armenian *berem*, "I bear," with Greek *fero*, Latin *fero*, Old Irish *berim*, Gothic *baira* (pronounced *bëra*) Lith. *berù*, Slavonic *bera*, against Sanskrit *bhārāmi*, Zend *barāmi*. Armenian, then, is half European, half Asiatic, and if such an intermediate idiom exists it is impossible to make a strict distinction between Asiatic and European. Let us take another instance. All the Asiatic languages have changed the original palatal *k* into sibilants, and the same change we find again in Slavonic and Baltic, both of which otherwise clearly belong to the European type; compare, for instance Sanskrit and Zend *daçan*, "ten," Armenian *tasn*, Slavonic *desetŭ*, Lith. *dëszimt*, with Greek *dëka*, Latin *decem*, Old Irish *deich*, Gothic *taihun*. In a similar way Litu-Slavic and Germanic are connected by the formation of a plural dative in *m*, as in Gothic *wulfam*, Lith. *vilkans*, Slavonic *vlükomŭ*, against the Sanskrit *-bhyas*, Latin *-bus*, Irish *-b*; and so all around. The consequence is that every attempt at grouping the Aryan families of speech on the genealogical basis must fail, because it would have to cut asunder some of the natural ties that hold the single families together. It is true that some of the coincidences falling under this head may be due to mere chance, especially those in phonology; for we often see the same phonetic processes going on in languages which stand in no connection whatever at the time. Yet in the case before us the number of the actual coincidences is too large to allow of such an explanation, and the fact of their existence is made all the more striking from the circumstance that it is each pair of *neighboring* families which shows these connecting links. If they prove anything (and it cannot be doubted that they do), we must necessarily come to the conclusion that every such link is a witness for at least a temporary connection between the two languages or families it holds together. To assume such temporary connections in the time after a true division of nations had taken place (that is, to assume, for instance, that Slavonic had come into contact with the Asiatic languages after the Europeans had migrated from Asia to Europe, or the forefathers of the present Asiatic nations from Europe to Asia, as the case may be) seems impossible. It is likewise highly improbable that connections intimate enough to leave distinct marks in language existed at a time when the original tribe had spread over the wide regions now covered by the Aryans, even supposing this spreading to have been so gradual as not to cause any break in the continuity of the Aryan population. And, even if we concede this, how are we to account for the fact that we have no longer the supposed continuity of speech, but well-defined single languages, whose separation must, after all, be due to breaks in the continuity of intercourse between the respective speakers? These and similar reasons point to the assumption that the origin of the phenomena alluded to must be sought in a remote period, when the Aryan tribe had an extension small enough to permit con-

tinuity of intercourse, and yet large enough to allow of dialectic variations in its different districts. In other words, when the actual break-up of the Aryan tribe into different nations came to pass the Aryan parent-speech was no longer a homogeneous idiom, but the development of dialects had begun. On their following wanderings, then, those tribes or clans would naturally cling together which had until then lived in the closest connection both of intercourse and dialect (for community of intercourse and of speech always go together), or, as we might also say, the old unity would naturally be broken up into as many parts as there had been dialectic centers. Transition dialects, which might have been spoken in the outlying parts of the old dialectic districts, would also naturally be then reduced to a common level in consequence of the general mixture of speakers that could not but have taken place on wanderings so extensive as those of the Aryan tribes must have been.

Such an assumption would indeed solve most of the difficulties mentioned above, especially the peculiar way in which the single families of Aryan are linked together. Each of these would then correspond to one of the main dialects of the parental language, and their mutual affinities would therefore be of the same kind as those of neighboring dialects, say, of any living speech. And in these nothing is more common, nay even more characteristic, than the gradual transition from one to the other, so that each dialect of an intermediate position partakes of some of the peculiarities of its neighbors to the right and left.

PHILOMELA. See NIGHTINGALE.

PHILOPEMEN, "the last of the Greeks" as he was called by an admiring Roman, was a leading champion of the Achæan League, which preserved in Peloponnesus a last shred of Greek freedom. Sprung from an illustrious Arcadian family, he was born at Megalopolis in Arcadia in 252 B.C. He was elected general of the Achæan League eight times, and upon being captured after putting down a revolt in Messene was put to death by poison 183 B.C. His murderers were obliged to kill themselves. His body was buried and his bones conveyed to Megalopolis with every mark of respect and sorrow; they were almost hidden in garlands.

PHILOSOPHY is a term whose meaning and scope have varied considerably according to the usage of different authors and different ages; and it would hardly be possible, even having regard to the present time alone, to define and divide the subject in such a way as to command the adhesion of all the philosophic schools. A specific sense of the word first meets us in Plato, who defines the philosopher as one who apprehends the essence or reality of things in opposition to the man who dwells in appearance and the shows of sense. Logic, ethics, and physics, psychology, theory of knowledge, and metaphysics are all fused together by Plato in a semi-religious synthesis. It is not till we come to Aristotle that we find a demarkation of the different philosophic disciplines corresponding, in the main, to that still current. In Socrates and Plato, the start is made from a consideration of man's moral and intellectual activity; but knowledge and action are confused with one another, as in the Socratic doctrine that virtue is knowledge. To this correspond the Platonic confusion of logic and ethics and the attempt to substitute a theory of concepts for a metaphysic of reality. Aristotle became the founder of logic, psychology, ethics, and æsthetics, as separate sciences, but it was only in the Alexandrian period that the special sciences attained to independent cultivation. Nevertheless, as the mass of knowledge accumulated, it naturally came

about that the name "philosophy" ceased to be applied to inquiries concerned with the particulars as such. The details of physics, for example, were abandoned to the scientific specialist, and philosophy restricted itself in this department to the question of the relation of the physical universe to the ultimate ground or author of things.

The aim of philosophy is to exhibit the universe as a rational system in the harmony of all its parts; and accordingly the philosopher refuses to consider the parts out of their relation to the whole whose parts they are. Philosophy corrects in this way the abstractions which are inevitably made by the scientific specialist, and may claim, therefore, to be the only concrete science, that is to say, the only science which takes account of all the elements in the problem, and the only science whose results can be claimed to be true in more than a provisional sense.

A fact is nothing except in its relation to other facts; and as these relations are multiplied in the progress of knowledge the nature of the so-called fact is indefinitely modified. Moreover, every statement of fact involves certain general notions and theories, so that the "facts" of the separate sciences cannot be stated except in terms of the conceptions or hypotheses which are assumed by the particular science. Thus mathematics assumes space as an existent infinite, without investigating in what sense the existence or the infinity of this "Uding," as Kant called it, can be asserted. In the same way, physics may be said to assume the notion of material atoms and forces. These and similar assumptions are ultimate presuppositions or working hypotheses for the sciences themselves. But it is the office of philosophy, or theory of knowledge, to submit such conceptions to a critical analysis, with a view to discover how far they can be *thought out*, or how far, when this is done, they refute themselves, and call for different form of statement, if they are to be taken as a statement of the ultimate nature of the real. The first statement may frequently turn out to have been merely provisionally or relatively true; it is then superseded by, or rather inevitably merges itself in, a less abstract account. In this the same "facts" appear differently, because no longer separated from other aspects that belong to the full reality of the known world. There is no such thing, we have said, as an individual fact; and the nature of any fact is not fully known unless we know it in all its relations to the system of the universe, or, in Spinoza's phrase, "*sub specie æternitatis*." In strictness, there is but one *res completa* or concrete fact, and it is the business of philosophy, as science of the whole, to expound the chief relations that constitute its complex nature.

The last abstraction which it becomes the duty of philosophers to remove is the abstraction from the knowing subject which is made by all the sciences, including the science of psychology. The sciences, one and all, deal with a world of objects, but the ultimate fact as we know it is the existence of an object for a subject. Subject-object, knowledge, or, more widely, self-consciousness with its implicates—this unity in duality is the ultimate aspect which reality presents. It has generally been considered, therefore, as constituting in a special sense the problem of philosophy. Philosophy may be said to be the explication of what is involved in this relation, or, in modern phraseology, a theory of its possibility. Any would-be theory of the universe which makes its central fact impossible stands self-condemned.

PHILOSTRATUS, the eminent Greek sophist, was probably born in Lemnos between 170 and 180 A.D. From his incidental statements respecting himself we

learn that he studied at Athens, and was afterward attached to the court of the empress Julia Domna, consort of Severus. It seems to be implied that Philostratus resided in Rome, and, according to Suidas, he lived until the reign of Philip (244–249). His works now extant are a biography of Apollonius of Tyana, *Lives of the Sophists*, *Heroicon*, *Imagines*, and *Epistles*.

PHILOXENUS, one of the last of the dithyrambic poets of Greece, was born in 435 B.C., in the island of Cythera. When the island was conquered by the Athenians in 424, Philoxenus was sold as a slave to Agesylas, who gave him the name of Myrmex ("ant"). On the death of Agesylas he was bought by the dithyrambic poet Melanippides. Philoxenus afterward resided in Sicily, at the court of Dionysius, tyrant of Syracuse, whose bad verses he declined to praise, and was in consequence sent to work in the quarries. Being fetched back again and asked by the tyrant how he liked his verses now, the poet made no reply but "Take me away to the quarries." From Sicily he seems to have gone to Tarentum, and thence perhaps to Corinth. He visited Colophon in Asia Minor, and died at Ephesus in 380. According to Suidas, Philoxenus composed twenty-four dithyrambs and a lyric poem on the genealogy of the Æacidæ.

PHLEBITIS, or INFLAMMATION OF THE VEINS (Gr. φλέβις, *phlebs*, a vein), although seldom an original or idiopathic disease, is a frequent sequence of wounds, in which case it is termed traumatic phlebitis (from the Gr. *trauma*, a wound), and is not uncommon after delivery. The disease is indicated by great tenderness and pain along the course of the affected vessel, which feels like a hard knotted cord, and rolls under the fingers. The hardness is, however, sometimes obscured by the swelling of the limb beyond and about the seat of the disorder, partly in consequence of the effusion of serum caused by the obstruction to the return of the venous blood (which thus gives rise to a local dropsy), and partly in consequence of the propagation of the inflammation to the surrounding tissues. With the return of the circulation, the swelling subsides, and the patient gradually recovers. If, however, the disease advances, suppuration takes place within the coagulum, and one of two things happens; either abscesses are formed along the veins, or the pus gets into the current of blood and contaminates the circulation, giving rise to the perilous disease known as *pyæmia*. Either condition is dangerous; the latter preëminently so. The use of leeches along the affected vein is recommended, and that they should be repeated over and over again if the symptoms of inflammation persevere, the subsequent application of cold lotions, and the internal use of mercury pushed to a moderate salivation.

PHLEBOLITES (Gr. φλέβις, *phlebs*, a vein; and λίθος, *lithos*, a stone), are calcareous concretions formed by the degeneration of coagulations in veins, or occasionally originating in the coats of the vessel. They are seldom detected till after death, although cases are on record in which, occurring in subcutaneous veins, they have given rise to external tumors of considerable size.

PHLEGMASIA ALBA DOLENS, or MILK-LEG, is a disease which is most common in women, after parturition, especially if they have lost much blood, but sometimes occurs in unmarried women and occasionally in males. It usually commences about a week or ten days after delivery with a feeling of pain in the loins or lower part of the abdomen, whence it extends to the groin and down the thigh and leg. The pain soon becomes severe, and principally follows the course of the internal cutaneous and crural nerve of the thigh and of the posterior tibial in the leg. The limb soon begins to

swell, and, in the course of a couple of days, is sometimes twice its ordinary size, and as the swelling develops itself, the acuteness of the pain diminishes. The limb is partly flexed, and lies motionless; any movement aggravates the pain. The swelling extends uniformly over the limb, which is pale and shining, and hot and firm to the touch, seldom pitting on pressure. The femoral vein may usually be felt like a hard cord, and this symptom, taken with the swelling, clearly indicates that this affection is essentially *crural phlebitis*. The uniformity of the cord is interrupted by nodules, arising either from inflamed cellular tissue, or from clots within the vein. Both legs are seldom attacked at the same time, and the left thigh is the most common seat of the disease. This affection usually terminates favorably, the acute symptoms disappearing in about ten days. The swelling, however, often continues for a long time, and sometimes lasts for life. There is no doubt that the disease is inflammation originating in the veins of the genital tract, and extending to those of the lower extremity. The treatment is the same as for phlebitis generally. Warm poppy fomentations, or bran poultices sprinkled with laudanum, may be applied externally at the beginning of the attack, after which, flannel saturated with a liniment composed of one part of laudanum to two parts of soap liniment, may be applied around the limb in the form of a bandage, applied not so tightly as to occasion pain. If necessary, the bowels must be gently opened with castor oil, and opium given to allay pain and induce sleep.

PHLEGON, of Tralles in Asia Minor, a Greek writer of the second century, was a freedman of the emperor Hadrian. His chief work was the *Olympiads*, a universal history in sixteen books, from the first down to the 229th Olympiad, (776 B.C. to 137 A.D.) Portions of another work of Phlegon, *On Marvels*, along with parts of another *On Long-lived Persons*, and the opening parts of his *Olympiads*, are extant in a Heidelberg MS. of the tenth century.

PHLOX, a considerable genus of *Polemoniaceæ*, chiefly consisting of North American perennial plants, with entire, usually opposite, leaves and showy flowers generally in terminal clusters. Each flower has a tubular calyx with five lobes, and a salver-shaped corolla with a long, slender tube and a flat limb. The five stamens are given off from the tube of the corolla at different heights and do not protrude beyond it. The ovary is three-celled with one to two ovules in each cell; it ripens into a three-valved capsule. The garden varieties fall under three groups—the annuals, including the lovely *P. Drummondii* from Texas and its many forms; the perennials, including a dwarf section of alpine plants (forms of *P. subulata*), suitable, by reason of their prostrate habit and neat mode of growth, for the rockery; and the taller-growing decussate phloxes which contribute so much to the beauty of gardens in late summer, and which have probably originated from *P. paniculata*. The range of color in all the groups is from white to rose and lilac.

PHOCÆA, in ancient geography, was one of the cities of Ionia, on the western coast of Asia Minor. It was the most northern of the Ionian cities, and was situated on the coast of the peninsula that separates the Gulf of Cyme. Its advantageous position between two good harbors, called Naustathmus and Lampter, is pointed out by Livy, and was probably the cause which led the inhabitants to devote themselves from an early period to maritime pursuits. They established friendly relations with Arganthonius, king of Tartessus, Spain, who even invited them to emigrate in a body to settle in his dominions, and, on their declining this offer, presented them with a large sum of money. When the

Ionian cities were attacked by Cyrus in 546, mistrusting their power of ultimate resistance, they determined to abandon their city, and, embarking their wives and children and most valuable effects, to seek a new home in the western regions, where they had already founded several flourishing colonies. A large part of the emigrants, however, relented, and, after having proceeded only as far as Chios, returned to Phocæa, where they submitted to the Persian yoke. Phocæa continued to exist under the Persian government, but greatly reduced in population and commerce, so that, although it joined in the revolt of the Ionians against Persia in 500, it was only able to send three ships to the combined fleet that fought at Lade. Nor did it ever again assume a prominent part among the Ionian cities, and it is rarely mentioned in Greek history.

PHOCAS, emperor of the east from 602 to 610, was a Cappadocian of humble origin, and was still but a centurion when chosen by the army of the Danube to lead it against Constantinople. A revolt within the city soon afterward resulted in the abdication of the reigning emperor MAURICE (*q.v.*) and in the speedy elevation of Phocas to the vacant throne (November 23, 602). By the representations of Theodosius, Maurice's supposed son, and of Narses, the Byzantine commander-in-chief on the Persian frontier, Chosroes (Khosrau) II. was induced to take up arms against the emperor in 604 (see PERSIA), and the appearance of the Persian armies as far west as Chalcedon in 609-610 made his deposition by HERACLIUS (*q.v.*) an easy task. He was beheaded by his successful rival on October 4, 610.

PHOCION, an Athenian statesman, born about 402 B.C., and in his youth a pupil of Plato. He saw service under the distinguished general Chabrias, whose temper, by turns sluggish and impetuous, he alternately stimulated and repressed. He thus won the regard of his good-natured commander, and was introduced by him to public notice and employed on important services. He was among the last of the Athenian leaders who combined the characters of statesman and soldier. In 351 Phocion and Evagoras, lord of the Cyprian Salamis, were sent by Idrieus, prince of Caria, with a military and naval force to put down a revolt which had broken out against the Persians in Cyprus. The task was successfully accomplished. Next year Phocion commanded a force which the Athenians sent to Eubœa in support of the tyrant Plutarch of Eretria. In 341 he returned to the island and put down Clitarchus, whom Philip, king of Macedonia, had set up as tyrant of Eretria. In spite of the successful issue of his expedition to Byzantium Phocion advised the Athenians to make peace with Philip. But the war party led by Demosthenes prevailed, and the battle of Chæronea (August, 338), in which Philip overthrew the united armies of Athens and Thebes, converted Greece into a province of Macedonia.

After the revolt of Thebes and its destruction by Philip's son and successor Alexander the Great, Athens, having been implicated in the movement, was called on by Alexander to surrender the orators of the anti-Macedonian party, including Demosthenes (335). Phocion advised the men to give themselves up, but nevertheless by his intercession he induced the conqueror to relent. Phocion led out a force and defeated a body of Macedonian and mercenary troops under Nicion, and after the battle of Crannon (322) Phocion's personal influence induced the victorious Antipater to spare Attica the misery of invasion. However, the Athenians were required by Antipater to surrender the chief members of the anti-Macedonian party, among them Demosthenes and Hyperides. Hyperides was executed, Demosthenes died by his own hand, and over



12,000 citizens lost the franchise, many of them going into exile. These disfranchised citizens had afterward an important influence on Phocion's fate. For some years Athens dwelt in peace, if not in honor, under the shadow of Macedonia. Phocion had the direction of affairs and filled the magistracies with respectable men. By his intercession with Antipater he procured for many of the exiles a repeal or mitigation of their sentence, but he declined to petition Antipater to withdraw the garrison from Munychia. After the death of Antipater, Alexander, son of Polyperchon, arrived in Attica at the head of an army and seized the ports of Piræus and Munychia to be held for his father. To this step, it was reported, he was instigated by Phocion. The latter fled to Alexander, who in response to the petition of an Athenian embassy surrendered him for trial upon a charge of having betrayed his country. He was condemned to die with the companions who had accompanied him in his flight. His death by poison occurred 317 B.C.

PHOCIS was in ancient times the name of a district of central Greece, between Bœotia on the east and the land of the Ozolian Locrians on the west. It adjoined the Gulf of Corinth on the south, while it was separated on the north from the Malian gulf by the ridge of Mount Cnemis and the narrow strip of territory occupied by the Epicnemidian and Opuntian Locrians.

Phocis was for the most part a rugged and mountainous country. In the center of it rose Mount Parnassus, attaining to the height of 8,068 feet, and an underfall of this, Mount Cirphis (4,130 feet), sweeps around to the Gulf of Corinth on the south, separating the Gulf of Crissa from that of Anticyra, both of which were included in the Phocian territory. The range of Mount Cnemis on its northern frontier was of less elevation (about 3,000 feet), but rugged and difficult of access, while the upper valley, or plain of the Cephissus, constituted the only considerable tract of fertile and level country comprised within the limits of Phocis. The little basin adjoining the Crissæan gulf, though fertile, was of limited extent, and the broad valley which led into the interior thence to Amphissa (now Salona) belonged to the Ozolian Locrians. Besides the Cephissus, the only river in Phocis was the Pleistus, which rose in Mount Parnassus, and, after flowing past Delphi, descended through a deep ravine to the Crissæan gulf.

Phocis possessed importance in a military point of view, not only from its central position with regard to the other states of northern Greece and its possession of the great sanctuary of Delphi, but from its command of the pass which led from the Malian gulf across Mount Cnemis to Elatea in the valley of the Cephissus, and afforded the only access for an invader who had already passed Thermopylæ into Bœotia and Attica.

The important city in Phocis after Delphi was Elatea; next to this came Abæ, also in the valley of the Cephissus, near the Bœotian frontier, celebrated for its oracle of Apollo. In the same neighborhood stood Danlis and Ambrysus; while farther south, toward the Corinthian gulf, lay Anticyra, on the gulf of the same name. Crissa, which had been in early times one of the chief cities of Phocis, and had given name to the Crissæan gulf, was destroyed by order of the Amphictyonic council in 591, and never rebuilt. The other towns of Phocis were places of no importance, and their names scarcely appear in history.

PHŒBUS (the bright or pure), a common epithet of APOLLO, (*q.v.*) Artemis in like manner is called Phœbe, and in the Latin poets and their modern followers "Phœbus" and "Phœbe" are often used simply for the sun and the moon respectively.

PHŒNICIA forms part of the seaboard of SYRIA (*q.v.*), extending along the Mediterranean (sometimes called the Phœnician Sea) from the mouth of the Eleutherus in the north to Mount Carmel in the south, a distance of rather more than two degrees of latitude. Formed partly by alluvium carried down by perennial streams from the mountains to the east, and fringed by great sand-dunes thrown up by the sea, Phœnicia is covered by a very fertile vegetable soil. It is only at Eleutherus in the north, and near Acre (Akka) in the south, that this strip of coastland widens out into plains of any extent; a smaller plain is found at Beirût (Beirut). For the most part the mountains approach within not many miles of the coast, or even close to it, leaving only a narrow belt of lowland, which from remote antiquity has been traversed by a caravan-route. To the south of Tyre the cliffs sometimes advance so close to the sea that a passage for the road had to be hewn out of the rocks, as at Scala Tyriorum. The mountains are not rich in mineral products; but it may be mentioned that the geologist Fraas has recently discovered indubitable traces of amber-diggings on the Phœnician coast. The purple-shell (*Murex trunculus* and *brandaris*) is still found in large quantities. The harbors on the Phœnician coast are nearly all silted up, and, with the exception of that of Beirût, there is no safe port for the large vessels of modern times. A few bays, open toward the north, break the practically straight coast-line, and there are a certain number of small islands off the shore.

The ethnographic relations of the Phœnicians have been the subject of much debate. Many investigators are of opinion that, in spite of their purely Semitic language, the Phœnicians were a distinct race from the Hebrews. In favor of the opposite and more probable view, that the Phœnicians are an early offshoot from the Semitic stock, it may be urged (1) that the account in Gen. x. is not framed on strict ethnographic lines, and (2) that the absence from Phœnicia of all trace of an original non-Semitic form of speech cannot be reconciled with the theory of an exchange of language. Inscriptions, coins, topographical names preserved by classical writers, proper names of persons, and the Punic passages in the *Pœnulus* of Plautus combine to show that the Phœnician language, like Hebrew, belonged to the north Semitic group. Even the Phœnician which survived as a rustic dialect in north Africa till the fifth century of our era was very closely akin to Hebrew.

Considering the great part which the Phœnicians played in the movements of ancient civilization, it is singular how fragmentary are our sources of knowledge for all the most essential elements of their history. What we are told of their religion is only in appearance an exception to this rule. The two triads of Hannibal's oath to Philip of Macedon—Sun, Moon, and Earth, and Rivers, Meadows, and Waters—contain the objects on which all Phœnician worship is based. Rivers were generally sacred to gods, trees to goddesses; mountains, too, were revered as nearer than other places to heaven; and bœtylia or meteoric stones were held sacred as divine messengers.

The oldest towns were held to have been founded by the gods themselves, who presumably also placed the Phœnicians in them. Imitating the Egyptians, the race claimed an antiquity of 30,000 years, yet they retained some memory of having migrated from older seats on an Eastern sea. Herodotus understood this of the Persian Gulf; the companions of Alexander sought to prove by learned etymologies that they had actually found here the old seats of the Phœnicians. But all this rested on a mere blunder, and the true form of the

tradition is preserved by Trogus, who places the oldest seats of the Phœnicians on the Syrium stagnum or Dead Sea, and says that, driven thence by an earthquake, they reached the coast, and founded Sidon.

In historical times the Phœnicians called themselves Canaanites and their land Canaan, the latter applying equally to the coast which they themselves held and the inland highlands which the Israelites occupied; and it is a singular fact that alike in the Old Testament and in Homer, in the time of Tyre's greatest might, we constantly read of Sidonians and not of Tyrians. Hence we may conjecture that during the flourishing period of Phœnicia, Sidon and Tyre formed a single state whose kings reigned first in Sidon and then in Tyre, but whose inhabitants continued to take their name from the old metropolis.

The towns of the Phœnician coast were active from a very early date in various manufactures. Glass-work, for which the sands of the Belus gave excellent material, had its chief seat in Sidon; embroidery and purple-dyeing were favored by the prevalence of the purple-giving murex all along the coast. The ancients ascribed to the Phœnicians the invention of all three industries. The Phœnicians, however, brought these arts to perfection and spread the knowledge of them. To them as the great trading nation was ascribed the invention of arithmetic, measure, and weight, which are really Babylonian in origin, and also of writing, although it is not even quite certain that it was the Phœnicians who adapted the Egyptian hieroglyphic alphabet to Semitic use. Yet here again the Phœnicians have undisputedly the scarcely inferior merit of having communicated the art to all the nations of the Mediterranean basin.

The beginnings of navigation lie beyond all human memory, but the ancients made this also an invention of the Phœnicians. Even in later times Greek observers noted with admiration the exact order kept on board Phœnician ships, the skill with which every corner of space was utilized, the careful disposition of the cargo, the vigilance of the steersmen and their mates. They steered by the pole-star, which the Greeks therefore called the Phœnician star; and all their vessels had a speed which the Greeks never rivaled. It was they, in fact, who from the earliest time distributed to the rest of the world the wares of Egypt and Babylon.

The great center of Phœnician colonization was the western half of the Mediterranean and the Atlantic coasts to the right and left of the straits. In especial the trade with Tarshish, that is, the region of the Tartessus (Guadalquivir), was what made the commercial greatness of the Phœnicians; for here they had not only profitable fisheries (tunny and murena) but above all rich mines of silver and other metals, to which the navigable rivers Guadiana and Guadalquivir gave easy access. Next the Phœnicians ventured farther on the ocean and drew tin from the mines of northwest Spain or the richer deposits of Cornwall; the tin islands (Cassiterides) were reached from Brittany, and are always distinguished from the British mainland, so that the old view which makes them the Scilly Islands is probably right. Amber, too, was brought in very early times from the farthest north. The rich trade with Spain led to the colonization of the west. Strabo dates the settlements beyond the Pillars of Hercules soon after the Trojan War, in the time, that is, of Tyre's first expansion. Lixus in Mauretania was older than Gades and Gades a few years older than Utica, which again was founded 1101 B.C. Ophelas may exaggerate when he speaks of 300 cities on the Mauretanian coast beyond the Pillars of Hercules; but the colonists and the Carthaginians after them stamped west Africa with a thor-

oughly Phœnician character, and their language was dominant, at least in the cities, far beyond the limits of their nationality, just as was the case with Latin and Arabic in later times.

The trading connections of the Phœnicians reached far beyond their most remote colonies, and it must have been their knowledge of Africa which encouraged Pharaoh Necho to send a Phœnician expedition to circumnavigate Africa. This greatest feat of ancient seamanship was actually accomplished in 611-605 B.C., at a time when the mother-country had already lost its independence, and the colonial empire had but a shadow of its former splendor. The power of Tyre rested directly on her colonies, which, unlike the Greek colonies, remained subject to the mother-city. Colonies paid tithes of all their revenues and sometimes also of booty taken in war to the Tyrian Hercules, and sent envoys to Tyre for his chief feast. But Tyre was too remote long to exercise as effective a control over her dependencies as was possible to the more favorably placed Carthage; the relation gradually became looser, and the more substantial obligations of the colonies ceased to be discharged; yet Carthage certainly paid tithes to the Tyrian Hercules as late as the middle of the sixth century B.C.

PHŒNIX. Herodotus, speaking of the animals in Egypt, mentions a sacred bird called "Phœnix" which he had only seen in a picture, but which the Heliopolitans said visited them once in 500 years, on the death of its father. The story of the Phœnix is repeated with variations by later writers, and was a favorite one with the Romans. The most familiar form of the legend is that in the *Physiologus*, where the Phœnix is described as an Indian bird which subsists on air for 500 years, after which, lading his wings with spices, he flies to Heliopolis, enters the temple there, and is burned to ashes on the altar. Next day the young Phœnix is already feathered; on the third day his pinions are full-grown, he salutes the priest and flies away. The period at which the Phœnix reappears is very variously stated, but 500 years is the period usually named; and Tacitus tells us that the bird was said to have appeared first under Sesostris, then under Amasis, again under Ptolemy III., and once more in 34 A. D.

PHŒNIXVILLE, a borough in the United States, in Schuylkill township, Chester county, Penn., is situated 27½ miles northwest of Philadelphia by the Philadelphia and Reading Railroad, on the right bank of the Schuylkill river, which is there joined by French Creek, crossed by eight fine bridges. Phœnixville is best known as the seat of the blast-furnaces and mills of the Phœnix Iron Company, which had its origin in a rolling and slitting mill erected in 1790 by Benjamin Longstreth, and long ranked as the largest in the country. The works cover 150 acres and employ sometimes 2,500 men. Phœnixville also contains a pottery, a sash and planing mill, a shirt-factory, and needle-works; and iron, copper, and lead are all mined in the neighborhood. The vicinity of the borough is noted for its large number of magnificent iron bridges. The population was 2,670 in 1850, 4,886 in 1860, 5,292 in 1870, 6,682 in 1889, and 8,514 in 1890.

PHONETICS, the matters pertaining to the voice, is the science and art of the production of sounds, including cries, by means of the organs of speech in man and their analogues in other animals.

In a more restricted sense, applied solely to human beings and to articulate significant sounds, the term "phonetics" is used to designate a work on the enumeration, evaluation, relations, classification, analysis, and synthesis of SPEECH-SOUNDS (*q.v.*)—that is, of the sounds actually used in speech for conveying and record-

ing thought by different nations and tribes, together with a means of fixing them by visible signs.

In a still more restricted and popular sense the term "phonetics" has been recently used for attempts to construct a new practical alphabet for English or other individual languages, or for several such languages simultaneously, with a view either of superseding the alphabets at present in use, or of improving their employment, or, at any rate, of facilitating the generally very difficult tasks of teaching and learning to read and write.

**PHONOGRAPH.** This apparatus, invented in 1877 by Thomas A. Edison, is designed to obtain a record of the sound vibrations resulting from articulate speech that can be mechanically reproduced at a distance of time. The instrument consists of a sender and a receiver or recorder. The sender consists of a tube having an open mouthpiece at one end, and bearing at the other end a thin diaphragm of metal or other substance, with a sharp point or stylus affixed to the center of its outer surface. The second apparatus consists of a cylinder, about four inches in diameter, having on its periphery a V-shaped groove cut spirally from end to end. Over this grooved cylinder a sheet of wax is placed, and the sender is advanced till the point of the style lightly touches the wax, over the opening of the V-shaped cut. While the words to be recorded are spoken or sung, the cylinder is turned rapidly, the apparatus for moving it giving a lateral as well as a circular motion. The point of the style thus traverses the wax spirally from end to end, and the vibrations in the diaphragm caused by the sounds result in a series of indentations in the wax. To reproduce the sounds in the transcriber (or in the sender) the cylinder is again presented to a style attached to a diaphragm, the style being pressed against the wax by a slight spring. The cylinder is now made to revolve, and the motion of the style upon the inequalities in the indented wax produces vibrations in the diaphragm corresponding to the sound-caused vibrations originally created in the instrument by the voice. The sounds are thus reproduced with great exactness, even the character of the voice being so perfectly rendered as to be recognized by anyone familiar with it. The record of sung or spoken sounds may be sent to a distance, or kept for an indefinite length of time, and the original sounds can be reproduced on applying to the proper instrument. In this manner messages have been sent back and forth from this country to Europe and repeated, by simply putting the tablet into the machine and turning the cylinder. Rubbings in wax may be taken from a plaster-cast of the original indented slip, so that copies may be sent to different persons, all of whom can thus reproduce the sounds so long as their wax copy remains intact.

**PHORMIUM, or NEW ZEALAND FLAX** (also called "New Zealand hemp"), is a fiber obtained from the leaves of *Phormium tenax* (ord. *Liliaceæ*). The plant is a native of New Zealand, the Chatham Islands, and Norfolk Island; it is now cultivated as an ornamental garden-plant in Europe, and for economic purposes it has been introduced into the Azores. The leaves grow from three to six and even nine feet in height and from two to three inches in breadth, springing from the extremity of a rhizome. After the tuft of leaves has continued growing for about three years a flowering stalk springs up to the height of about sixteen feet, and when it comes to maturity the whole plant dies down. Among the Maoris the fiber has always been an article of considerable importance, yielding cloaks, mats, cordage, fishing-lines, etc., its valuable properties having attracted the attention of traders even before colonists settled in the islands. The leaves, for fiber-yielding

purposes, come to maturity in about six months, and the habit of the Maoris is to cut them down twice a year, rejecting the outer and leaving the central immature leaves. Phormium is prepared with great care by native methods, only the mature fibers from the under-side of the leaves being taken. No means have yet been devised for producing by mechanical or chemical means fiber in the perfect condition it shows when selected and prepared by Maoris. Phormium is a cream-colored fiber with a fine silky gloss, capable of being spun and woven into many of the heavier textures for which flax is used, either alone or in combination with flax. It is, however, principally a cordage fiber, and in tensile strength it is second only to Manila hemp; recently it has come into use as a suitable material for the bands of self-binding reaping-machines.

**PHOSPHORESCENCE**, a name given to a variety of phenomena due to different causes, but all consisting in the emission of a pale more or less ill-defined light, not obviously due to combustion. In addition to phosphorescence after insolation many minerals exhibit this property under other circumstances: (*a*) on heating to a temperature much below what is known as a "red heat;" (*b*) on friction, as in the case of fused calcium chloride (Homberg's phosphorus); (*c*) on cleavage, a property manifested by mica, the two split portions becoming electrified—the one positive, the other negative; (*d*) on crystallization, as boracic acid after fusion, or water on rapid freezing. A few meteorological phenomena may also be mentioned. Rain has been seen to sparkle on striking the ground, and waterspouts and meteoric dust have presented a luminous appearance. The *ignis fatuus*, or will-o'-the-wisp, seen in marshy districts, has given rise to much difference of opinion. The vegetable kingdom has furnished few instances of the property under consideration; the earliest on record took place in the year 1762, when a daughter of Linnæus saw luminous emanations from a species of *Tropæolum*, since which time a like appearance has been noticed in *Helianthus annuus*, *Lilium bulbiferum*, *Calendula officinalis*, *Tagetes patula*, and *T. erecta*, all of which are red or orange-colored flowers. There are also a number of small marine phosphorescent organisms (*Pyrocystis*, *Peridinium*), concerning which it is impossible to say with certainty whether they should be referred to the animal or vegetable kingdom. But the most brilliant as well as the most varied and interesting cases of phosphorescence belong to the animal world, and there is not one of the larger groups which does not furnish some instances of it.

The light emitted by different animals varies very much in color: green has been noticed in the glow-worm, fireflies, some brittle-stars, centipedes, and annelids; blue is seen in the Italian firefly (*Luciola italica*); and this and light green are the predominant colors exhibited by marine animals, although the beautiful Girdle of Venus and some species of *Salpa* and *Cleodora* appear red, and *Pavonaria* and other gorgonoids lilac. The curious lantern-fly (*Fulgora pyrorhynchus*) has a purple light. One very remarkable instance is mentioned of an *Appendicularia* in which the same individual appeared first red, then blue, and finally green. In the lowest forms of life and in many jellyfish there seem to be no organs specially set apart for the production of light, this being emitted from the whole surface of the body. In other groups of animals the localization of the photogenic property in certain organs or tissues is universal, and these present the utmost variety in structure and situation.

Dead and putrescent animals are not infrequently phosphorescent; this fact has most commonly been observed in fish, though instances are not wanting in

which the property has been manifested by mollusks and other animals, and even by the human body. Furthermore a few startling but apparently well-authenticated instances are on record in which human beings have been luminous while yet alive owing to certain states of disease. The fact that the nervous system is often closely connected with the luminous organs indicates that the exhibition of the light is either dependent on the volition of the animal or is the reflex result of the stimulation of sensory nerves (Panceri). In the glow-worm the distribution of tracheæ (air-tubes) throughout the photogenic apparatus, and the fact that carbonic acid extinguishes the light while oxygen intensifies it, suggests that it is due to some form of slow combustion, while the fatty contents of the luminous cells of this and many other animals point to the probability that a fat containing free phosphorus is the active agent in the process. Since a large number of luminous organs retain their power after the death of the animal, and even after desiccation and subsequent moistening, there seems no necessity to adopt the theory that we have to deal with an instance of the direct transformation of vital into radiant energy. The well-known phosphorescence of the sea is due to the animals which inhabit it, except a few cases in which it has been ascribed to putrescent matter.

The service rendered by this property to its possessors is in many cases by no means obvious; indeed it would seem certain that to crustacean larvæ and other surface-organisms surrounded by voracious enemies phosphorescence must be a "perilous gift." The fact that so many deep-sea animals are phosphorescent, coupled with the discovery that many fish from those regions have large and normally-developed eyes while others have organs which appear to be adapted for the production of light, has led to the belief that this source of light becomes of great importance in the depths of the ocean where no sunlight penetrates—a hypothesis which is known as the "abyssal theory of light."

**PHOSPHORUS AND PHOSPHATES.** "Phosphorus" (light-bringer) had currency in chemistry as a generic term for all substances which shine in the dark without burning, until the name came to be monopolized by a peculiar kind of "phosphorus" which was discovered, some time previous to 1678, by the German alchemist Brand of Hamburg. Brand, hoping to obtain thereby an essence for the "ennobling" of silver into gold, subjected urine-solids to dry distillation. In lieu of the hoped-for essence he obtained as part of the distillate a wax-like, easily fusible solid, which, besides being phosphorescent, readily caught fire, to burn with a dazzling light into a white solid acid. The new phosphorus naturally excited universal interest; but it was, and remained, only a rather costly chemical curiosity until Scheele, in 1771, starting from the discovery of Gahn that bone-ash is the lime-salt of a peculiar non-volatile acid, proved that this acid is identical with the one formed in the combustion of phosphorus, and that the latter, being only "phlogisticated" bone-ash acid, can be obtained from it by distillation with charcoal at a high temperature. This method of Scheele's is used to the present day for the manufacture of phosphorus, and even the theoretical notion on which it rests is recognized as correct as far as it goes, anhydrous bone-ash acid being a compound of phosphorus with oxygen, the formation of which involves the liberation of part of the *energy* ("phlogiston") of each in the kinetic form of heat. That phosphorus is an elementary substance was originally a surmise, which, however, has been confirmed by all subsequent experiences. In comparatively recent times it was found that Brand's phosphorus is susceptible of passing (by mere loss of energy) into two

allotropic modifications, known as "red" and "metallic" phosphorus respectively, so that the name "phosphorus" has again come to assume a generic meaning, being used for these three substances and the element as such conjointly.

Recently purified phosphorus is a slightly yellowish or colorless solid of about the consistence of beeswax. At low temperatures it is brittle; specific gravity = 1.83 at 10° C. It fuses at 44.3° C. into a strongly light-refracting liquid of 1.743 (Kopp) specific gravity. Neither in the solid nor in the liquid state does it conduct electricity. When heated further (in an inert atmosphere such as hydrogen or carbonic-acid gas) it boils at 290° C., and assumes the form of a colorless vapor which at 1040° C. is 4.5 times as heavy as air or 65.1 times as heavy as hydrogen, whence it follows that its molecular weight is  $2 \times 65.1 = 130.2 =$  very nearly *four* times the atomic weight of phosphorus (31.0). Phosphorus is insoluble in water, more or less sparingly soluble in alcohol, ether, fatty oils, and oil of turpentine, and very abundantly soluble in bisulphide of carbon. When exposed to the air, and especially to moist air, it suffers gradual oxidation into phosphorus and phosphoric acids with evolution of a feeble light. Phosphorus does not phosphoresce in the *absence* of oxygen. Singularly, it does not phosphoresce in pure oxygen either, unless the tension of the gas be reduced to some point considerably below one atmosphere. Phosphorus is a most dangerous poison; doses of as little as 0.1 gram (= 1.5 grains) are known to have been fatal to adults. The heads of a few lucifer matches may suffice to kill a child. Phosphorus is used chiefly for the manufacture of lucifer matches (see MATCHES), and also in the manufacture of iodide of methyl and other organic preparations used as auxiliary agents in the tar-color industry. Phosphorus-paste, made by working up a small proportion of phosphorus melted under water in a hot mortar with flour, is used as poison for vermin.

**PHOTIUS**, patriarch of Constantinople from 857 to 867 and again from 877 to 886 A.D., the most eminent literary and ecclesiastical character of his age, was probably born between 820 and 825. At the height of glory and success he was suddenly precipitated from his dignity by a palace revolution. Archbishop Theodore Santabaren, his confidant and favorite, had accused Basil's son, Leo, of a conspiracy against his father. Leo owed his liberty and eyesight to Photius' entreaties; nevertheless, on his accession, in 886, he involved his benefactor in the ruin of his accuser. Arrested, degraded from the patriarchate, banished to the monastery of Bordi in Armenia, Photius, as if by magic, disappears from history. No letters of this period of his life are extant, which leads to the inference that his imprisonment was severe. The precise date of his death is not known, but it is said to have occurred on February 6, 891.

**PHOTOGRAPHY.** It would be somewhat difficult to fix a date when what we now know as "photographic action" was first recorded. We may take it that Scheele, the Swedish chemist, was the first to enter upon a scientific investigation of the darkening action of sunlight on silver chloride. He found by experiment that when silver chloride was exposed to the action of light beneath water there was dissolved in the fluid a substance which, on the addition of caustic (silver nitrate), caused the precipitation of new silver chloride, and that on applying liquor ammonia to the blackened chloride an insoluble residue of metallic silver was left behind. He also noticed that of the rays of the spectrum the violet most readily blackened the silver chloride. In Scheele, then, we have the first who applied combined chemical and spectrum analysis to the science of photography.

To England belongs the honor of first producing a photograph by the utilization of Scheele's observations on chloride of silver.

The first to found a process of photography which gave pictures that were subsequently unaffected by light was Nicéphore de NIEPCE, (*q.v.*) His process, which he called provisionally "héliographie, dessins, et gravures," consists in coating the surface of a metallic plate with a solution of asphaltum in oil of lavender and exposing it to a camera image. In his description he recommends that the asphaltum be powdered and the oil of lavender dropped upon it in a wine-glass, and that it be then gently heated. A polished plate is covered with this varnish, and, when dried, is ready for employment in the camera. After requisite exposure, which is very long indeed, a very faint image, requiring development, is seen. Development is effected by diluting oil of lavender with ten parts in volume of white petroleum. After this mixture has been allowed to stand two or three days it becomes free from turbidity and is ready to be used. The plate is placed in a dish and covered with the solvent. By degrees the parts unaffected by light dissolve away, and the picture, formed of modified asphaltum, is developed. The plate is then lifted from the dish, as much as possible of the solvent being allowed to drain away. It is next placed on an inclined support and carefully freed from all the remaining solvents by washing in water. Subsequently, instead of using oil of lavender as the asphaltum solvent, Niepce employed an animal oil, which gave a deeper color and more tenacity to the surface-film than did his original agent.

Later still, Daguerre and Niepce used as a solvent the brittle residue obtained from evaporating the essential oil of lavender dissolved in ether or alcohol—a transparent solution of a lemon-yellow color being formed. This solution was used for covering glass or silver plates, which, when dried, could be used in the camera. The time of exposure varied somewhat in length. Daguerre remarked that "the time required to procure a photographic copy of a landscape is from seven to eight hours, but single monuments, when strongly lighted by the sun, or which are themselves very bright, can be taken in about three hours." Perhaps there is no sentence which could be quoted that illustrates more forcibly the advance made in photography from the days when this process was described. The ratio of three hours to  $\frac{1}{15}$  of a second is a fair estimate of the progress made since Niepce.

*Daguerreotype.*—We have already noticed in the joint process of Daguerre and Niepce that polished silver plates were used, and we know from the latter that among the chemical agents tried iodine suggested itself. Iodine vapor or solution applied to a silvered plate would cause the formation of silver iodide on those parts not acted upon by light. The removal of the resinous picture would leave an image formed of metallic silver, while the black parts of the original would be represented by the darker silver iodide. This was probably the origin of the daguerreotype process.

Daguerreotype pictures were originally taken on silver-plated copper, and even at the present day the silvered surface thus prepared serves better than electro-deposited silver of any thickness. An outline of the operations is as follows:—A brightly-polished silver plate is cleaned by means, first of finely-powdered pumice and olive oil, then of a dilute nitric acid, and a soft buff is employed to give it a brilliant polish, the slightest trace of foreign matter or stain being fatal to the production of a perfect picture. The plate, thus prepared, is ready for the iodizing operation. Small fragments of iodine are scattered over a saucer, covered

with gauze. Over this the plate is placed, face downward, resting on supports, and the vapor from the iodine is allowed to form upon it a surface of silver iodide, which is the sensitive compound. It is essential to note the color of the surface-formed iodide at its several stages, the varying colors being due to interferences caused by the different thicknesses of the minutely thin film of iodide of silver. The stage of maximum sensitiveness is obtained when it is of a golden orange color. In this state the plate is withdrawn and removed to the dark side of the camera, ready for exposure. Long exposures were required, varying in Paris from three to thirty minutes. The length of the exposure was evidently a matter of judgment, more particularly as over-exposure introduced an evil which was called "solarization," but which was in reality due to the oxidation of the iodide, itself altered by prolonged exposure to light. As a matter of history it may be interesting to remark that the development of the image by means of mercury vapor is said to be due to a chance discovery of Daguerre.

The first great improvement in the daguerreotype process was the resensitizing of the iodized film by bromine vapor. Mr. Goddard published his account of the use of bromine in conjunction with iodine in 1840, and M. Claudet employed a combination of iodine and chlorine vapor in 1841. In 1844 Daguerre published his improved method of preparing the plates, which is in reality based on the use of bromine with iodine.

*Fox-Talbot Process.*—In January, 1839, Fox Talbot described the first of his processes, photogenic drawing, in a paper to the Royal Society. He states that he began experimenting in 1834, and that in the solar microscope he obtained an outline of the object to be depicted in full sunshine in half a second. We must turn, however, to the *Philosophical Magazine* for the account of the full details of his method, which consisted essentially in soaking paper in common salt, brushing one side only of it with about a 12 per cent. solution of silver nitrate in water, and drying at the fire. Fox Talbot stated that by repeating the alternate washes of the silver and salt—always ending, however, with the former—greater sensitiveness was attained. This is the same in every respect as the method practiced by Wedgwood in 1802; but, when we come to the next process, which he called "calotype" or "beautiful picture," we have a distinct advance. This process Talbot protected by a patent in 1841. It may be briefly described as the application of iodide of silver to a paper support. Carefully-selected paper was brushed over with a solution of silver nitrate (100 grains to the ounce of distilled water), and dried by the fire. It was then dipped into a solution of potassium iodide (500 grains being dissolved in a pint of water), where it was allowed to stay two or three minutes until silver iodide was formed. In this state the iodide is scarcely sensitive to light, but is sensitized by brushing "gallo-nitrate of silver" over the surface to which the silver nitrate had been first applied. This "gallo-nitrate" is not a chemical compound, but merely a mixture, consisting of 100 grains of silver nitrate dissolved in two ounces of water, to which is added one-sixth of its volume of acetic acid, and immediately before applying to the paper an equal bulk of a saturated solution of gallic acid in water. The prepared surface is then ready for exposure in the camera, and, after a short isolation in the dark, develops itself, or the development may be hastened by a fresh application of the "gallo-nitrate of silver." The picture is then fixed by washing it in clean water and drying slightly in blotting paper, after which it is treated with a solution of potassium bromide, and again washed and dried. Here there is no mention made of hyposulphite of soda

as a fixing agent, that having been first used by Sir J. Herschel in February, 1840.

*Albumen Process on Glass.*—It was a most decided step in advance when Niepce de St. Victor, a nephew of Nicéphore de Niepce, employed a glass plate and coated it with iodized albumen. The originator of this method did not meet with much success. In the hands of M. Blanquart Évrard it became more practicable; but it was carried out in its greatest perfection by M. Le Gray. The outline of the operations is as follows:—The whites of five fresh eggs are mixed with about one hundred grains of potassium iodide, about twenty grains of potassium bromide, and ten grains of common salt. The mixture is beaten up into a froth with an egg-whisk or fork, and allowed to settle for twenty-four hours, when the clear liquid is decanted off. A circular pool of albumen is poured on a glass plate, and a straight rule (its ends being wrapped with waxed paper to prevent its edge from touching the plate anywhere except at the margins) is drawn over the plate, sweeping off the excess of albumen, and so leaving an even film. The plate is first allowed to dry spontaneously, a final heating being given to it in an oven or before the fire. The heat hardens the albumen, and it becomes insoluble and ready for the nitrate-of-silver bath. One of the difficulties is to prevent crystallization of the salts held in solution, and this can only be effected by keeping them in defect rather than in excess. The plate is sensitized for five minutes in a bath of nitrate of silver, acidified with acetic acid, and exposed while still wet, or it may be slightly washed and again dried and exposed while in its desiccated state. The image is developed by gallic acid in the usual way. After the application of albumen many modifications were introduced in the shape of starch, serum of milk, gelatin, all of which were intended to hold iodide *in situ* on the plate; and the development in every case seems to have been by gallic acid.

*Collodion Process.*—A great impetus was given to photography in 1850, rendering it easy of execution and putting it into the hands of the comparatively untrained. This was the introduction of collodion, a vehicle which up to the present day holds its own against the more rapid processes on account of the facility with which the plates are prepared, and also because it is a substance totally unaffected by silver nitrate, which is not the case when any other organic substance is employed, and, it may be said, inorganic as well in many instances.

In 1844, Hunt introduced another reducing agent, which has continued to be the favorite down to the present time, viz., ferrous sulphate. By its use the time of necessary exposure of the plate is reduced, and the image develops with great rapidity.

*Dry Plates.*—It would appear that the first experiments with collodion dry plates were due to M. Gaudin. In *La Lumière* of April 22 and May 27, 1854, he describes his researches on the question; while in England, Mr. G. R. Muirhead, on August 4, 1854, stated that light acts almost as energetically on a dry surface as on a wet after all the silver has been washed away from the former previous to desiccation. Doctor Taupenot, however, seems to have been the first to use a dry-plate process that was really workable. His original plan was to coat a plate with collodion, sensitize it in the ordinary manner, wash it, cause a solution of albumen to flow over the surface, dry it, dip it in a bath of silver nitrate, acidified with acetic acid, and wash and dry it again. The plate was then in a condition to be exposed, and was to be developed with pyrogallic acid and silver.

A great advance was made in all dry-plate processes by the introduction of what is known as the "alkaline developer," which is, however, inapplicable to all plates

on which silver nitrate is present in the free state. The introduction of this developer is believed to be of American origin; and it is known that in the year 1862 Major Russell used it with the dry plates he introduced. An alkaline developer consists of an alkali, a reducing agent, and a restraining agent. These bodies, when combined and applied to the solid bromide or chloride of silver, after being acted upon by light, as when a plate was exposed to the camera image, were able to reduce the sub-bromide or sub-chloride, and to build up an image upon it, leaving the unaltered bromide intact, except so far as it was used in the building up.

The alkalis used embraced all the alkalis themselves and the mono-carbonates. The sole reducing agent up till recent times was pyrogallic acid. In the year 1880 Abney found that hydrokinone was even more effective than pyrogallic acid, its reducing power being stronger. Various other experimentalists tried other kindred substances, but without adding to the list of really useful agents. In 1884, however, Herr Egli and Arnold Spiller brought out hydroxylamin as a reducing agent, which promises to be of great use if it can be prepared cheaply enough.

*Collodion Emulsion Processes.*—In 1864 Bolton and Sayce published the germ of a process which revolutionized photographic manipulations, and by a subsequent substitution of gelatin for collodion gave an impetus to photography which has carried it to that state of perfection at which it has arrived at the present time (1890). The outline of the method was to dissolve a soluble bromide in plain collodion, and add to it drop by drop an alcoholic solution of silver nitrate, the latter being in excess or defect according to the will of the operator. To prepare a sensitive surface the collodion containing the emulsified sensitive salt was poured over a glass plate, allowed to set, and washed till all the soluble salts resulting from the double decomposition of the soluble bromide and the silver nitrate, together with the unaltered soluble bromide or silver nitrate, were removed, when the film was exposed wet, or allowed to dry and then exposed. The rapidity of these plates was not in any way remarkable, but the process had the great advantage of doing away with the sensitizing nitrate-of-silver bath, and thus avoiding a tiresome operation. The plates were developed by the alkaline method, and gave images which, if not primarily dense enough, could be intensified by the application of pyrogallic acid and silver nitrate as in the wet collodion process.

*Gelatin Emulsion Process.*—The facility with which collodion emulsion plates could be prepared had turned all investigation into this channel, and collodion was not the only vehicle that was tried for holding the sensitive salts in suspension. As early as September, 1871, Dr. R. L. Maddox had tried emulsifying the silver salt in gelatin, and had produced negatives of rare excellence. In November, 1873, Mr. King described a similar process, getting rid of the soluble salts by washing. Efforts had also been made in this direction by Mr. Burgess in July, 1873. Mr. R. Kennett, in 1874, may be said to have been the first to put forward the gelatin emulsion process in a practical and workable form, as he then published a formula which gave good and quick results. It was not till 1878, however, that the great capabilities of silver bromide when held in suspension by gelatin were fairly known; in March of that year Mr. C. Bennett showed that by keeping the gelatin solution liquid at a low temperature for as long as seven days extraordinary rapidity was conferred on the sensitive salt. It may in truth be said that the starting-point of rapid plates was 1878, and that the full credit of this discovery should be allotted to Mr. C. Bennett.

The warming process introduced by Bennett was soon superseded. Col. Stuart Wortley in 1879 announced that, by raising the temperature of the vessel in which the emulsion was stewed to 150° Fahr., instead of days being required to give the desired sensibility only a few hours were necessary. A further advance was made by boiling the emulsion, first practiced, we believe, by Mr. Mansfield in 1879. Another improvement was effected by Mr. W. B. Bolton by emulsifying the silver salt in a small quantity of gelatin and then raising the emulsion to boiling point, boiling it for from half an hour to an hour, when extreme rapidity was attained. It would be impossible to enumerate many minor improvements in this process that have from time to time been made; it is sufficient to state in historical sequence the different important stages through which it has passed. It may be useful to give an idea of the relative rapidities of the various processes we have described.

Daguerreotype, originally.....	half an hour's exposure.
Calotype .....	2 or 3 minutes' exposure.
Collodion.....	10 seconds' exposure.
Collodion emulsion.....	15 seconds' exposure.
Rapid gelatin emulsion.....	1-15 second's exposure.

By this it will be seen what advances have been made in the art of photography during the fifty years of its existence.

*Photo-Lithography.*—Reference has already been made to the effect of light on gelatin impregnated with bichromate of potash, whereby the gelatin becomes insoluble, and also incapable of absorbing water where the action of the light has had full play. It is this last phenomenon which occupies such an important place in photo-lithography. In the spring of 1859, Asser, of Amsterdam, produced photographs on a paper basis in printer's ink. Being anxious to produce copies of such prints mechanically, he conceived the idea of transferring the greasy ink impression to stone, and multiplying the impressions by mechanical lithography. Following very closely upon Asser, J. W. Osborne, of Melbourne, made a similar application; his process is described by himself in the *Photographic Journal* for April, 1860, as follows:—"A negative is produced in the usual way, bearing to the original the desired ratio. \* \* \* A positive is printed from this negative upon a sheet of (gelatinized) paper, so prepared that the image can be transferred to stone, it having been previously covered with greasy printer's ink. The impression is developed by washing away the soluble matter with hot water, which leaves the ink on the lines of print of the map or engraving." The process of transferring is accomplished in the ordinary way. Early in 1860, Col. Sir H. James, R.E., F.R.S., brought forward the Southampton method of photo-lithography, which had been carefully worked out by Captain de Courcy Scott, R.E.

**PHOTOGRAPHIC ENGRAVING, or PHOTO-ENGRAVING.** In one of these processes a steel plate, such as is prepared for engravers, is first dipped into a solution containing acetic and sulphuric acids; it is then coated with a mixture containing a solution of fine gelatin and bichromate of potash. This is impressed with the image of a photographic negative by exposure in the copying frame, and washed. The film of gelatin is previously yellow, but the action of the light through the light parts of the photograph change it dark brown, but the remainder is unaffected; consequently, a picture is produced of a light yellow color on a dark ground. The action of the light is to reduce the bichromate of potash, and, consequently, to render the gelatin combined with it insoluble; while those portions which have been protected from the action of the light by the dark parts of the negative are still readily soluble in

water, and can be removed by soaking; the insoluble portion thus forms a raised picture, which is submitted to a solution containing bichloride of patina in certain proportions, with a little free acid and water, which etches out the exposed parts of the plate, and renders it fit for engraving from. An ingenious method of giving to the whole picture the appearance of an engraving consists in spreading over the gelatinized plate, when nearly dry, a piece of fine muslin, and evenly pressing it so as to leave an impression of the cross-lines of the textile material upon the surface. A modification of this system is that, instead of washing, the gelatinized surface is thinly but evenly covered with finely powdered copal or other resin, and the under-side of the plate exposed to sufficient heat to melt the resin, so as to make a thin varnish over the whole. The etching fluid is then poured on, and, notwithstanding the resin coating, it acts through to the metal, and eats in wherever the gelatin has not been rendered insoluble by the action of the bichromate of potash and the light. When sufficiently etched, it is washed in clean water, and the plate is freed from the resin and the gelatin. The same processes, with some modifications, applied to zinc, constitute Photo-zincography, and to stone, Photo-lithography, both of which are largely practiced.

**PHOTOMETER** (Gr. *phos*, light; *metron*, measure), an instrument for measuring the intensity of light. The instrument consists of a screen of thin paper placed vertically, and behind it, at the distance of a few inches, is placed a cylindrical stick, or any other similar body. When the intensity of light from two flames is to be compared, they are placed behind this stick in such a way that each casts a separate shadow of the stick upon the paper screen. The observer stands in front of the screen, and directs the removal of the two lights either to or from the stick, till the shadows which are cast upon the screen are equally obscure. The distance of each light from the shadow it casts on the screen is then measured; and the squares of these distances give the relative intensities of the two lights. This photometer may also be modified by employing, instead of a cylindrical stick, a second screen parallel to the first, but of greater thickness, and having an aperture cut in its center.

**PHOTOMETRY, CELESTIAL.** The earliest records that have come down to us regarding the relative positions of the stars in the heavens have always been accompanied with estimations of their relative brightness. With this brightness was naturally associated the thought of the relative magnitudes of the luminous bodies from which the light was assumed to proceed. Hence in the grand catalogue of stars published by Ptolemy (c. 150 A.D.), but which had probably been formed 300 years before his day by Hipparchus, the 1,200 stars readily visible to the naked eye at Alexandria were divided into six classes according to their luster, though instead of that term he used the word "magnitude;" the brightest he designates as being of the first magnitude, and so downward till he comes to the "least visible," to which he assigns the sixth. These magnitudes he still further divides each into three. He does not, indeed, tell us the precise process by which these divisions were estimated, but the principle involved is obvious. The eye was here made the natural photometer, and it is certain that even in the instances where modern instrumental appliances are called into requisition the ultimate appeal is made to perception by the eye. Moreover, it is one of the many remarkable instances of the acuteness and precision of the Greek mind that for upward of 1,500 years no real improvement was made in these estimations of luster by any of Ptolemy's numerous successors in this field of research.

Flamsteed was the first astronomer who extended the estimation of magnitude to stars visible only by the telescope.

It was not till the year 1796 that any real advance was made in stellar photometry. Sir W. Herschel, instead of assigning a particular magnitude to stars, arranged them in small groups of three or four or five, indicating the order in which they differed from each other in luster at the time of observation. This method was admirably adapted to the discovery of any variations in brightness which might occur in the lapse of time among the members of the group. Sir William observed in this way some 1,400 stars.

It is to Sir John Herschel that we are indebted for the first successful attempt at stellar photometry by what may be termed "artificial" means. By the aid of appliances of the simplest kind he deflected the light of the moon (by means of the internal reflection of a rectangular prism) through a small lens 0.12 inch in diameter and of very short focus, 0.2253 inch, so as to form a sort of artificial star in its focus. By the instrumentality of strings and a wooden pole he could move this artificial star of comparison so as to be in the same line of sight with any actual star whose light he proposed to measure. Other strings enabled him to remove this microscopic lunar image to such a distance from the eye that its light was adjudged to be sensibly the same as that of the star compared. The distance of the short focused lens with the image contiguous to it was measured with a graduated tape, and the inverse squares of these distances afforded relative numerical measures of the brightness of the several stars thus brought into ocular juxtaposition with the equalized light of the tiny lunar image. In this way he proceeded with the observations of a considerable number of stars, and these, by appropriate methods, were reduced so as to afford the means of the comparison of their relative brightness when set side by side with results obtained by means of his "sequences," and with the estimated magnitudes of preceding astronomers. Sir John, however, did not go on to the formation of a complete "uranometria." Various other methods have been proposed and used by different observers. The most recent and probably the most successful device for a stellar photometer on the *principle of equalizing lights* is that invented by Professor Pickering of Harvard College. He deflects the light of Polaris, or of some other star such as *Lambda Ursæ Minoris*, by means of prismatic reflection, and he contrives to form an image of it contiguous to the image of any other star selected on the meridian. The equalization of the lights is then effected by the intervention of a polarizing apparatus, such as that adopted by Zöllner. Thus the artificial and in many respects objectionable lamp-star of Zöllner is dispensed with. Professor Pickering, with singular inventive power, has devised many other forms of stellar photometers on virtually the same principle. Unlike his eminent predecessors, the American astronomer is persevering in the formation of a complete catalogue of star-magnitudes.

PHOTOPHONE is the name of an apparatus which may be said to transmit articulate speech to a distance along a beam of light. In the photophone found most serviceable the transmitter is a plane mirror of silvered microscope glass or thin mica; the receiver, fixed at a distance, without any connection, is a parabolic reflecting mirror, in the focus of which is placed a sensitive selenium cell, connected in local circuit with a battery and telephone. When the apparatus is used, a strong beam of light is concentrated by a lens in the plane mirror; the speaker directs his voice against the back of this mirror, which is thrown into vibrations corresponding

with those of the voice. The reflected beam of light, to which similar vibrations are also communicated, is directed through a lens to the receiving mirror, and creates in the selenium cell a rapidly intermittent current, which at the end of the telephone attached becomes audible again as vocal sound. The rays of the oxyhydrogen light, or of an ordinary kerosene lamp, suffice for transmitting articulate speech.

PHOTO-SCULPTURE, invented by M. Willème in 1867, is an ingenious use of photography to assist a sculptor in modeling portrait statues, or fac-similes and reduced reproductions of other statues. The subject stands in the center of a circular chamber, and is simultaneously photographed by no less than twenty-four cameras, arranged at equal distances around the chamber. The twenty-four photographs are subsequently made available in the sculptor's studio, where the clay model is arranged on a frame capable of being turned around. A magic lantern throws the outline of photograph No. 1 on a screen in front of the artist, who by means of a pantograph brings this outline to bear on the clay in its first position. The model is then turned around  $\frac{1}{24}$  of a revolution, and the outline of photograph No. 2 is taken advantage of. Thus the modeler works his way, in twenty-four changes, around the model, and the likeness or fac-simile or reduced figure of the original is or should be complete.

PHRENOLOGY. This name was given by Forster in 1815 to the empirical system of psychology formulated by Gall and developed by his followers, especially by Spurzheim and Combe. At first it was named "cranioscopy," "craniology," "physiognomy," or "zoöonomy," but Forster's name was early adopted by Spurzheim, and became that whereby the system is now known. The principles upon which it is based are four: (1) the brain is the organ of the mind; (2) the mental powers of man can be analyzed into a definite number of independent faculties; (3) these faculties are innate, and each has its seat in a definite region of the brain; (4) the size of each of these regions is the measure of the power of manifesting the faculty associated with it. While Phrenology is thus, on the one hand, a system of mental philosophy, it has a second and more popular aspect as a method whereby the disposition and character of the individual may be ascertained. These two sides of the subject are distinct from each other, for, while it can only serve as a reliable guide for reading character on the assumption of its truth as a philosophic system, yet the possibility of its practical application does not necessarily follow from the establishment of the truth of its theoretic side.

Early in the thirteenth century Albertus Magnus gave a detailed description of the distribution of mental and psychical faculties in the head. The anterior region he assigned to judgment, the middle to imagination, and the posterior to memory. A somewhat similar allocation was made by Gordon, professor of medicine in Montpellier (1296), who assigned common sensation and the reception of impressions to the anterior cornua of the lateral ventricles, *phantasia* to the posterior, this power being twofold (*imaginativa* and *cogitativa*), judgment or *astimativa* to the third ventricle, and memory to the fourth. Figures of a similar division were given by Petrus Montagnana and Lodovico Dolce, still later by Ghiradelli of Bologna and by Theodore Gall of Antwerp. That the "vital spirits" resided in the ventricles was doubted by many, and refuted by a few of the anatomists of the seventeenth century. Bauhin, in 1621, attacked the old view, and Hoffmann of Altorf showed that, as the ventricles were closed cavities, they could not transmit any material fluid. That these spirits existed at all was doubted by Alex-



ander Benedictus, Plater, and a few others; but they were believed in by the great majority of seventeenth and even of eighteenth century medical writers.

Of later writers three deserve special notice as having largely prepared the way for the more modern school of Phrenology. Unzer of Halle in his work on physiology extended the preëxisting theories of localization. Metzger, twenty years before the publication of Prochaska's work, had proposed to make a series of observations on the anatomical characteristics of the brains of persons of marked intellectual peculiarity; but it is not known to the present writer whether he ever carried this into effect. In a more special manner Prochaska of Vienna may be looked upon as the father of Phrenology, as in his work on the nervous system, published in Vienna in 1784, are to be found the germs of the later views which were propounded in that city twelve years later.

The system formulated by Gall is thus a modern expansion of an old empirical philosophy, and its immediate parentage is easily traced, although, according to Gall's account, it arose with him as the result of independent observations. These, he tells us, he began to make at an early age, by learning to correlate the outward appearances and mental qualities of his school-fellows. Gall's first published paper was a letter in the *Deutscher Merkur* of December, 1798, but his principal expositions were oral, and attracted much popular attention, which largely increased when, in 1802, he was commanded by the Austrian Government, at the instance of the ecclesiastical authorities, to discontinue his public lectures. In 1804 he obtained the coöperation of Spurzheim (1776-1832), a native of Longwich, near Treves, who became his pupil in 1800, and proved a powerful ally in promulgating the system. Master and pupil first taught in harmony, but they found it advisable to separate in 1813; and we find Spurzheim, several years after their parting, declaring that Gall had not introduced any new improvements into his system since their separation. "My philosophical views," he also says, "widely differ from those of Gall."

The popularity of Phrenology has waned, and few of the phrenological societies survive; the cultivation of the system is confined to a few enthusiasts such as will be found attached to any cause, and some professional teachers who follow Phrenology as a vocation. Like many similar systems, it has a much larger following in America than in Europe. Based, like many other artificial philosophies, on an admixture of assumption and truth, certain parts will survive and become incorporated into scientific psychology, while the rest will in due course come to be relegated to the limbo of effete heresies.

*The Faculties and their Localities.*—The system of Gall was constructed by a method of pure empiricism, and his so-called organs were for the most part identified on slender grounds. Having selected the place of a faculty, he examined the heads of his friends and casts of persons with that peculiarity in common, and in them he sought for the distinctive feature of their characteristic trait. Gall marked out on his model of the head the places of twenty-six organs as round inclosures with vacant interspaces. Spurzheim and Combe divided the whole scalp into oblong and conterminous patches. Other methods of division and other names have been suggested by succeeding authors, especially by Cox, Sidney Smith (not Sydney), Toulmin Smith, Carus of Dresden, Don Mariano Cubi i Solar, Powell of Kentucky, Buchanan of Cincinnati, Hittel of New York. Some, like the brothers Fowler, raise the number of organs to forty-three; but the system of Spurzheim and Combe is that which has always been most popular in Britain.

Spurzheim separated the component faculties of the human mind into two great groups, and subdivided these as follows:

- I. Feelings, divided into—
  1. Propensities, internal impulses inviting only to certain actions.
  2. Sentiments, impulses which prompt to emotion as well as to action.
    - A. Lower—those common to man and the lower animals.
    - B. Higher—those proper to man.
- II. Intellectual faculties—
  1. Perceptive faculties.
  2. Reflective faculties.

Even though no fault could be found with the physiology and psychology of Phrenology, it would not necessarily follow that the theory could be utilized as a practical method of reading character. For although the inner surface of the skull is molded on the brain and the outer surface approximates to parallelism thereto, yet the correspondence is sufficiently variable to render conclusions therefrom uncertain. The spongy layer or diploe which separates the two compact tables may vary conspicuously in amount in different parts of the same skull as in the cases described by Professor Humphrey (*Journ. of Anat.*, vol. viii., page 187). The frontal sinus that opprobrium phrenologicum, is a reality not infrequently of large size and may wholly occupy the regions of five organs, the centers of ossification of the frontal and parietal bones, the muscular crests of these and the occipital bones, also, differ in their prominence in different skulls. Premature synosposes of sutures mold the brain without doing much injury to its parts. Artificial malformations alter the apparent skull shape considerably and affect the relative development of the brain but little. All these and other cogent reasons of a like kind, whose force can be estimated by those accustomed to deal with the component soft parts of the head, should lead phrenologists to be careful in predicting relative brain power from skull shape. Psychology, physiology, and experience alike contribute to discredit the system and to show how worthless the so-called diagnoses of character really are. Its application by those who are its votaries is seldom worse than amusing, but it is capable of doing positive social harm, as in its proposed application to the discrimination or selection of servants and other subordinate officials. It has even been proposed to use it for the purposes of the guaranteeing society and for the selection of parliamentary representatives. The sarcastic suggestion which originated with Christopher North of molding children's heads so as to suppress the evil and foster the good was actually repeated in good faith by a writer on Phrenology, but experience of the effects of malformation leads one to be skeptical as to the feasibility of this mode of producing a social Utopia. The application of Phrenology to the art of painting and sculpture has been suggested, but a careful examination of some of the best pictures of the best masters who were close observers of nature, shows that no phrenological principles were accepted by them in their works. An application to ethnology has also been proposed, but although there are in most cases well marked racial characteristics presented by the skull, yet all attempts at correlating national characteristics therewith have been groundless and worthless. For further particulars on allied subjects see PHYSIOGNOMY.

There is a large weight of evidence which can not be explained away, in favor of the existence of some form of localization of function. So little is known of the physical changes which underlie psychical phenonoma, or indeed of the succession of the psy-

chical processes themselves, that we can not as yet judge as to the nature of the mechanism of these centers. So much of the psychic work of the individual life consists in interpretation of sensations and translation of these into motions that there are strong *a priori* grounds for expecting too much of the material of the nerve centers occupied with this kind of work, but in the present conflict of experimental evidence it is safer to suspend judgment. That these local areas are not centers in the sense of being indispensable parts of their respective motor apparatuses is clear; as the function abolished by ablation of a part returns, though tardily, so that whatever superindendence the removed region exercised apparently becomes assumed by another part of the brain. Experimental physiology and pathology, by suggesting other functions for much of the brain service are thus directly subversive of much of the Phrenology of Gall and Spurzheim.

PHRYGIA was the name of a large country in Asia Minor, inhabited by a race which the Greeks called *Phryges*, *Freemen*. Roughly speaking, Phrygia comprised the western part of the great central plateau of Anatolia, extending as far east as the river Halys; but its boundaries are vague, and varied so much at different periods that a sketch of its history must precede any account of the geography. According to unvarying Greek tradition the Phrygians were most closely akin to certain tribes of Macedonia and Thrace; and their near relationship to the Hellenic stock is proved by all that is known of their language and art, and is accepted by almost every modern authority. The country named Phrygia in the better known period of history lies inland, separated from the sea by Paphlagonia, Bithynia, Mysia, and Lydia. Yet we hear of a Phrygian "thalassocracy" at the beginning of the ninth century B.C. The Troad and the district around Mount Sipylus are frequently called Phrygian, as also is the seaport Sinope; and a district on the coast between Sestus and the river Cius was regularly named Little Phrygia. Again, the wide currency of names like Mygdones, Doliones, and Phryges or Briges both in Asia Minor and in Europe has been pointed out, and many other examples may be added. The inference has been generally drawn that the Phrygians were a stock wide-spread in the countries which lie around the Ægean Sea. There is, however, no decisive evidence, and no agreement among modern scholars, as to whether this stock came from the East over Armenia, or whether it was European in origin and crossed the Hellespont into Asia Minor.

It is impossible to fix a date for the beginning of the Phrygian kingdom. It appears to have arisen on the ruins of an older civilization, whose existence is revealed to us only by the few monuments which it has left.

The downfall of the Phrygian monarchy can be dated with comparative accuracy. Between 680 and 670 the Cimmerians in their destructive progress over Asia Minor overran Phrygia; the king Midas in despair put an end to his own life; and from that time the history of Phrygia is a story of slavery, degradation, and decay, which contrasts strangely with the earlier legends. The catastrophe seems to have deeply impressed the Greek mind, and the memory of it was preserved. The date of the Cimmerian invasion is fixed by the concurrent testimony of the contemporary poets Archilochus and Callinus, of the late chronologers, Eusebius, etc., and of the inscriptions of the Assyrian king Essar-haddon. The Cimmerians were finally expelled from Asia Minor by Alyattes before his war with the Medes under Cyaxares, (590-585 B.C.)

Alexander the Great placed Phrygia under the command of Antigonus, who retained it when the empire was broken up. When Antigonus was defeated and

slain at the decisive battle of Ipsus, Phrygia came under the sway of Seleucus. As the Pergamenian kings grew powerful, and at last confined the Gauls in eastern Phrygia, the western half of the country was incorporated in the kingdom of Pergamum. Under the Roman empire Phrygia had no political existence under a separate government, but formed part of the vast province of Asia. In autumn, 85 B.C., the pacification of the province was completed by Sulla, and throughout the imperial time it was common for the Phrygians to date from this era.

When the Roman empire was reorganized by Diocletian, at the end of the third century, Phrygia was divided into two provinces, distinguished at first as Prima and Secunda, or Great and Little, for which the names Pacatiana and Salutaris soon came into general use. Pacatiana comprised the western half, which had long been completely pervaded by Græco-Roman manners, and Salutaris the eastern, in which the native manners and language were still not extinct. Each province was governed by a "præses" about 412 A.D., but shortly after this date an officer of consular rank was sent to each province, (Hierocles, *Synecd.*) About 535 Justinian made some changes in the provincial administration: the governor of Pacatiana was henceforth a "comes," while Salutaris was still ruled by a "consularis." When the provinces of the Eastern empire were reorganized and divided into "themata" the two Phrygias were broken up between the Anatolic, Opsician, and Thracesian themes, and the name Phrygia finally disappeared. Almost the whole of the Byzantine Phrygias is now included in the vilayet of Broussa or Khodavendikya, with the exception of a small part of Parorius and the district about Themisonium (Karayuk Bazar) and Ceretapa (Kayadibi), which belong to the vilayet of Koniye, and the district of Laodicea and Hierapolis, which belongs to Aidin. The principal modern cities are Kutayah (Cotyæum), Eski Sheher (Dorylæum), Afum Kara Hissar (near Prynnessus), and Ushak (near Trajanopolis).

PHRYNE, a celebrated Greek courtesan, flourished in the time of Alexander the Great, (fourth century B.C.) She was born at Thespiæ in Bœotia, but seems to have lived at Athens. On the occasion of a festival of Poseidon at Eleusis she laid aside her garments, let down her hair, and stepped into the sea in the sight of the people, thus suggesting to the painter Appelles his great picture of Aphrodite rising from the Sea, for which Phryne sat as model. The sculptor Praxiteles was one of her lovers, and she is said to have been the model of his celebrated Cnidian Aphrodite, which Pliny declared to be the most beautiful statue in the world. Being accused of impiety by Euthias, she was defended by the orator Hyperides, one of her lovers. When it seemed that the verdict was about to be against her, he rent her robe and displayed her lovely bosom, which so moved her judges that they acquitted her.

PHRYNICHUS, the name of a number of distinguished Greeks, of whom the most prominent were the following:—

I. PHRYNICHUS, one of the earliest tragic poets of Athens, was the son of Polyphradmon, and a pupil or follower of Thespiis, who is commonly regarded as the founder of tragedy. But such were the improvements introduced by Phrynichus that some of the ancients regarded him as its real founder. He flourished, according to Cyrillus and Eusebius, in 483 B.C., but he gained a poetical victory (probably his first) as early as 511. His famous play, the *Capture of Miletus*, was probably composed shortly after the conquest of that city by the Persians (494). He wrote numerous other works.

According to Suidas it was Phrynichus who first introduced female characters on the stage (played by men in masks).

2. PHRYNICHUS, a poet of the Old Attic Comedy and a contemporary of Aristophanes, is said by Suidas to have been an Athenian, but according to the scholiast on Aristophanes (*Frogs*, 13) he was satirized as a foreigner. His first comedy was exhibited in 429 B.C. (according to Suidas, as corrected by Clinton and Meineke). He composed ten plays, of which the *Solitary* ("Monotropos") was exhibited in 414 along with the *Birds* of Aristophanes and gained the third prize, and the *Muses* carried off the second prize in 405, Aristophanes being first with the *Frogs*. He was not included by the Alexandrian critics in their canon of the best poets. The remains of his works, which have been edited with the other fragments of the Attic Comedy by Meineke and Bothe, are too scanty to allow us to judge of their merits.

3. PHRYNICHUS ARABIUS, a grammarian of Bithynia, lived in the reigns of the emperors Marcus Antoninus and Commodus (second century A.D.)

PHTHALIC ACID. This name was given by Laurent to a di-basic acid,  $C_8H_6O_4$ , which he obtained by the oxidation of naphthalin or its tetra-chloride with nitric acid. Schunck subsequently obtained the same acid by boiling alizarin with nitric acid, but failed to recognize its identity with Laurent's.

PHTHISIS or CONSUMPTION. This term, although applicable to several forms of wasting disease, is commonly used to designate a malady having for its chief manifestations progressive emaciation of the body and loss of strength, occurring in connection with morbid changes in the lungs and in other organs.

Few diseases possess such sad interest for humanity as consumption, both on account of its widespread prevalence and of its destructive effects, particularly among the young; and in every age of medicine the subject has formed a fertile field for inquiry as to its nature, its cause, and its treatment. On all these points medical opinion has undergone numerous changes with the advance of science and the application of more accurate methods of investigation; yet, notwithstanding the many important facts which within recent years have been brought to light, it must be admitted that our knowledge of this disease is still far from complete.

In the early part of the present century the study of the diseases of the chest received a great impetus from the labors of Laennec, whose discovery of the stethoscope led to greater minuteness and accuracy in investigation (see AUSCULTATION). This physician held that phthisis depended on the development of tubercles in the lungs, which, undergoing various retrograde changes, led to the breaking down and excavation of these organs—in short, produced the whole phenomena of consumption; and, further, that this tuberculous formation affected various other parts and organs, and was the result of a morbid constitutional condition or diathesis. This doctrine, which was generally taught during the first half of the century, and even longer, was to some extent superseded by that to which the greatest prominence was given by Niemeyer and others, namely, that the majority of cases of phthisis had their origin in an inflammation of the lung (catarrhal pneumonia), but that tubercle—the existence of which was freely admitted—might occasionally be evolved out of this condition. This view has had wide acceptance, but has been modified in a variety of ways, especially by its extension to inflammation in other parts besides the lungs, the unabsorbed products of which are held to be capable of producing tubercle by infection from within the system. Still more recently there has arisen

another doctrine in connection with the discovery by Koch of the micro-organism or bacillus of tubercle, which can be cultivated, and which, when inoculated, appears capable of producing tubercular disease, namely, the doctrine of the infectiveness of phthisis by means of this "microbe" received into the system from without. This view, which is supported by many striking facts and arguments, has been extensively adopted as furnishing in all probability a rational basis of the pathology of tubercular consumption. Yet it has not been universally accepted, being held by many to be insufficient to account for the origin and course of the disease in numerous instances and in certain of its forms. It is impossible to deny an important place in the course of the disease to inflammatory processes. Even in those cases where the lungs are infiltrated with tubercular deposit evidence of inflammation is abundantly present, while, on the other hand, it would seem that in not a few instances the process is inflammatory throughout. That phthisis, therefore, is not the same process in all cases, but that there are distinct varieties of the disease, is made clear by the morbid anatomy of the lungs no less than by other considerations.

Whatever be the form, the common result of the presence of these disease-products is to produce consolidations in the affected portions of the lungs, which, undergoing retrograde changes (cassation), break down and form cavities, the result being the destruction in greater or less amount of lung-substance. These changes most commonly take place at the apex of one lung, but with the advance of the disease they tend to spread throughout its whole extent and to involve the other lung as well. When the disease is confined to a limited area of a lung it may undergo arrest—even although it has advanced so far as to destroy a portion of the pulmonary tissue, and a healing process may set in and the affected part cicatrize. This is, however, exceptional, the far more common course being the progress of the destructive change either by the spread of the inflammatory process or by infection through the lymphatics, etc., from the existing foci of diseased lung-tissue. Various morbid changes affecting the lungs themselves or other organs frequently arise in the course of phthisis, complicating its progress and reducing the chance of recovery. Of these the more common are affections of the pleura, stomach, liver, kidneys, and especially the intestines, which in the later stage of the disease become ulcerated, giving rise to the diarrhœa which is so frequent and fatal a symptom at this period.

The causes influential in producing phthisis are numerous and varied, but they may for general consideration be embraced under two groups, namely, those which are *predisposing* and operate through the constitution as a whole, and those which are *exciting* and act immediately upon the organs implicated. These two sets of causes may be more or less distinctly associated in an individual case; but, on the other hand, one may appear to act in both ways—as predisposing and exciting. The following may serve to illustrate some of the conditions of a predisposing kind. A constitutional tendency to scrofula and its manifestations lends itself readily to the production of phthisis. This morbid constitution is characterized, among other things, by a liability to low chronic forms of inflammation affecting gland-textures, mucous membranes, etc., the products of which show little readiness to undergo absorption, but rather to degenerate. Inflammations of this character affecting the lungs, as is not uncommon, have a special tendency to lead to the breaking down of lung-texture and formation of phthisical cavities. Many high authorities hold that tubercle-formation may be evolved out of scrofulous inflammations of glands, such as those of the neck, by an

infective process, like that already referred to. The mention of this constitutional state naturally suggests another powerful predisposing cause, namely, hereditary transmission. The extent to which this influence operates as a cause of consumption has been differently estimated by writers, owing, probably, to the various aspects in which the matter is capable of being viewed. It is impossible to deny that the children of parents one or both of whom are consumptive are liable to manifest the disease—that is, they inherit a constitution favoring its development under suitable exciting causes. But a similar constitutional proclivity may be induced by other influences acting through the parents. Should either or both of them be enfeebled by previous disease or by other weakening cause, they may beget children possessing a strong predisposition to consumption. Marriages of near relatives are held by some to induce a consumptive tendency—probably, however, owing to the fact that any constitutional taint is likely to be intensified in this way. Phthisis is a disease of early life, the period between fifteen and thirty-five being that in which the great majority of the cases occur, and of these by far the larger proportion will be found to take place between the ages of twenty and thirty. The influence of sex is not marked. Occupations, habits, and conditions of life have a very important bearing on the development of the disease apart altogether from inherited tendency. Thus occupations which necessitate the inhalation of irritating particles, as in the case of stone-masons, needle-grinders, workers in minerals, in cotton, flour, straw, etc., are specially hurtful, chiefly from the mechanical effects upon the delicate pulmonary tissue of the matter inhaled. No less prejudicial are occupations carried on in a heated and close atmosphere, as is often the case with compositors, gold-beaters, seamstresses, etc. Again, habitual exposure to wet and cold or to sudden changes of temperature will act in a similar way in inducing pulmonary irritation which may lead to phthisis. Irregular and intemperate habits are known predisposing causes; and overwork, over-anxiety, want of exercise, insufficient or unwholesome food, bad hygienic surroundings such as overcrowding and defective ventilation, are all powerful agents in sowing the seeds of the disease. Consumption sometimes arises after fevers and other infectious maladies, or in connection with any long-continued drain upon the system, as in over-lactation. The subject of climate and locality in connection with the causation of phthisis has received considerable attention, and some interesting facts have been ascertained on this point. That phthisis is to be met with in all climes, and it would seem fully as frequently in tropical as in temperate regions, is evidence that climate alone exercises but little influence. It is very different, however, with locality, elevation appearing to affect to a considerable extent the liability to this disease.

Cases of phthisis differ widely as regards their severity and their rate of progress. Sometimes the disease exhibits itself as an acute or galloping consumption, where from the first there is high fever, rapid emaciation, with cough and other chest symptoms, or with the comparative absence of these, and a speedily fatal termination. In such instances there would probably be found extensive tuberculization of the lungs and other organs. In other instances, and these constitute the majority, the progress of the disease is chronic, lasting for months or years, and along with periods of temporary improvement there is a gradual progress to a fatal issue. In other cases, again, the disease is arrested and more or less complete restoration to health takes place.

All modern treatment has been directed to the de-

struction of the bacilli, and various modes of doing this have been proposed. One plan proposed is the inhalation of very hot dry air, it being held possible to thus kill the micrococci without injuring the patient. Other methods look to the introduction into the system of various drugs inimical to the life of bacteria. This is proposed to be accomplished in various ways—such as injection under the skin, per rectum, etc. Great attention and anxiety are now centered around these experiments.

The treatment of phthisis has received much attention from physicians as well as from empirics, by the latter of whom chiefly many so-called cures for consumption have from time to time been given forth. It need scarcely be stated that many authorities assert there is no "cure" for this disease; but while this may be true, it is no less true that by the adoption of certain principles of treatment under enlightened medical guidance a very great deal may now be done to ward off the disease in those who show a liability to it, and to mitigate and retard, or even arrest, its progress in those who have already become affected by it. The preventive measures include careful attention to hygienic conditions, both personal and surrounding. In the case of children who may inherit a consumptive tendency or show any liability to the disease much care should be taken in bringing them up to promote their general health and strengthen their frames. Plain, wholesome food with fatty ingredients, if these can possibly be taken, milk, cream, etc., are to be recommended. Exercise in the open air and moderate exercise of the chest by gymnastics and by reading aloud or singing are all advantageous. An ample supply of fresh air in sleeping apartments, schools, etc., is of great importance, while warm clothing and the use of flannel are essential, especially in a climate subject to vicissitudes. The value of the bath and of attention to the function of the skin is very great. The like general hygienic principles are equally applicable in the case of adults. When the disease has begun to show any evidence of its presence its treatment becomes a matter of first importance, as it is in the early stages that most can be done to arrest or remove it. Special symptoms, such as cough, gastric disturbances, pain, etc., must be dealt with by the physician according to the individual case; but it is in this stage of the disease that the question of a change of climate in the colder seasons of the year arises among those whose circumstances render such a step practicable. There can be no doubt that the removal of patients threatened by or already suffering from consumption to some mild locality, either in the country or abroad, proves in many instances most salutary. The object aimed at is to obtain a more equable climate, where the atmosphere may have a soothing influence on the respiratory organs, and where, also, open-air exercise may be taken with less risk than at home. Of like value and in a similar class of cases are long sea-voyages. Nevertheless, there is no doubt that consumptive patients are often sent abroad manifestly to die. It may be stated generally (although doubtless there may be exceptions) that where the disease exhibits a decidedly acute form, even in its earlier stages, any distant change is rather to be discouraged; while in the advanced stages, where there is great prostration of strength, with colliquative symptoms, the removal of a patient is worse than useless, and frequently hastens the end.

Throughout the whole course of the malady the nutrition of the patient forms a main part of the treatment, and tonics which promote the function of the digestive organs are especially helpful. Cod-liver oil has long been held to be of eminent value, as it appears not merely to possess all the advantages of a food but to

exert a retarding effect on the disease. Where it is well borne, not only will the weight of the body be found to increase, but the cough and other symptoms will markedly diminish. The oil is as a rule best administered at first in small quantity. The frequently employed substitutes, such as malt extract, tonic syrups, etc., although not without their uses, are all inferior to cod-liver oil. The occasional employment of counter-irritation to the chest in the form of iodine or small blisters is of service in allaying cough and relieving local pains. Respirators to cover the mouth and nose, and so constructed as to contain antiseptic media through which the air is breathed, are sometimes found to lessen cough and other symptoms of chest-irritation.

Among the most serviceable drugs in the treatment of the symptoms of phthisis are the preparations of opium. Administered along with such agents as hydrocyanic acid and expectorants, they are eminently useful in soothing severe cough; along with astringents they are equally valuable in controlling diarrhea; while with quinine, digitalis, etc., they aid in allaying fever and restlessness and in procuring sleep. But besides these many other medicinal agents, too numerous to mention here, are employed with much advantage. Each case will present its own features and symptoms calling for special attention and treatment, and details upon these points must be left to the advice of the medical attendant.

PHYLACTERY is the name given in the New Testament to the *tefillin* or "prayer-thongs" of the Jews. Every Jew wears at prayer two of these thongs—(1) the hand-tefilla, a leather thong wound around the left arm and supporting a small case containing a parchment strip with the passages Exod. xiii. 1-10, 11-16, Deut. vi. 4-9, xi. 13-21 written in four columns; (2) the head-tefilla, a similar thong with the four passages inscribed on four separate slips of parchment, and worn around the head so that the box with the texts rests on the forehead. The use of these phylacteries is justified by a literal interpretation of expressions in the passages above cited, and they form, together with the *zizith* or "fringe" and the *mezûza* above the door, the three sets of visible signs by which the Israelite is constantly reminded of his duty to God.

PHYLLOXERA. See VINE.

PHYSICAL CONSTANTS. See WEIGHTS AND MEASURES.

PHYSICAL GEOGRAPHY. See GEOGRAPHY.

PHYSICAL SCIENCES. According to the original meaning of the word, physical science would be that knowledge which is conversant with the order of nature—that is, with the regular succession of events whether mechanical or vital—in so far as it has been reduced to a scientific form. The Greek word "physical" would thus be the exact equivalent of the Latin word "natural." In the actual development, however, of modern science and its terminology these two words have come to be restricted each to one of the two great branches into which the knowledge of nature is divided according to its subject-matter. Natural science is now understood to refer to the study of organized bodies and their development, while Physical Science investigates those phenomena primarily which are observed in things without life, though it does not give up its claim to pursue this investigation when the same phenomena take place in the body of a living being.

What is commonly called "physical science" occupies a position intermediate between the abstract sciences of arithmetic, algebra, and geometry, and the morphological and biological sciences. The principal physical sciences are as follows:—

A. *The Fundamental Science of Dynamics, or the*

*doctrine of the motion of bodies as affected by force.*—

The divisions of dynamics are the following:—(1) Kinematics, or the investigation of the kinds of motion of which a body or system of bodies is capable, without reference to the cause of these motions. This science differs from ordinary geometry only in introducing the idea of motion—that is, change of position going on continuously in space and time. Kinematics includes, of course, geometry, but in every existing system of geometry the idea of motion is freely introduced to explain the tracing of lines, the sweeping out of surfaces, and the generation of solids. (2) Statics, or the investigation of the equilibrium of forces—that is to say, the conditions under which a system of forces may exist without producing motion of the body to which they are applied. Statics includes the discussion of systems of forces which are equivalent to each other. (3) Kinetics, or the relations between the motions of material bodies and the forces which act on them. Here the idea of matter as something capable of being set in motion by force, and requiring a certain force to generate a given motion, is first introduced into physical science. (A) Energetics, or the investigation of the force which acts between two bodies or parts of a body, as dependent on the conditions under which action takes place between one body or part of a body and another so as to transfer energy from one to the other.

The science of dynamics may be divided in a different manner with respect to the nature of the body whose motion is studied. This forms a cross division. (1) Dynamics of a particle; including its kinematics or the theory of the tracing of curves, its statics or the doctrine of forces acting at a point, its kinetics or the elementary equations of motion of a particle, and its energetics, including, as examples, the theory of collision and that of central forces. (2) Dynamics of a connected system, including the same subdivisions. This is the most important section in the whole of Physical Science, as every dynamical theory of natural phenomena must be founded on it. The subdivisions of this, again, are—*a.* dynamics of a rigid system, or a body of invariable form; *b.* dynamics of a fluid, including the discussion ( $\alpha$ ) of its possible motion, ( $\beta$ ) of the conditions of its equilibrium (hydrostatics), ( $\gamma$ ) of the action of force in producing motion (hydrodynamics, not so unsatisfactory since Helmholtz, Stokes, and Thomson's investigations), and ( $\delta$ ) of the forces called into play by change of volume; *c.* dynamics of an elastic body; *d.* dynamics of a viscous body.

B. *The Secondary Physical Sciences.*—Each of these sciences consists of two divisions or stages. In the elementary stage it is occupied in deducing from the observed phenomena certain general laws, and then employing these laws in the calculation of all varieties of the phenomena. In the dynamical stage the general laws already discovered are analyzed and shown to be equivalent to certain forms of the dynamical relations of a connected system (*A*, 2), and the attempt is made to discover the nature of the dynamical system of which the observed phenomena are the motions. This dynamical stage includes, of course, several other stages rising one above the other; for we may successfully account for a certain phenomenon, say the turning of a weathercock toward the direction of the wind, by assuming the existence of a force having a particular direction and tending to turn the tail of the cock in that direction. In this way we may account not only for the setting of the weathercock but for its oscillations about its final position. This, therefore, is entitled to rank as a dynamical theory. But we may go on and discover a new fact, that the air exerts a pressure and that there is a greater pressure on that side of the cock on which

the wind blows. This is a further development of the theory, as it tends to account for the force already discovered. We may go on and explain the dynamical connection between this inequality of pressure and the motion of the air regarded as a fluid. Finally, we may explain the pressure of the air on the hypothesis that the air consists of molecules in motion, which strike against each other and against the surface of any body exposed to the air.

The dynamical theories of the different Physical Sciences are in very different stages of development, and in almost all of them a sound knowledge of the subject is best acquired by adopting, at least at first, the method which we have called "elementary"—that is to say, the study of the connection of the phenomena peculiar to the science without reference to any dynamical explanations or hypotheses. Thus we have—

(1) Theory of gravitation, with discussion of the weight and motion of bodies near the earth, of the whole of physical astronomy, and of the figure of the earth. There is a great deal of dynamics here, but we can hardly say that there is even a beginning of a dynamical theory of the method by which bodies gravitate toward each other.

(2) Theory of the action of pressure and heat in changing the dimensions and state of bodies. This is a very large subject and might be divided into two parts, one treating of the action of pressure and the other of heat. But it is much more instructive to study the action of both causes together, because they produce effects of the same kind, and therefore mutually influence each other. Hence the term "thermodynamics" might be extended to the whole subject were it not that it is already restricted to a very important department relating to the transformation of energy from the thermal to the mechanical form and the reverse. The divisions of the subject are seven. (a) Physical states of a substance—gaseous, liquid, and solid; elasticity of volume in all three states; elasticity of figure in the solid state; viscosity in all three states; plasticity in the solid state; surface-tension, or capillarity; tenacity of solids; cohesion of liquids; adhesion of gases to liquids and solids. (b) Effects of heat in raising temperature, altering size and form, changing physical state. (c) Thermometry. (d) Calorimetry. (e) Thermodynamics, or the mutual convertibility of heat and work. (f) Dissipation of energy by diffusion of matter by mixture, diffusion of motion by internal friction of fluids, diffusion of heat by conduction. (g) Theory of propagation of sound, vibrations of strings, rods, and other bodies.

(3) Theory of radiance. (a) Geometrical optics; theory of conjugate foci and of instruments. (b) Velocity of light in different media. (c) Prismatic analysis of light—spectroscopy, radiant heat, visible radiance, ultra-violet rays, calorescence, etc., fluorescence, etc. (d) Colors of thin plates, diffraction, etc. (d') Proof of the existence of wave-lengths and wave-periods (preparation for dynamical theory). (e) Polarized light, radiant heat, etc. (é) The disturbance is transverse to the ray. (f) Quantity of energy in the total radiation from a hot body; Prévost's theory of exchanges, etc. (g) Theory of three primary colors.

(4) Electricity and magnetism. (a) Electrostatics, or distribution and effects of electricity in equilibrium. (b) Electrokinematics, or distribution of currents in conductors. (c) Magnetism and magnetic induction, (diamagnetism, etc.) (a) Electromagnetism, or the effects of an electric current at a distance. Under (b) we may discuss electro-chemistry, or the theory of electrolysis; under (c) terrestrial magnetism and ship's magnetism; and after (d) comes electrokinetics, or electromagnetic phenomena considered with reference to the fundament-

al science of dynamics. There is also Faraday's discovery of the effect of magnetism on light, and the electromagnetic theory of light.

Chemistry is not included in this list, because, though dynamical science is continually reclaiming large tracts of good ground from the one side of chemistry, chemistry is extending with still greater rapidity on the other side into regions where the dynamics of the present day must put her hand upon her mouth. Chemistry, however, is a physical science, and a physical science which occupies a very high rank.

PHYSIOGNOMY. By the act of Parliament 17 George II., c. 5, all persons pretending to have skill in Physiognomy were deemed rogues and vagabonds, and were liable to be publicly whipped, or sent to the house of correction until next sessions. The pursuit thus stigmatized as unlawful is one of great antiquity, and one which in ancient and mediæval times had an extensive though now almost forgotten literature. Physiognomy was regarded by those who cultivated it as a twofold science—(1) a mode of discriminating character by the outward appearance, and (2) a method of divination from form and feature. It was very early noticed that the good and evil passions by their continual exercise stamp their impress on the face, and that each particular passion has its own expression. Thus far physiognomy is a branch of physiology, and from a very early age of human thought it attracted philosophic attention. But in its second aspect it touched astrology, of which Galen says that the physiognomical part is the greater, and this aspect of the subject bulked largely in the fanciful literature of the Middle Ages. The name originated with the Greeks.

The first systematic treatise about Physiognomy which has come down to us is that attributed to Aristotle, in which he devotes six chapters to the consideration of the method of study, the general signs of characters, the particular appearances characteristic of the dispositions, of strength and weakness, of genius and stupidity, of timidity, impudence, anger, and their opposites, etc. Then he studies the Physiognomy of the sexes, and the characters derived from the different features, and from color, hair, body, limbs, gait, and voice. He compares the varieties of mankind to animals, the male to the lion, the female to the leopard.

The Latin classics, too, occasionally refer to Physiognomy.

Hitherto the Physiognomy of the schools had been chiefly descriptive; in the succeeding period the astrological side, whose gradual development may be noted, becomes the most important part. Hence in the subsequent or second stage of history chiromancy is specially predictive in character, and attains an importance it had not originally possessed. The treatises also contain occasional digressions on onychomancy, alectoromancy, clidomancy, coscinomancy, podoscopy, spasmatomancy, etc.

Along with the medical science of the period the Arabians took up the study of Physiognomy: 'Alí b. Ragel wrote a book on nævi; Rhazes (1040) devoted several chapters of his medical work to it; and Averroes (1165) made many references to it in his *De Sanitate*. Avicenna also makes some acute physiognomical remarks in his *De Animalibus*. Albertus Magnus (born 1205) devotes much of the second tract of his *De Animalibus* to the consideration of Physiognomy. There is, however, nothing original in the treatise, which largely consists of extracts from Aristotle, Polemon, and Loxus. The famous sage of Balwearie, Michael Scott, while court astrologer to the emperor Frederick II., wrote his treatise *De hominis phisionomia* (c. 1272), much of which is physiological and of curious interest. In 1335

Petrus de Abano of Padua delivered in Paris a course of lectures on this subject (afterward edited by Blondus, 1544), a few years before he was burned for heresy. Shortly after the introduction of printing in the fifteenth century a large number of works on Physiognomy were produced.

The sixteenth century was particularly rich in publications on Physiognomy. Not only were the classical works printed, but additions were made to the literature by authors too numerous to mention.

The rise of the study of anatomy served largely to bring Physiognomy into discredit by substituting real facts for fictions; hence in the seventeenth century its literature, while not smaller in quantity, was less important in quality.

The eighteenth century shows a still greater decline of interest in Physiognomy. The few straggling works which have since appeared are scarcely deserving of notice, the rising attraction of phrenology having given to pure Physiognomy the *coup de grâce* by taking into itself whatever was likely to live of the older science.

The physiological school of Physiognomy was foreshadowed by Parsons and founded by Sir Charles Bell, as his *Essay on the Anatomy of Expression*, published in 1806, was the first really scientific study of expression. He was one of the first who accurately correlated the motions expressive of the passions with the muscles which produce them, and in the latter editions of his work these descriptions are much enlarged and improved. Shortly after the appearance of the first edition of Bell's *Essay* Moreau published his first edition of Lavater along somewhat the same lines (1807). The experiments of Duchenne (Paris, 1862) showed that by the use of electricity the action of the separate muscles could be studied and by the aid of photography accurately represented. These tested and confirmed by experimental demonstration the hypothetic conclusions of Bell. The machinery of expression having thus been clearly followed out, the correlation of the physical actions and the psychical states was made the subject of speculation by Spencer (*Psychology*, 1855), and such speculations were first reduced to a system by Darwin (*Expression of Emotions*, 1872), who formulated and illustrated the following as fundamental principles:—

(1) Certain complex acts are of different or indirect service under certain conditions of the mind in order to relieve or gratify certain sensations or desires, and whenever the same state of mind is induced the same set of actions tend to be performed even when they have ceased to be of use.

(2) When a directly opposite state of mind is induced to one with which a definite action is correlated, there is a strong and involuntary tendency to perform a reverse action.

(3) When the sensorium is strongly excited nerve force is generated in excess and is transmitted in definite directions depending upon the connections of nerve cells and on habit.

It follows from these propositions that the expression of emotion is for the most part not under the control of the will, and that those striped muscles are the most expressive which are the least voluntary. The philosophy of Physiognomy may be formulated upon this definite theoretic basis.

(1) The actions we look upon as expressive of emotions are such as at some time were serviceable in relieving or gratifying the desires or sensations accompanying emotion.

(2) Such actions become habitually associated with the mental condition and continue even where their utility is lost.

(3) Certain muscles which produce these actions

become from habitual action strengthened, and when the skin diminishes in fullness and elasticity with advancing age the action of the muscle produces furrows or wrinkles in the skin at right angles to the course of the fibers of the muscle.

(4) As the mental disposition and proneness to action are inherited by children from parents, so the facility and proneness to expression are similarly developed under the law of heredity.

(5) To some extent habitual muscular action, and the habitual flow of nerve force in certain directions may alter the contour of such bones and cartilages as are thereby acted upon by the muscles of expression.

PHYSIOLOGUS, the most common title of a collection of some fifty Christian allegories much read in the Middle Ages, and still existing in several forms and in about a dozen Eastern and Western languages. As nearly all its imagery is taken from the animal world, it is also known as the *Bestiary*.

That the substance of the *Physiologus* was borrowed from commentaries on Scripture is confirmed by many of the sections opening with a text, followed up by some such formula as "but the Physiologus says." When zoölogical records failed, Egypto-Hellenic ingenuity was never at a loss for a fanciful invention distilled from the text itself, but which, to succeeding copyists, appeared as part of the teaching of the original Physiologus.

At the later period, when the church had learned to look with suspicion upon devotional books likely to provoke the scoffing of some and lead others into heresy, a work of this kind could hardly meet with her approval. A synod of Pope Gelasius, held in 496, passed censure, among others, on the "Liber Physiologus."

PHYSIOLOGY. The word "Physiology" may be used either in a general or in a more restricted sense. In its more general meaning it was used largely of old, and is still occasionally used in popular writings, to denote all inquiry into the nature of living beings. A very slight acquaintance, however, with the phenomena of living beings shows that these can be studied from two, apparently very different, points of view.

In its older sense Physiology embraced certain morphological problems, and corresponded to what is now called BIOLOGY (*q.v.*); in its more modern sense Physiology leaves these matters on one side and deals only with the actions of living beings on their surroundings (the study of these necessarily involving the correlative study of the effect of the surroundings on the living being), and appeals to matters of form and structure only so far as they throw light on problems of action. Looking forward into the far future, we may perhaps dimly discern the day when morphology and Physiology will again join hands, and all the phenomena of living beings, both those which relate to form and those which relate to action, will be seen to be the common outcome of the same molecular processes. But that day is as yet most distant; and, though occasionally even now the two sciences cross each other's path, action explaining form and form in turn explaining action, the dominant ideas of the two are so distinct, the one from the other, that each must for a long time yet be developed along its own line. It is proposed to treat in the following pages of Physiology in this narrower, more restricted sense.

If anyone at the present day, making use of the knowledge so far gathered in, were to attempt a rough preliminary analysis of the phenomena of action of a living being—for instance of one of the more complex, so-called higher animals, such as man—he might proceed in some such way as the following:—

One of the first, perhaps the first and most striking

fact about man is that he moves: his body moves of itself from place to place, and one part of the body moves on another. If we examine any one of these movements, such as the bending of the forearm on the arm, we find that it is brought about by certain masses of flesh, called muscles, which from time to time contract, that is, shorten; and these muscles are so disposed that, when they shorten, and so bring their ends nearer together, certain bones are pulled upon and the arm is bent. Upon further examination it will be found that all the gross movements of the body, both the locomotion of the whole body and the movements of parts upon parts, are carried out by the contraction or shortening of muscles. The muscles, together with bones, tendons, and other structures, are arranged in various mechanical contrivances, many of them singularly complex; hence the great diversity of movement of which an animal or man is capable; but in all cases the central fact, that which supplies the motive-power, is the contraction of a muscle, a shortening of its constituent fibers whereby its two ends are brought for a while nearer together.

When, pushing the analysis farther, we attempt to solve the question, Why do muscles contract? we find that the muscles of the body are connected with what is called the central nervous system by certain strands of living matter called nerves; and we further find that, with some few exceptions, which need not concern us now, the contractions of muscles are brought about by certain occult invisible changes called nervous impulses which travel along these nerves from the central nervous system to the muscles. Hence, when a nerve is severed, the muscle to which the nerve belonged, thus cut adrift from the central nervous system, no longer stirred by impulses reaching it therefrom, ceases to contract, and remains motionless and as it were helpless. Pushing the problem still farther home, and asking how these impulses originate in the central nervous system, we find that this central nervous mass is connected, not only with the muscles by means of nerves which, carrying impulses outward from itself to the muscles and so serving as instruments of movement, are called motor or efferent nerves, but also with various surfaces and parts of the body by means of other nerves, along which changes or impulses travel inward to itself in a centripetal fashion. Moreover, the beginnings or peripheral endings of these and other nerves appear to be so constituted that various changes in the surroundings of the body, or internal changes in the body itself, give rise to impulses, which, thus originated, travel inward to the central nervous system; hence these nerves are spoken of as sensory or afferent. Such sensory impulses reaching the central nervous system may forthwith issue as motor impulses leading to movement; but on many occasions they tarry within the central mass, sweeping backward and forward along particular areas of its substance, thus maintaining for awhile a state of molecular agitation and leading to movement at some subsequent period only. Moreover, we have reason to think that molecular disturbances may arise within the central nervous system apart from the advent, either past or present, of any impulses along sensory nerves. Lastly, the presence of these molecular agitations in the central nervous system, whether the immediate result of some new afferent impulse, or the much delayed and complicated outcome of some impulse which arrived long ago, or the product of internal changes apparently independent of all disturbance from without and so far spontaneous, may be indicated by corresponding phases of what we speak of as consciousness. We are thus led to conceive of the central nervous system as, chiefly at least, the seat of a molec-

ular turmoil maintained by multitudinous afferent impulses streaming in along the various afferent nerves, a turmoil which makes itself felt within as changes of consciousness, and produces effects without by movements wrought through motor nerves and muscles. And one large part of Physiology has for its task the unraveling of the laws which govern this turmoil, which determine, in relation to the advent of afferent impulses and the occurrence of intrinsic changes, the issue of motor impulses, and thus the characters of the resulting movements.

The movements of man or of an animal are not, however, the only salient facts of his existence. Equally characteristic of him are the facts, (1) that he from time to time eats, and must eat in order to live, and (2) that a supply of fresh air containing a certain quantity of oxygen is indispensable to his remaining alive. Viewed from a chemical point of view, an animal body, whether dead or alive, is a mass of complex unstable chemical substances, combustible in nature, *i.e.*, capable of being oxidized, and of being reduced by oxidation to simpler, more stable substances, with a setting free of energy. Combustible in the ordinary sense of the word an animal body is not, by reason of the large excess of water which enters into its composition; but an animal body thoroughly dried will in the presence of oxygen burn like fuel, and, like fuel, give out energy as heat. The material products of that combustion are fairly simple, consisting of water, carbonic acid, some ammonia or nitrogen compounds, and a few salts. And these same substances appear also as the products of that slower combustion which we call decay; for, whether the body be burnt swiftly in a furnace or rot away slowly in earth, air, or water, the final result is the same, the union of the complex constituent substances with the oxygen furnished from the air, and their reduction thereby to the above-named products, with a development of heat, which either as in the first case is rapid and appreciable, or as in the second is so slow and gradual as to be with difficulty recognized. Moreover, during life also the same conversion, the same oxidation, the same reduction of complex substances to simpler matters, the same setting free of the energy present in the former but absent in the latter, may be noted. The animal body dies daily, in the sense that at every moment some part of its substance is suffering decay, is undergoing combustion; at every moment complex substances full of latent energy are by processes of oxidation reduced to simpler substances devoid of energy or containing but little.

This breaking down of complex substances, this continued partial decay, is indeed the source of the body's energy; each act of life is the offspring of an act of death. Each strain of a muscle, every throb of the heart, all the inner work of that molecular turmoil of the nervous system of which we spoke above, as well as the chemical labor wrought in the many cellular laboratories of glands and membranes, every throw of the vital shuttle, means an escape of energy as some larger compacted molecule splits into smaller simpler pieces. Within the body the energy thus set free bears many shapes, but it leaves the body in two forms alone, as heat and as the work done by the muscles of the frame. All the inner labor of the body, both that of the chemical gland-cells, of the vibrating nerve-substance with its accompanying changes of consciousness, and of the beating heart and writhing visceral muscles, is sooner or later, by friction or otherwise, converted into heat; and it is as heat that the energy evolved in this labor leaves the body. Manifold as seems the body's energy, it has but one source, the decay of living material, *i.e.*, the oxidation of complex substances diversely built up into various living



matters, and but two ends, heat and muscular work. The continued setting free of energy which thus marks the living body, entailing as it does the continued breaking up and decay of living substance, constitutes a drain upon the body which must be met by constantly-renewed supplies, or otherwise the body would waste away and its energy flicker out. Hence the necessity on the one hand for that which we call food, which, however varied, is essentially a mixture of complex combustible energy-holding bodies, and on the other hand for that other kind of food which we call breath, and which supplies the oxygen whereby the complex oxidizable substances may be oxidized to simpler matters and their potential energy made to do work. Thus food supplies the energy of the body, but in quantity only, not in quality. The food by itself, the dead food, can exhibit energy as heat only, with intervening phases of chemical action; before its energy can be turned into the peculiar grooves of nervous and muscular action it needs to be transmuted into living substance, and in that transmutation there is a preliminary expenditure of part of the food's store of energy.

Here, then, we have a second view of physiological labor. To the conception of the body as an assemblage of molecular thrills—some started by an agent outside the body, by light, heat, sound, touch, or the like; others begun within the body, spontaneously as it were, without external cause: thrills which, traveling to and fro, mingling with and commuting each other, either end in muscular movements or die away within the body—to this conception we must add a chemical one, that of the dead food continually being changed and raised into the living substance, and of the living substance continually breaking down into the waste matters of the body by processes of oxidation, and thus supplying the energy needed both for the unseen molecular thrills and for the visible muscular movements.

Hence the problems of Physiology may in a broad sense be spoken of as threefold. (1) On the one hand, we have to search the laws according to which the complex unstable food is transmuted into the still more complex and still more unstable living flesh, and the laws according to which this living substance breaks down into simple, stable waste products, void or nearly void of energy. (2) On the other hand, we have to determine the laws according to which the vibrations of the nervous substance originate from extrinsic and intrinsic causes, the laws according to which these vibrations pass to and fro in the body, acting and reacting upon each other, and the laws according to which they finally break up and are lost, either in those larger swings of muscular contraction whereby the movements of the body are effected, or in some other way. (3) And lastly, we have to attack the abstruser problems of how these neural vibrations, often mysteriously attended with changes of consciousness, as well as the less subtle vibrations of the contracting muscles, are wrought out of the explosive chemical decompositions of the nervous and muscular substances, that is, of how the energy of chemical action is transmuted into and serves as the supply of that vital energy which appears as movement, feeling, and thought.

Even a rough initial analysis, however, such as we have just attempted to sketch, simple as it seems with our present knowledge, is an expression of the accumulated and corrected inquiries of many ages; the ideas which it embodies are the results of long-continued investigations, and the residue of many successive phases of opinion.

In the natural hierarchy of the sciences, Physiology follows after chemistry, which in turn follows physics, molar and molecular; and in a natural development, as

indeed is evident from what we have just seen, the study of the two latter should precede that of the former. At a very early age, however, the exigencies of life brought the study of man, and so of Physiology, to the front before its time; hence the history of Physiology consists to a large extent, especially in its opening chapters, of premature vain attempts to solve physical and chemical problems before the advent of adequate physical or chemical knowledge. But no ignorance of these matters could hide from the observant mind, even in quite early times, two salient points which appear also in the analysis just given, namely, that, while some of the phenomena of living beings seem due to powers wholly unknown in things which are not living, other phenomena, though at first sight special to living beings, appear to be in reality the peculiar outcome of processes taking place as well in things not alive. It was further early seen that, while the former are much more conspicuous, and make up a greater part of the life of the individual in those living beings which are called animals, especially in man, and in animals more closely resembling man, than in those which are called plants, the latter are common to both divisions of living things. Both sets of phenomena, however, were at first regarded as the products of certain special agencies; both were spoken of as the work of certain spirits; and the distinction between the two was formulated by speaking of the spirits as being in the former case *animal* and in the latter *vital*.

From the very outset even the casual observer could not fail to be struck with the fact that many of the processes of living beings appear to be the results of the various contrivances or machines of which a living body is largely built up. This, indeed, was evident even before the distinction between animal and vital spirits was recognized; and, when that differentiation was accepted, it was seen that the part played by these machines and contrivances in determining the actions of living beings was much more conspicuous in the domain of vital than of animal spirits. As inquiry was pushed forward the prominence and importance of this machinery became greater and greater, more especially since the phenomena supposed to be due to the agency of vital spirits proved more open to direct observation and experiment than those attributed to the animal spirits. It was found that the most fruitful path of investigation lay in the direction of studying the structure and independent action of the several constituent machines of the body, and of unraveling their mutual relations.

These machines received the names of organs, the work or action of an organ being at a later period spoken of as its function. And, when it became clear that many of the problems concerned with what was supposed to be the work of the vital spirits could be solved by the proper appreciation of the functions of certain organs, it was inferred that the more difficult problems belonging to the animal spirits could be solved in the same way. Still later on it was found that the conception of organs and functions was not only quite separable from, but indeed antagonistic to, the hypothesis of the entities called spirits.

In this way the first great phase, as it may be called, of the science of Physiology was evolved—a phase which lasted till quite recent times. Under this conception every living being, plant or animal, was regarded as a complex of organs, each with its respective function, as an engine built up of a number of intricately contrived machines, each performing its specific work. The whole animal body was parceled out into organs, each of which was supposed to have its appropriate function; and the efforts of investigators were directed, on the

one hand, to a careful examination of the structural features of an organ with the view of determining by deduction what its function must be, and, on the other hand, to confirming or correcting by observation and experiment the conclusions thus reached by the anatomical method. And the fruitfulness of this line of inquiry proved so great that the ideas directing it became absolutely dominant. In many cases the problem to be worked out was in reality a purely mechanical one. This was notably so in the great question of the circulation so brilliantly solved by Harvey. Putting aside for awhile the inquiry as to the origin of the force with which the walls of the heart press on the blood contained in its cavities, accepting the fact that the blood is thus pressed at each beat of the heart, all the other truths of the circulation which Harvey demonstrated are simply the outcome of certain mechanical conditions, such as the position and arrangement of the valves, the connection of various patent tubes, and the like. And many other problems—as, for instance, those connected with respiration—proved to be similarly capable of solution by the application of ordinary mechanical principles to anatomical facts.

So fruitful, and consequently so adequate, seemed this conception of living beings as built up of contrivances or organs, in contrast with the lifeless world in whose monotonous masses no such structural disposition could be recognized, that the word "organic" came into use as a term distinctive of living things. The phrase was especially adopted by the chemists, who for a long time classified their material into "organic" substances, *i.e.*, substances found only in living beings, and into "inorganic" substances, that is, substances occurring in lifeless bodies as well. Indeed, this nomenclature has not even yet been wholly abandoned. Triumphant, however, as was this mode of inquiry in these and similar instances, there remained in every investigation an unsolvable residue, like the question of the origin of the force exerted by the heart referred to above in speaking of Harvey's work; and in many other instances the questions which could not be solved on mechanical principles formed a great part of the whole problem. Thus in the case of the liver careful dissection showed that minute tubes starting from all parts of the liver joined into one large canal, which opened into the small intestine, and observation and experiment taught that these tubes during life conveyed from the liver to the intestine a peculiar fluid called bile, which appeared on the one hand to originate in the liver, and on the other to be used up for some purposes in the intestine. But here the mere mechanical flow of the bile along the gall-ducts, instead of being of primary, was merely of secondary importance, and the problem of how the bile was generated and made its way into the small beginnings of the ducts was the greater part of the whole matter. This latter problem was left unsolved, and indeed for awhile unattempted. Nevertheless the success in other directions attending the conception of organs and functions encouraged physiologists to speak of the liver as an organ whose function was to secrete bile, and, further, led them to ignore to a large extent the great unsolved portion of the problem, and to regard the mere enunciation of the function as the chief end of physiological inquiry.

Moreover, whenever attempts were made to unravel these obscurer problems, the efforts of investigators were mainly confined to a fuller and more complete elucidation of the supposed function of an organ, and the method of inquiry adopted was in most cases one which regarded the finer elements of the part studied as minute organs making up the whole gross organ, and which sought to explain the functions of these smaller

organs on the same mechanical principles which had proved so successful in the case of the whole organ. When the improvements in the microscope opened up a new world to the anatomist, and a wholly fresh mechanical analysis of the structure of living bodies became possible, great hopes were entertained that the old method applied to the new facts would soon solve the riddles of life by showing how the mysterious operations of the living substances out of which the grosser organs were built were the outcome of structural arrangements which had hitherto remained invisible, were in fact the functions of minute component organs. A vision of a grand simplicity of organic nature dawned upon the minds of physiologists. It seemed possible to conceive of all living beings as composed of minute organic units, of units whose different actions resulted from their different structural characters, whose functions were explicable by, and could be deduced from, their anatomical features, such units being built up into a number of gross organs, the functions of each of which could in turn be explained by the direction which its mechanical build gave to the efforts of its constituent units. Such a view seemed to have touched the goal, when, in the first half of this century, the so-called "cell-theory" was enunciated as a physiological generalization.

Long before, in the previous century, the genius of Caspar Wolff had led him to maintain that the bodies of living beings may be regarded as composed of minute constituent units, which, being in early life all alike and put together as an unformed mass, gradually differentiate and are ultimately arranged into the tissues and organs of the adult being. But, though Wolff was not unaware of the physiological bearing of his conception, his mind was chiefly bent toward morphological views, and his cell-theory is essentially a morphological one. The cell-theory, however, which became famous in the third decade of the present century, and to which the twin names of Schwann and Schleiden will always be attached, was essentially a physiological one. The chief interest which these authors felt in the ideas that they put forth centered in the conviction that the properties of the cell as they described it were the mechanical outcome of its build; and for a time it seemed possible that all physiological phenomena could be deduced from the functions of cells, the anatomical characteristics of the various kinds of cells determining in turn their special functions. In the cell-theory the conception of organs and functions reached its zenith; but thenceforward its fall, which had been long prepared, was swift and great. Two movements especially hurried on its decline.

It had long been a reproach to physiologists that, while to most organs of the body an appropriate function had been assigned, in respect to certain even conspicuous organs no special use or definite work could be proved to exist. Of these apparently functionless organs the most notorious instance was that of the spleen, a large and important body, whose structure, though intricate, gave no sign of what its labors were, and whose apparent uselessness was a stumbling-block to the theological speculations of Paley. While in the case of other organs a definite function could be readily enunciated in a few words, and their existence therefore easily accounted for, the spleen remained an opprobrium, existing, as it appeared to do, without purpose, and therefore without cause.

The progress of discovery during the present century, by a cruel blow, instead of pointing out the missing use of the spleen, rudely shook the confidence with which the physiologists concluded that they had solved the riddle of an organ when they had allotted to it a special

function. From very old times it had been settled that the function of the liver was to secrete bile; and the only problems left for inquiry as touching the liver seemed to be those which should show how the minute structure of the organ was adapted for carrying on this work. About the middle of this century, however, the genius of Claude Bernard led him to discover that the secretion of bile was by no means the chief labor of the liver. He showed that this great viscus had other work to do than that of secreting bile, had another "function" to perform, but a function which seemed to have no reference whatever to the mechanical arrangements of the organ, which could never have been deduced from any inspection, however complete, of its structure, even of its most hidden and minute features, and which therefore could not be called a function in the old and proper sense of that word. By a remarkable series of experiments, which might have been carried out by one knowing absolutely nothing of the structural arrangements of the liver beyond the fact that blood flowed to it along the portal vein, and from it along the hepatic vein, he proved that the liver, in addition to the task of secreting bile, was during life engaged in carrying on a chemical transformation by means of which it was able to manufacture and store up in its substance a peculiar kind of starch, to which the name of *glycogen* was given. Bernard himself spoke of this as the glycogenic function of the liver, but he used the word "function" in a broad, indefinite sense, simply as work done, and not in the older and narrower meaning as work done by an organ structurally adapted to carry on a work which was the inevitable outcome of the form and internal build of the organ. In this glycogenic function organization, save only the arrangements by means of which the blood flows on from the portal to the hepatic channels in close proximity to the minute units of the liver-substance, the so-called hepatic cells appeared to play no part whatever; it was not a function, and in reference to it the liver was not an organ, in the old sense of the words. This discovery of Bernard's threw a great flash of light into the darkness hitherto hiding the many ties which bound together distant and mechanically isolated parts of the animal body. Obviously the liver made this glycogen, not for itself, but for other parts of the body; it labored to produce, but they made use of, the precious material, which thus became a bond of union between the two.

The glycogenic labors of the simple hepatic substance carried out independently of all intricate structural arrangements, and existing in addition to the hepatic function of secreting bile, being thus revealed, men began to ask themselves the question, may not something like this be true of other organs to which we have allotted a function, and thereupon rested content? And further, in the cases where we have striven in hope, and yet in vain, to complete the interpretation of the function of an organ, by finding in the minute microscopic details of its structure the mechanical arrangements which determine its work, may we not have followed throughout a false lead, and sought for organization where organization in our sense of the word does not exist? The answer to this question, and that an affirmative one, was hastened by the collapse of the cell-theory on its physiological side, very soon after it had been distinctly formulated.

The "cell," according to the views of those who first propounded the cell-theory, consisted essentially of an envelope or "cell-membrane," of a substance or substances contained within the cell-membrane, hence called cell-contents, and of a central body or kernel called the "nucleus," differing in nature from the rest

of the cell-contents. And, when facts were rapidly accumulated, all tending to prove that the several parts of the animal or vegetable body, diverse as they were in appearance and structure, were all built up of cells more or less modified, the hope arose that the functions of the cell might be deduced from the mutual relations of cell-membrane, cell-contents, and nucleus, and that the functions of an organ might be deduced from the modified functions of the constituent modified cells. Continued investigation, however, proved destructive of this physiological cell-theory. It soon became evident that the possession of an investing envelope or cell-membrane was no essential feature of a cell, and that even the central kernel or nucleus might at times be absent. It was seen, in fact, that the anatomical unit need have no visible parts at all, but might be simply a minute mass, limited in various ways, of the material spoken of as cell-contents. Under the cell-theory, the cell was supposed to be the first step in organization, the step by which a quantity of formless unorganized plasm became an organized unit; this plasm was further supposed still to form the chief part of the cell-contents, and soon became recognized under the name of protoplasm. Hence the destructive anatomical researches which deprived the cell of its cell-membrane, and even of its nucleus, left nothing except a mass of protoplasm to constitute an anatomical unit. For such a unit the word "cell" was a misnomer, since all the ideas of organization denoted by the word had thus vanished; nevertheless it was retained with the new meaning, and up to the present time the definition of a cell is that of a limited mass of protoplasm, generally but not always containing a modified kernel or nucleus.

With this anatomical change of front the physiological cell-theory was utterly destroyed. The cell was no longer a unit of organization; it was merely a limited mass of protoplasm, in which, beyond the presence of a nucleus, there was no visible distinction of parts. It was no longer possible to refer the physiological phenomena of the cell to its organization; it became evident that the work done by a "cell" was the result not of its form and cellular structure but simply of the nature and properties of the apparently structureless protoplasm which formed its body. A new idea pressed itself on men's minds, that organization was a concomitant and result of vital action, not its condition and cause; as Huxley in one of his earliest writings put it, "They [cells] are no more the producers of the vital phenomena than the shells scattered in orderly lines along the sea beach are the instruments by which the gravitative force of the moon acts upon the ocean. Like these, the cells mark only where the vital tides have been, and how they have acted." Hence arose the second of the two movements mentioned above, that which may be called the "protoplasmic" movement, a movement which, throwing overboard altogether all conceptions of life as the outcome of organization, as the mechanical result of structural conditions, attempts to put Physiology on the same footing as physics and chemistry, and regards all vital phenomena as the complex products of certain fundamental properties exhibited by matter, which, either from its intrinsic nature or from its existing in peculiar conditions, is known as living matter—mechanical contrivances in the form of organs serving only to modify in special ways the results of the exercise of these fundamental activities and in no sense determining their initial development.

Long before the cell-theory had reduced to an absurdity the "organic" conception of Physiology, the insight of the brilliant Bichat, so early lost to science, had led him to prepare the way for modern views by developing his doctrine of "tissues." That doctrine

regarded the body as made up of a number of different kinds of living material, each kind of material having certain innate qualities proper to itself as well as certain structural features, and the several kinds of material being variously arranged in the body. Each of these body-components was spoken of as a tissue, muscular tissue, nervous tissue, and the like; and the varied actions of the body were regarded as the result of the activities of the several tissues modified and directed by the circumstance that the tissues were to a great extent arranged in mechanical contrivances or organs which largely determined the character and scope of their actions.

The imperfection of microscopic methods in Bichat's time, and, we may perhaps add, his early death, prevented him from carrying out an adequate analysis of the qualities or properties of the tissues themselves. During the middle portion of this century, however, histological investigation, *i.e.*, inquiry into the minute structure of the tissues, made enormous progress, and laid the basis for a physiological analysis of the properties of tissues. In a short time it became possible to lay down the generalization that all the several tissues arise, as far as structure is concerned, by a differentiation of a simple primitive living matter, and that the respective properties of each tissue are nothing more than certain of the fundamental properties of the primordial substance thrown into prominence by a division of labor running to a certain extent parallel to the differentiation of structure. Developed in a fuller manner, this modern doctrine may be expounded somewhat as follows:—

In its simplest form a living being, as illustrated by some of the forms often spoken of as *amœbæ*, consists of a mass of substance in which there is no obvious distinction of parts. In the body of such a creature even the highest available powers of the microscope reveal nothing more than a fairly uniform network of material, a network sometimes compressed, with narrow meshes, sometimes more open, with wider meshes, the intervals of the meshwork being filled, now with a fluid, now with a more solid substance or with a finer and more delicate network, and minute particles or granules of variable size being sometimes lodged in the open meshes, sometimes deposited in the strands of the network. Sometimes, however, the network is so close, or the meshes filled up with material so identical in refractive power with the bars or films of the network, and at the same time so free from granules, that the whole substance appears absolutely homogeneous, glassy or hyaline. Analysis with various staining and other reagents leads to the conclusion that the substance of the network is of a different character from the substance filling up the meshes. Similar analysis shows that at times the bars or films of the network are not homogeneous, but composed of different kinds of stuff; yet even in these cases it is difficult, if not impossible, to recognize any definite relation of the components to each other such as might deserve the name of structure; and certainly in what may be taken as the more typical instance, where the network seems homogeneous, no microscopic search is able to reveal to us a distinct structural arrangement in its substance. In all probability optical analysis, with all its aids, has here nearly reached its limits; and, though not wholly justified, we may perhaps claim the right to conclude that the network in such case is made up of a substance in which no distinction of parts will ever be visible, though it may vary in places or at times in what may be spoken of as molecular construction, and may carry, lodged in its own substance, a variety of matters foreign to its real self. This remarkable network is often

spoken of as consisting of protoplasm, and though that word has come to be used in several different meanings, we may for the present retain the term. The body of an *amœba*, then, or of a similar organism consists of a network or framework which we may speak of as protoplasm, filled up with other matters. In most cases it is true that in the midst of this protoplasmic body there is seen a peculiar body of a somewhat different and yet allied nature, the so-called nucleus; but this we have reason to think is especially concerned with processes of division or reproduction, and may be absent, for a time at all events, without any injury to the general properties of the protoplasmic body.

Now such a body, such a mass of simple protoplasm, homogeneous save for the admixtures spoken of above, is a living body, and all the phenomena which we sketched out at the very beginning of this article as characteristic of the living being may be recognized in it. There is the same continued chemical transformation, the same rise and fall in chemical dignity, the same rise of the dead food into the more complex living substance, the same fall of the living substance into simpler waste-products. There is the same power of active movement, a movement of one part of the body upon another giving rise to a change of form, and a series of changes of form resulting eventually in a change of place. In what may be called the condition of rest the body assumes a more or less spherical shape. By the active transference of part of the mass in this or that direction the sphere flattens itself into a disk, or takes on the shape of a pear, or of a rounded triangle, or assumes a wholly irregular, often star-shaped or branched, form. Each of these transformations is simply a rearrangement of the mass, without change of bulk. When a bulging of one part of the body takes place there is an equivalent retraction of some other part or parts; and it not infrequently happens that one part of the body is repeatedly thrust forward, bulging succeeding bulging, and each bulging accompanied by a corresponding retraction of the opposite side, so that, by a series of movements, the whole body is shifted along the line of the protuberances. The tiny mass of simple living matter moves onward, and that with some rapidity, by what appears to be a repeated flux of its semi-liquid substance.

The internal changes leading to these movements may begin, and the movements themselves be executed, by any part of the uniform body; and they may take place without any obvious cause. So far from being always the mere passive results of the action of extrinsic forces, they may occur spontaneously, that is, without the coincidence of any recognizable disturbance whatever in the external conditions to which the body is exposed. They appear to be analogous to what in higher animals we speak of as acts of volition. They may, however, be provoked by changes in the external conditions. A quiescent *amœba* may be excited to activity by the touch of some strange body, or by some other event—by what in the ordinary language of Physiology is spoken of as a stimulus. The protoplasmic mass is not only mobile, but sensitive. When a stimulus is applied to one part of the surface a movement may commence in another and quite distant part of the body; that is to say, molecular disturbances appear to be propagated along its substance without visible change, after the fashion of the nervous impulses we spoke of in the beginning of this article. The uniform protoplasmic mass of the *amœba* exhibits the rudiments of those attributes or powers which in the initial sketch we described as being the fundamental characteristics of the muscular and nervous structures of the higher animals.

These facts, and other considerations which might be

brought forward, lead to the tentative conception of protoplasm as being a substance (if we may use that word in a somewhat loose sense) not only unstable in nature but subject to incessant change, existing indeed as the expression of incessant molecular, that is, chemical and physical change, very much as a fountain is the expression of an incessant replacement of water. We may picture to ourselves this total change which we denote by the term "metabolism" as consisting on the one hand of a downward series of changes (*katabolic* changes), a stair of many steps, in which more complex bodies are broken down with the setting free of energy into simpler and simpler waste bodies, and on the other hand of an upward series of changes (*anabolic* changes), also a stair of many steps, by which the dead food, of varying simplicity or complexity, is, with the further assumption of energy, built up into more and more complex bodies. The summit of this double stair we call "protoplasm." Whether we have a right to speak of it as a single body, in the chemical sense of that word, or as a mixture in some way of several bodies, whether we should regard it as the very summit of the double stair, or as embracing as well the topmost steps on either side, we cannot at present tell. Even if there be a single substance forming the summit, its existence is absolutely temporary; at one instant it is made, at the next it is unmade. Matter which is passing through the phase of life rolls up the ascending steps to the top, and forthwith rolls down on the other side. But to this point we shall return later on. Further, the dead food, itself fairly but far from wholly stable in character, becomes more and more unstable as it rises into the more complex living material. It becomes more and more explosive, and when it reaches the summit its equilibrium is overthrown and it actually explodes. The whole downward stair of events seems in fact to be a series of explosions, by means of which the energy latent in the dead food and augmented by the touches through which the dead food becomes living protoplasm, is set free. Some of this freed energy is used up again within the material itself, in order to carry on this same vivification of dead food; the rest leaves the body as heat or motion. Sometimes the explosions are, so to speak, scattered, going off as it were irregularly throughout the material, like a quantity of gunpowder sprinkled over a surface, giving rise to innumerable minute puffs, but producing no massive visible effects. Sometimes they take place in unison, many occurring together, or in such rapid sequence that a summation of their effects is possible, as in gunpowder rammed into a charge, and we are then able to recognize their result as visible movement, or as appreciable rise of temperature.

These various phenomena of protoplasm may be conveniently spoken of under the designation of so many properties, or attributes, or powers of protoplasm, it being understood that these words are used in a general and not in any definite scholastic sense. Thus we may speak of protoplasm as having the power of *assimilation*, *i. e.*, of building up the dead food into its living self; of movement, or of *contractility* as it is called, *i. e.*, of changing its form through internal explosive changes; and of *irritability* or *sensitiveness*, *i. e.*, of responding to external changes, by less massive internal explosions, which, spreading through its mass, are not in themselves recognizable through visible changes, though they may initiate the larger visible changes of movement.

These and other fundamental characteristics, all associated with the double upward and downward series of chemical changes, of constructive and destructive metabolism, are present in protoplasm wherever found; but a very brief survey soon teaches us that specimens of protoplasm existing in different beings or in different

parts of the same being differ widely in the relative prominence of one or another of these fundamental characteristics. On the one hand, in one specimen of protoplasm the energy which is set free by the series of explosions constituting the downward changes of destructive metabolism may be so directed as to leave the mass almost wholly in the form of heat, thus producing very little visible massive change of form. Such a protoplasm consequently, however irritable and explosive, exhibits little power of contractility or movement. In another specimen, on the other hand, a very large portion of the energy similarly set free may be spent in producing visible changes of form, the protoplasm in this instance being exquisitely mobile. Such differences must be due to different internal arrangements of the protoplasm, though, since no vision, however well assisted, can detect these arrangements, they must be of a molecular nature rather than of that grosser kind which we generally speak of as structural. It is true that, as the differences in properties become more and more prominent, as the protoplasm becomes more and more specialized, features which we can recognize as structural intervene; but even these appear to be subsidiary, to accompany and to be the result of the differences in property, or to be concerned in giving special directions to the activities developed, and not to be the real cause of the differences in action. We are thus led to the conception of protoplasm as existing in various differentiated conditions while still retaining its general protoplasmic nature, a difference of constitution making itself felt in the different character of the work done, in a variation of the results of the protoplasmic life. We have a division of physiological labor going hand in hand with a differentiation of material, accompanied ultimately by morphological results which may fairly be spoken of as constituting a differentiation of structure.

Some of the simpler and earlier features of such a division and differentiation may be brought out by comparing with the life of such a being as the *amœba* that of a more complex and yet simple organism as the *hydra* or freshwater polyp. Leaving out certain details of structure, which need not concern us now, we may say that the *hydra* consists of a large number of units or cells firmly attached to each other, each cell being composed of protoplasm, and in its broad features resembling an *amœba*. The polyp is in fact a group or crowd of *amœba*-like cells so associated together that, not only may the material of each cell, within limits, be interchanged with that of neighboring cells, but also the dynamic events taking place in one cell, and leading to exhibitions of energy, may be similarly communicated to neighboring cells, also within limits. These cells are arranged in a particular way to form the walls of a tube, of which the body of a *hydra* practically consists. They form two layers in apposition, one an internal layer called the *endoderm*, lining the tube, the other an external layer called the *ectoderm*, forming the outside of the tube. And, putting aside minor details, the differences in structure and function observable in the organism are confined to differences between the *ectoderm* on the one hand, all the constituent cells of which are practically alike, and the *endoderm* on the other, all the cells of which are in turn similarly alike. The protoplasm of the *ectoderm* cells is so constituted as to exhibit in a marked degree the phenomena of which we spoke above as irritability and contractility, whereas in the *endoderm* these phenomena are in abeyance, those of assimilation being prominent. The movements of the *hydra* are chiefly brought about by changes of form of the *ectoderm* cells, especially of tail-like processes of these cells, which, arranged as a longitudinal

wrapping of the tubular body, draw it together when they shorten, and lengthen it out when they elongate, and it is by the alternate lengthening and shortening of its body, and of the several parts of its body, that the hydra changes its form and moves from place to place. Inaugurating these changes of form, the products of contractility, are the more hidden changes of irritability; these also are especially developed in the ectoderm cells, and travel readily from cell to cell, so that a disturbance originating in one cell, either from some extrinsic cause, such as contact with a foreign body, or from intrinsic events, may sweep from cell to cell over the surface of the whole body. The animal feels as well as moves by means of its ectoderm cells. In the endoderm cells the above phenomena, though not wholly absent, are far less striking, for these cells are almost wholly taken up in the chemical work of digesting and assimilating the food received into the cavity, the lining of which they form.

Microscopic examination further shows that these two kinds of cells differ from each other to some extent in visible characteristics; and, though, as we have seen, the differences in activity appear to be dependent on differences in invisible molecular arrangement rather than on gross visible differences such as may be called structural, still the invisible differences involve or entail, or are accompanied by, visible differences, and such differences as can be recognized between endoderm and ectoderm, even with our present knowledge, may be correlated to differences in their work; future inquiry will probably render the correlation still more distinct.

The ectoderm cells together constitute what we have spoken of above as a tissue, whose function in the modern sense of the word is movement and feeling, and the endoderm cells constitute a second tissue, whose function is assimilation; and the phenomena of the whole being result from the concurrent working of these two functions. Of organs, in the old sense of the word, of mechanical contrivances, there is hardly a trace. The performances of the being are, it is true, conditioned by its being molded in the form of a long tubular sac with a crown of like tubular arms, but beyond this the explanation of every act of the hydra's life is first to be sought in the characteristics of the endoderm and ectoderm. The physiology of the hydra is, for the most part, a series of problems, dealing on the one hand with the intimate nature of the ectodermic protoplasm and the changes in that protoplasm which give rise to movement and feeling, as well as with the laws whereby those changes are so regulated that movement and feeling come and go as the needs of the organism may require, and on the other hand with the intimate nature of the endodermic protoplasm and the changes in that protoplasm whereby the dead food is, also according to the needs of the economy, transformed into living substance. Whereas the older Physiology dealt almost exclusively with mechanical problems, the Physiology of to-day is chiefly busied with what may be called molecular problems.

The physiology of the higher animals, including man, is merely a development of the simpler physiology of the hydra, which has been rendered more complex by a greater division of physiological labor, entailing greater differentiation of structure, and been varied by the intercalation of numerous mechanical contrivances.

In the hydra each ectoderm cell—for, broadly speaking, they are all alike—serves three chief purposes of the body. (1) It is sensitive, that is, it is thrown into peculiar molecular agitations, with expenditure of energy, when acted upon by external agents. In man and the higher animals certain cells of the original ectoderm of the embryo are differentiated from their

fellows (which, losing to a large extent this sensitiveness, remain as a mechanical covering to the body) by a more exquisite development of this power of reaction, and moreover are differentiated from each other in their relative sensitiveness to different agents, so that one set of cells becomes peculiarly susceptible to light, another set to pressure, and the like. Thus the uniform ectoderm of the hydra, uniformly susceptible to all agencies, is replaced by a series of special groups of cells forming the basis of sensory organs, each group being specially sensitive to one agent, and having the nature of its constituent cells correspondingly modified. (2) In each ectoderm cell of the hydra the agitations primarily induced by the exciting agent become so modified by changes taking place in the cell that the outcome is not always the same. According to processes taking place in the cell, movement of one kind or another, or no movement at all, may result, and such movement as results may take place immediately or at some other time; it may be at a time so distant that the connection with the exciting disturbance is lost, and the movement appears to be spontaneous. In man and the higher animals these more complex "neural" processes are carried on, not by the simple sensory cells which receive the primary impression, but by a group of cells set apart for the purpose. These cells constitute a central nervous system, in which a still further division of labor and differentiation of structure takes place, the simple neurotic processes of the hydra, with its dim volition and limited scope of action, being developed in a complex manner into processes which range from simple elaboration of the initial additional agitation of the sensory cell into what we speak of as intelligence and thought. (3) Each ectoderm cell, by its tail-like prolongation, or by its whole body, contributes to the movement of the animal while still carrying on the two other actions just described. In man and the higher animals the material of the sensory cell and of the central nervous cells is too precious to be wasted in movements; these accordingly are carried out by groups of cells constituting the muscular tissue, in which both the sensitiveness and the higher neurotic processes of the primitive cell are held in abeyance; indeed, the latter have almost disappeared in order that the energy of the protoplasm may be more completely directed to producing those changes of form which determine the movements of the animal.

Further, the separation in space of these three groups of cells or tissues necessitates the introduction of elements whereby the agitations set up in the sensory cell should be communicated to the central nervous cells, where these agitations are further elaborated, as well as of elements whereby the muscular tissue may receive vibrations from the central nervous cells, so that the movements of the body may be determined by these. Hence strands of irritable protoplasm whose energy is not spent in movement, but wholly given up to the rapid and easy transmission of molecular vibrations, unite, as sensory nerves, the sensory cells with the central nervous cells, and, as motor nerves, these with the muscles.

Lastly, for the adequate carrying out of complex movements, the contractile cells, elongated into specially constructed fibers and constituting the muscles, are arranged, with inert tissues such as bones, cartilages, tendons, and the like (tissues of mechanical virtues, manufactured by an active protoplasm, but themselves passive, no longer active), into various mechanical contrivances. Similarly the sensory cells, as notably those of the eye and the ear, set apart to be acted upon by special agents, are provided with special mechanisms in order that the agent may act with more complete pre-

cision. Thus the sensory cells constituting the retina of the eye, in which alone sensory, visual impulses are generated, are provided with an intricate dioptric mechanism, formed partly of inert tissues such as the lens, partly of peculiarly arranged muscular and nervous elements.

In this way the simple ectoderm of the hydra is replaced by a complicated system composed of organs, some of them of extremest intricacy. But the whole system may be reduced to two sets of factors. On the one hand there are organs in the old sense of the word, that is, mechanical arrangements, some connected with muscles and others connected with the sensory cells, organs whose functions have for the most part to be interpreted on mechanical principles, since their most important factors, putting aside intervening muscular and nervous elements, are the inert products of protoplasm doing simple mechanical work. On the other hand there are organs in the latter sense of the word, namely, sensory cells differentiated to be sensitive to special influences, central nervous cells differentiated to carry on the inner nervous work, muscles differentiated to contract, and nerves differentiated to bind together these three other factors. The work of these latter organs is dependent on the nature of their protoplasm; mechanical arrangements play but little part in them; and the results of their activity can in no way be explained on simple mechanical principles.

Corresponding with this differentiation of the ectoderm cells runs a somewhat similar differentiation of the endoderm cells. In the hydra each endoderm cell appears to receive some of the food bodily into itself and there to elaborate it into what may be spoken of as prepared nutritive material. Some of this material the cell retains within itself in order to renew its own protoplasm; the rest oozes out to the ectoderm cells, the replenishment of whose protoplasm is thereby effected with a saving of labor. In the higher animals the preparation of food is far more complicated. The endodermic sheet of the alimentary canal is folded and arranged into organs called glands, with the mechanical advantage that a large amount of surface is secured within a small bulk; and the constituent endodermic cells of their glands pour out, or secrete, as is said, divers fluids into the cavity or the canal, so that much preliminary preparation of digestion of the food takes place before the food really enters the body. Further, these secreting glandular cells are so differentiated as to pour out special juices acting on special constituents of a meal, and the food subjected in turn to the action of these several juices becomes thoroughly prepared for reception into the body. This reception is carried out by other endoderm cells, which in receiving the digested food probably act upon it so as still further to heighten its nutritive value; and the absorbed food, before it is presented to the muscular and nervous tissues, for whose use it is largely, though of course not exclusively, intended, is subjected to the action of other cells, such as those forming the lymphatic glands and the liver, in order that it may be still further elaborated, still further prepared for the final conversion into living protoplasm.

As in the case of the tissues and organs of ectodermic origin, so also here, the wide separation in space of the masses of differentiated cells constituting tissues necessitates the introduction of mechanical contrivances for the carriage of material from place to place. In the simple minute hydra the nutritive material can permeate the whole body by simply oozing from cell to cell. In the higher animal a hydraulic system for the distribution of nutritive material is introduced. A fluid is distributed in a ceaseless flow all over the body by a mechanical arrangement, consisting of a pump with branching

tubes, worked on mechanical principles, and capable of being imitated artificially, save that the power which drives the machine is the energy set free by living muscle. As this circulating fluid or blood rushes past the endoderm cells which have gorged themselves from the rich contents of the alimentary canal, it receives from them some of the material which they have absorbed and elaborated, and carries this, the nutritive supply, to muscles, nerves, and all parts of the body. Similarly it carries away from muscle, nerves, and other tissues of waste-products of their activity those broken fragments of simpler stuffs into which, as we have seen, the complex protoplasm, wherever it exists, is forever splitting up, and bears them back to differentiated endoderm and other cells, whose work has become, so to speak, inverted, since their activity is directed to casting things out of the body, instead of receiving things into the body. And lastly, by a special arrangement, by a peculiar property of those red corpuscles which make blood red, this circulating material at one and the same time carries to each corner of the body, not only the nutritive material required for building up protoplasm, but also the oxygen by which the constructed protoplasm may suffer oxidation, and in being oxidized set free that energy the manifestation of which is the token of life. Blood is in fact the medium on which all the various parts of the body live. Just as an amœba finds in the water which is its home both the food with which it builds itself up and the oxygen with which it breaks itself down, and returns to the water the waste-products of its continued disintegration, so each islet of the living substance of the higher animal, be it muscle or nerve or gland, draws its food and its oxygen from the red blood-stream sweeping past it, finding therein all its needs, and sheds into the same stream the particles into which it is continually breaking up, and for which it has no longer any use. Hence the blood becomes, as it were, a chemical epitome of the body; from it each tissue takes something away; to it each tissue gives something back. As it sweeps by each tissue, losing and gaining, it makes the whole body common, and when working aright brings it about that each tissue is never in lack of the things which it wants, never choked up with the things with which it has done.

This vascular system, consisting of a force-pump and branching tubes, constitutes, as we have said, a mechanical arrangement worked on mechanical principles. Nevertheless occult protoplasmic processes intervene as factors in its total work. Not only is the force-pump itself a living muscular organ, not only are the walls of the tubes muscular in nature, so that the mere mechanical working of the system is modified by changes not of mechanical origin taking place in them, but the living material which lines the tubing throughout, especially in the minuter channels, finds work to do, also not of a mechanical nature. The gross phenomena of the flow of blood through the capillary channels may (see VASCULAR SYSTEM) be interpreted on simple hydraulic principles; but no appeal to the ordinary physical laws of dead material will explain the phenomena of the interchange between the blood on the inside of a capillary wall and the tissue-elements on the outside. In every tissue, be it gland, muscle, or nerve, the blood, so far from being actually in contact with the active protoplasmic units of the tissue, is separated by the protoplasmic film of the capillary wall, and by a space or spaces, greater or smaller, filled with the fluid called lymph and lined to a greater or less extent with protoplasmic cells, which lining, often at least, parts the tissue-units from the lymph. Hence the tissue lives upon the lymph, while the lymph is replenished from the blood; and the

interchange between the tissue-unit and the blood is determined, not only by the direct action of the tissue-unit on the lymph, but also by the relations of the lymph to the blood, as regulated by the capillary wall and the cellular lining of the lymph-spaces. We may speak of the interchange as broadly one of diffusion or osmosis through filmy membranes; but diffusion is not the lord in the matter: it is rather a humble servant directed hither and thither by occult molecular processes in the protoplasmic structures concerned.

The foregoing rough analysis leads to a conception of the physiology of the animal body which may be expressed somewhat as follows:—The body is composed of different kinds of matter; each kind of matter, arranged in units more or less discrete, constitutes a tissue; and the several tissues, though having a common likeness in token of their origin from a common primordial protoplasm, have dissimilar molecular constitutions, entailing dissimilar modes of activity. Nor is each tissue homogeneous, for two parts of the body, though so far alike as to be both examples of the same general tissue, may be different in molecular constitution, more or less distinctly expressed by microscopic differences of structure, and correspondingly different in action. Thus a liver-cell and a kidney-cell, though both examples of glandular tissue, are quite distinct; so also several varieties of muscular tissue exist; and in the dominant nervous tissue we have not only a broad distinction between nerve-fibers and nerve-cells, but the several groups of nerve-cells which are built up into the brain and spinal cord, and indeed probably the single nerve-cells of these, though all possessing the general characters, in both structure and function, of nervous protoplasm, differ most widely from each other. These several tissues of diverse constitution and activity, ranging as regards the rapidity of the molecular changes taking place in them from the irritable, unstable, swiftly-changing nerve-cell to the stable, slowly-changing, almost lifeless tendon or bone, are disposed in the body in various mechanical arrangements constituting organs or machines, whereby the activities of the constituent tissue-elements are brought to bear in special directions. These organs range from those in which the mechanical provisions are dominant, the special activity of the tissue-elements themselves being in the background, and supplying only an obscure or even unimportant factor, as in the organs of respiration, to those in which the mechanical provisions are insignificant, as in the central nervous system, where the chief mechanical factor is supplied by the distribution in space of the nerve fibers or cells.

Hence it is obvious that almost every physiological inquiry of any large scope is, or sooner or later becomes, of a mixed nature. On the one hand, investigation has to be directed to the processes taking place in the actual tissue-elements, in the protoplasmic cells and modifications of cells. These are essentially of a molecular, often of a chemical or chemico-physical, nature; in the problems thus raised matters of form and structure, other than that of molecular structure, which no microscope can ever reveal, are of a secondary moment only, or have no concern in the matter at all. These may be spoken of as the purely physiological or as the molecular problems. On the other hand, the natural results of these tissue-activities are continually being modified by circumstances whose effect can be traced to the mechanical arrangements under which the tissue in question is acting, whence arise problems which have to be settled on simple mechanical principles.

We may take as an illustration the physiology of the kidney. In the old language the function of the kidney is to secrete urine. When we come to inquire into the

matter, we find, in the first place, that the secretion of urine—that is, the quantity and quality of the urine escaping from the duct of the kidney in a given period—is partly determined by the quantity of blood passing through the kidney and the circumstances of its passage. Now the quantity of blood reaching the kidney at any one time is dependent partly on the width of the renal arteries, partly on the general pressure of the blood in the arterial system. The width of the renal arteries is in turn dependent on the condition of their muscular walls, whether contracted or relaxed; and this condition is determined by the advent of nervous impulses, the so-called vaso-motor impulses, arising in the central nervous system and passing down to the renal arteries along certain nerves. The emission of these vaso-motor impulses from the central nervous system is further determined, on the one hand by the condition of certain parts of the central nervous system, the so-called vaso-motor centers, and on the other by the passage of certain afferent sensory impulses to those vaso-motor centers from sensory surfaces such as the skin. Similarly the general blood-pressure is dependent on the condition, patent or narrowed, of the small arteries generally, this being likewise governed by the vaso-motor system and on the coincident work done by the heart in driving blood into the great blood-vessels, this work being also governed by the nervous system. Hence in attacking such a problem as to how any particular event, such as the exposure of skin to the cold, influences the flow of blood through the kidney and thus the secretion of urine, the investigator, without staying to inquire into the nature of nervous impulses, or into the nature of changes taking place in vaso-motor centers, etc., directs his attention to determining what impulses are generated under the circumstances, what paths they take, to what extent they are quantitatively modified, how far they and their effects react upon each other, and so on. His inquiry in fact takes on to a large extent the characteristics of an attempt to unravel an intricate game, in which the counters are nervous impulses, muscular contractions, and elastic reactions, but in which the moves are determined by topographical distribution and mechanical arrangements.

But there are other problems connected with the physiology of the kidney of quite a different nature. The kidney is, broadly speaking, constructed of living protoplasmic cells so arranged that each cell is on one side bathed with blood and lymph, and on the other forms the boundary of a narrow canal, which, joining with other canals, ultimately opens into the urinary bladder. Here the question arises how it is that these protoplasmic cells, having nothing to draw upon but the common blood, which is distributed to other organs and tissues as well, are able to discharge on the other side of them into the canal the fluid urine, which is absolutely distinct from blood, which contains substances wholly unknown in blood, as well as substances which, though occurring in blood, are found there in minute quantities only, and, moreover, are not found to escape from the blood into any other tissues or organs. In attempting to answer this question we come upon an inquiry of quite a different nature from the preceding, an inquiry for the solution of which mechanical suggestions are useless. We have to deal here with the molecular actions of the protoplasmic cell. We must seek for molecular explanations of the questions, why a current sets across the cell from blood-capillary and lymph-space to the hollow canal; why the substances which emerge on the far side are so wholly unlike those which enter in on the near side; why, moreover, the intensity of this current may wax and wane, now flooding the canal with urine, now nearly or quite drying up; why



not only the intensity of the current but also the absolute and relative amount of the chemical substances carried along it are determined by events taking place in the cell itself, being largely independent of both the quantity and quality of the blood which forms the cell's only source of supply. These and other like questions can only be solved by looking with the mind's eye penetrating through careful inferences, into those inner changes which we call molecular, and which no optical aid will ever reveal to the physical eye.

*Nervous System.*—However complex may be the anatomical arrangements in man and the higher animals, the nervous system consists essentially of three portions: (1) *central* masses of nervous matter, or *ganglia*, constituting the brain and spinal cord, and containing invariably nerve-cells; (2) *peripheral* or *terminal* arrangements, existing in the organs of sense, in muscle, and in electric organs; and (3) *nerves*, or internuncial cords connecting the central with the peripheral organs. The nerves may be regarded as conductors of a mode of energy which, for want of a better term, is termed "nerve-force," originating either in the nerves themselves on the application of a stimulus or in the terminal organs or in the central organs. Thus, if a nerve be irritated at any point of its course, a change is set up in the nerve-fibers at the point of irritation, and this change is propagated along the nerve-fibers to a central or terminal organ, thus producing a characteristic phenomenon—it may be a sensation of pain or of pleasure, an involuntary movement, the contraction of a muscle, or a discharge of electricity. Again, the stimulus may act on a terminal organ, such as the retina, setting up a change which is then propagated or conveyed to the brain by the optic nerve, there giving rise to a sensation of light or color. Finally, the nervous action may originate in a central organ, as is the case when a voluntary movement is made. The voluntary impulse, in this instance, originates in the brain; a change passes along nerve-fibers from the brain to the muscles, and as a result the muscles contract.

*Part III. Physiology of Plants.*—The body of a plant, like that of an animal, consists of one or more structural units which are termed "cells," and in plants, as in animals, the cell consists essentially of an individualized mass of protoplasm.

The cell or cells constituting the body of a plant present, in most cases, the important peculiarity that the protoplasm is inclosed in a membrane termed the "cell-wall." This membrane does not consist of protoplasm, but of a substance, cellulose, belonging to the group of the carbohydrates. All cell-walls do not, however, consist exclusively of this substance, though this is probably always the case at their first formation; but the cell-wall may undergo considerable modification during the life of the cell. It may, for example, undergo lignification; it then comes to consist largely of a substance termed "lignin," which is much richer in carbon than is cellulose; this takes place typically in those cells which form woody or sclerenchymatous tissue. Or it may undergo cuticularization, when it comes to consist largely of a substance termed "suberin" or "cutin," which, like lignin, is richer in carbon than cellulose. Or, again, it may become gummy or mucilaginous. These chemical differences are accompanied by differences in the physical properties of the cell-wall. A cellulose cell-wall is extensible, capable of swelling from taking up water into itself by imbibition, and is readily traversed by water. A lignified or cuticularized cell-wall is more rigid and less capable of swelling by imbibition; moreover, a cuticularized cell-wall is almost impermeable to water. A gummy or mucilaginous cell-

wall is more extensible and more capable of swelling by imbibition.

The structure of the plant-cell is not the same at all periods of its life. When a cell is young the protoplasm occupies the whole of the cavity inclosed by the cell-wall. But in the course of growth the increase in bulk of the protoplasm is not nearly so great as the increase in surface of the cell-wall, so that in the mature cell the protoplasmic contents form merely a rather thin layer known as the *primordial utricle*, which lies in close contact with the internal surface of the cell-wall at all points. There thus comes to be a relatively large cavity in the cell, the *vacuole*, which is filled with a liquid, the *cell-sap*, consisting of water holding various substances, organic and inorganic, in solution. The structure of a mature living cell is then this: it consists of a cell-wall, lined with a layer of protoplasm, which incloses the vacuole, filled with cell-sap.

The protoplasm of plants is endowed with all those fundamental properties which are possessed by that of animals. When a plant is unicellular these properties are all exhibited, so far as they are necessary to the maintenance of the organism, by its protoplasm; in other words, all the necessary vital functions are performed by the protoplasm of the single cell of which the plant consists. The performance of all the necessary vital functions by the protoplasm of one cell obtains also in the case of not a few multicellular plants—in those, namely, in which all the cells are similar to each other in structure and contents. In the great majority of multicellular plants, however, the functions are distributed to a greater or less extent; there is more or less complete physiological division of labor. In these plants the cells are not all similar in appearance, and their diversity is to be ascribed to their adaptation in different ways to the performance of particular functions. Further, the cells which have undergone modifications in some particular direction for the performance of some particular function are grouped together in certain parts of the plant, and these parts are spoken of as "organs." Thus the roots of one of the higher plants are the organs for the absorption from the soil of water and substances in solution; the leaves are the organs for the absorption of gases from the air, and, in virtue of the green coloring-matter chlorophyll, which their cells contain, they are also the organs in which certain important constructive processes are carried on. But the extent to which physiological division of labor is carried out in plants is not nearly so considerable as it is in animals, and accordingly the protoplasm of the different cells of plants exhibits only in a very slight degree that specialization of structure which is so conspicuous in animals.

*Absorption of Water and Substances in Solution.*—The bodies of plants, unlike those of the great majority of animals, do not contain any internal cavity into which the food may be taken as a preliminary to its being absorbed by the tissues. The materials of the food of plants are therefore taken up directly from without into the cells of the absorbent organs. The cells which are especially concerned in absorption are, in the higher and subaërial plants, the *root-hairs*—thin-walled, unicellular, unbranched filaments which are developed from the epidermal cells some way behind the growing-point of the root; in the lower plants, and even in those of the higher plants which lie submerged, all the cells of the plant may take part in absorption. Since the food is directly absorbed by the cells, and since the cells all possess a cell-wall, the materials of the food must be taken up in solution. Salts and other substances are, as a matter of fact, taken up by the absorbent cells in the form of watery solutions. Sub-

stances which are soluble in water are dissolved in the water which is present in a greater or smaller proportion in all soils, and of those which are not soluble in water many are brought into solution by the acid sap which saturates the walls of the root-hairs. The actual process of absorption is an instance of diffusion through a membrane—that is, of osmosis. Only such substances can be absorbed by a root-hair, for instance, as are capable of diffusing not only through the cell-wall but also through the protoplasmic primordial utricle. Further, only such substances can be absorbed by the root-hair as are present in larger proportion in the water to be absorbed than they are in the cell-sap of the root-hair; this inequality between the proportion of any substance in solution in the liquid on the one side and in that of a membrane on the other is a necessary condition of osmosis. Hence, in order that the absorption of any particular substance by the root-hairs may be continuous, it is necessary that the substance in question should not accumulate in the cell-sap; this accumulation is prevented either by the actual consumption (*i.e.*, chemical decomposition) of the substance in the cell or by the withdrawal of it to supply the needs of adjacent cells. In fact, so far as the process of absorption is concerned, the cell-sap of the internal cells of the root stands in the same relation to the cell-sap of the root-hairs as the cell-sap of the root-hairs does to the external liquid; and, as this relation exists between the successive internal layers of cells, there is set up a current of absorbed substances which travels from the surface toward the center.

It appears from the foregoing considerations that the amount of any particular salt absorbed in a given time depends upon (1) its diffusibility and (2) its consumption in the plant. Of these two conditions the second is the one which is of real physiological importance, and, if only the given time is sufficiently long, the first condition may be neglected. For instance, let us suppose that a plant is absorbing by its roots two salts—the one (*A*) being very diffusible, the other (*B*) much less diffusible—and that, while the former undergoes no change in the plant after absorption, the latter is at once decomposed. Now, if the time of observation is short, it may happen that the amount absorbed of the salt *A* will be found to be greater than that of the salt *B*; but, if the time be extended, the amount absorbed of the salt *B* will certainly be found to be greater than that of the salt *A*. The explanation is that the salt *A* would at first be absorbed very rapidly, on account of its high diffusibility; but the absorption of it would gradually diminish, in consequence of the accumulation of it in the cell-sap of the plant, until it ceased altogether. The absorption of the salt *B*, on the other hand, if less active at first than that of *A*, would be continuous, and thus, over a relatively long period of time, the amount of it absorbed would come to be much greater than that of *A*.

As a matter of fact, it has been ascertained that when different salts or other substances are presented to the root of a plant they are absorbed in different quantities. And further, it has been ascertained that the different salts are absorbed in different proportions by the roots of different plants; it is, in fact, upon this that the necessity for the "rotation of crops" depends.

The gases principally absorbed by plants are oxygen and carbon dioxide. The former is absorbed by every living cell, and at all times; the latter is absorbed exclusively by cells which contain chlorophyll, and by them only when exposed to light. In the more highly organized plants the cells which contain chlorophyll are confined almost entirely to the leaves, so that the

leaves may be regarded as the organs by which these plants absorb carbon dioxide.

Besides oxygen and carbon dioxide other gases are also absorbed by plants, but to a small extent only. Nitrogen is absorbed in small quantities merely in virtue of its solubility and diffusibility; it is not in any way acted upon by the cells after its absorption. It appears that ammonia may be absorbed from the air in the form of gas by the leaves, and that, when thus absorbed, it contributes to the nutrition of the plant. Other gases, such as sulphur dioxide, sulphureted hydrogen, and hydrochloric acid, which are occasionally present in the air as impurities, are absorbed by the leaves, as is shown by the pernicious effects which they produce.

*Circulation.*—It is obviously necessary, in multicellular plants in which certain cells only are in a position to absorb food-materials from without, that these food-materials should be conveyed from the absorbent cells to the remainder of the plant. In no plant is there any organ comparable to the heart of animals by means of which a distribution throughout the tissues of absorbed food-materials is effected. The distribution is accomplished by purely physical means, principally by osmosis. When the cell-sap of a cell becomes charged, by absorption from without or from neighboring cells, with any substance, diffusion-currents are at once set up between this cell and any adjacent cells the cell-sap of which may contain the substance in question in smaller proportion, and these currents will persist until osmotic equilibrium, as far as this substance is concerned, is established. The diffusion-currents do not flow in any definite direction, but their course is determined simply by inequalities in the chemical composition of the cell-sap of the cells in different parts of the plant. Since in subaërial plants the roots are as a rule the only organs which absorb substances from the soil, and since the cell-sap of their cells is therefore relatively rich in absorbed food-materials, the general direction of the diffusion-currents is from the roots upward into the stem and leaves.

In cellular plants—that is, in plants which possess no vascular tissue—the distribution of absorbed food-materials is effected solely by osmosis. Many of these plants are small, so that the distribution is effected from cell to cell with sufficient rapidity by this means. Those of them that are large have a very considerable absorbent surface, many of them being aquatic in habit, so that the absorbed substances have no great distance to travel. In vascular plants, more particularly in those which are subaërial in habit, the distribution of the water, holding substances in solution, which is absorbed by the roots, is effected to a considerable extent by means of the vascular system. The forces by which the flow of liquid through the vascular tissue is maintained are the following:—The first is the *root-pressure*. It is a matter of common observation that, when the stems of vascular plants are cut across, particularly in the spring, an escape of water takes place from the surface of that portion of the stem which still remains connected with the root, an escape which may persist for some considerable time. It has been ascertained that this outflow of water takes place under considerable pressure; for instance, Hales observed, in the case of a vine, that the pressure was sufficiently great to support a column of mercury thirty-two and a half inches in height. But the root-pressure not only manifests itself by causing a flow of water from the cut surfaces of stems, it also causes in many plants the exudation of drops of water at the free surface. Drops may commonly be seen on the surface of certain fungi, which are exuded in consequence of the hydrostatic pressure set up in the plant by the active absorption effected by

the organs (rhizoids) which here perform the functions of roots. Again, drops are frequently to be found on the margins and at the apices of the leaves, especially the younger ones, of many plants, such as grasses, aroids, alchemillas, saxifrages, etc. That the formation of these drops depends upon the forcing of water upward through the vessels by the root-pressure is proved by the fact that, if the stem be cut off from the root and then placed with its cut end in water, no more drops will appear on the leaves. The water thus forced into the vascular system is not pure water, but a watery solution of various substances, principally salts absorbed by the roots. It is therefore obvious that the root-pressure assists in the distribution of these substances throughout the plant.

In order to understand how the root-pressure is set up it will be necessary to give a brief description of the general structure of the root. It consists of a central fibro-vascular cylinder which is surrounded by several layers of parenchymatous cells, the most external of these layers being in contact with the epidermal layer, certain cells of which are developed into root-hairs. Water is absorbed by the root-hairs and passes from them by osmosis into the subjacent parenchymatous cells. It is obvious, however, that osmosis cannot take place between the cells of the innermost layer and the vessels, for the conditions of osmosis are not fulfilled, inasmuch as the vessels at first contain no liquid. The passage of water from the cells into the vessels can only take place by filtration. For this a certain pressure is necessary, and this pressure is set up by the absorbent activity of the root-hairs and of the parenchymatous cells. The system of cells absorbs large quantities of water, more indeed than the cells can contain, so that at length the resistance of the cell-walls is overcome at what is presumably the weakest point, and water filters into the cavities of the vessels of the wood. There it collects, and it may, under certain circumstances, fill the whole vascular system; then, since absorption is still going on at the surface of the roots, sufficient pressure is set up to cause that exudation of drops on the leaves to which allusion has been made, and, if the stem be cut across, to cause "bleeding" at the cut surface. From the foregoing account it is apparent that the root-pressure is the expression of the absorbent activity of the root-hairs.

But the vessels of the wood do not always contain water. Hales observed that, whereas a vine will bleed freely if its stem be cut across in the month of April, no bleeding is observed if it be cut in July. And yet it cannot be doubted that the plant is absorbing water by its roots more actively in July than in April. The explanation of these facts is that, although in July the plant is absorbing water actively by its roots, yet it is losing so much in the form of vapor from its leaves that water does not accumulate in the cavities of the vessels. This loss of water in the form of vapor from the general surface of the plant exposed to the air is termed "transpiration." The parts of the plant which are more especially concerned in transpiration are the leaves. By their structure they are peculiarly adapted for this purpose. The tissue of a leaf is penetrated in all directions by intercellular spaces, which communicate directly with the external air by means of the stomata in the epidermis. In this way a very large surface of moist and thin cell-wall is brought into contact with the air, a condition most favorable to evaporation.

The activity of transpiration is very much affected by external conditions—the moister the air, the smaller will be the transpiration; and conversely, the drier the air and the higher the temperature, the greater will be the amount of water transpired. Light, too, has a remark-

able influence: it has been ascertained by a great number of observers that transpiration is more active in light than in darkness. It seems probable that this is to be attributed largely to the influence of light upon the stomata. Each stoma is usually bounded by two cells, termed "guard-cells," which are capable of so altering their form as to close or to open the aperture between them. The form of the guard-cells is dependent upon the amount of water which they contain. When they hold comparatively little water, and are flaccid, their adjacent free surfaces are straight and in contact with each other; the stoma is then closed. When, however, they contain so much water that their cell-walls are under considerable pressure from within—in a word, when the guard-cells are turgid—they curve so that their adjacent free surfaces are no longer in contact, but a space is left between them; the stoma is then open. It appears that the guard-cells become turgid under the influence of light; and it is probably to this open condition of the stomata that the greater transpiration of leaves when exposed to light is to be ascribed.

It is obvious that the effect of transpiration upon the distribution of water through the plant is very great. It sets up a rapid current, known as the "transpiration-current," which travels from the roots upward toward the leaves.

It has been conclusively proved that the channel along which the transpiration-current travels is the fibro-vascular tissue, and that it is the xylem or woody portion of a fibro-vascular bundle which is the conducting tissue. In the case of plants like conifers and dicotyledons, in which there is a formation of secondary xylem or wood from a cambium-layer, it is the younger wood, the alburnum, along which the transpiration-current passes. The older wood, the duramen, it is true, usually contains water, but it does not serve as a conducting channel, only as a reservoir.

*Distribution of Organic Nutrient Substances.*—In vascular plants the distribution of the organic nutrient substances is, like the conduction of substances absorbed by the roots, assisted by the vascular tissue; but, whereas it is the wood which is the conducting tissue in the latter case, in the former it is the bast or phloem, and more especially the bast-vessels or sieve-tubes. These vessels consist of elongated cells placed end to end, the septa between the adjacent cells being perforated so as to admit of a direct continuity between their protoplasmic contents.

The importance of the wood and of the bast respectively as conducting tissues is well illustrated by the "ringing" experiments which have been repeatedly made on plants, such as dicotyledons and conifers, which have the fibro-vascular bundles arranged in a ring in the stem. When a ring of tissue, extending inward as far as the cambium-layer, is removed from the stem of a dicotyledonous plant the following facts are to be observed: (1) that the leaves which are borne on branches arising from the stem above the level at which the ring of tissue has been removed will not exhibit any signs of withering; (2) that the part of the stem below the incision will not increase in thickness to nearly the same extent as the part above the incision. From these facts it is clear (1) that the operation in question has not materially affected the conduction of water and food-materials in solution upward to the leaves, and, since the wood is the only unimpaired tissue, it is obviously in the wood that the upward current travels; and (2) that the operation has materially affected the conduction of organic nutrient substances to the parts below the incision, the diminished growth of these parts being the result of inadequate nutrition; this effect of

the operation is to be ascribed, principally at least, to the destruction of the continuity of the bast-tissue.

In various families of vascular plants, and in some cellular plants also (certain fungi), there are to be found cells, forming what is known as "laticiferous tissue," which probably assist in distributing both food-materials and organic nutrient substances throughout the plant. In some plants the cells are quite distinct from each other, and extend from one end of the plant to the other, growing with its growth, so that they attain a very considerable size, and are much branched; these are spoken of as "laticiferous cells." In other plants the cells are comparatively small, and fuse together to form an intricate network; these are spoken of as "laticiferous vessels." The cells of the laticiferous tissue contain a milky liquid, termed "latex," which consists of water holding inorganic salts, sugar, gum, extractives and proteids, in solution, and holding in suspense resinous and fatty bodies. The cells contain protoplasm in addition, and not uncommonly starch-granules.

*Food of Plants.*—A rough idea of the nature of its food can be obtained by analyzing a plant. It is found that, in the process of incineration, a considerable weight of its dry solid is burned up and given off in the form of gas; this represents the combustible or organic portion of the plant. The incombustible residue, the ash, is found to be of a mineral or inorganic nature. The gases given off are carbon dioxide, watery vapor, and nitrogen, showing that the combustible portion of the plant contained the elements carbon, hydrogen, and nitrogen. In the ash occur a number of elements, of which the principal are sulphur, phosphorus, potassium, calcium, magnesium, iron, sodium, chlorine, and silicon. But it does not necessarily follow that, because any given chemical element can be detected in a plant, that element is to be regarded as part of the food of the plant, for, as has been already pointed out, plants may absorb substances which in no way contribute to their nutrition, or which are even injurious. When an element enters into the chemical composition of the substances of which the organized structure of the plant consists, then it is clear that this element must form part of the food; but, when an element does not thus contribute to the building up of the organized substance of the plant, its admission to the rank of a food-material must be the subject of direct experiment. It has been ascertained that many elements, though, so far as is known, they are not essential constituents of the organized structure of the plant, are nevertheless essential to the maintenance of its life; they may not, indeed, go to build up the plant-substance, but in some way or other they promote the metabolic processes.

The method which has afforded the most valuable results bearing upon the relative physiological importance of various food-materials is that which is known as "water-culture." It consists in growing plants with their roots immersed in water holding certain salts in known quantities in solution. The mixture of salts can, of course, be varied at pleasure, and the effect upon the plant of the absence of certain elements, as of their presence in smaller or larger quantities, can be observed. Further, by an analysis of that portion of the solution which remains unabsorbed at the close of the experiment, the proportion in which the various salts have been absorbed can be ascertained.

The elements of the food of plants may be conveniently classified into two groups, the first consisting of those which enter into the composition of organized plant-substance, the second consisting of those which, without actually entering into the structure of the plant, are essential to the proper performance of the

metabolic processes. To the first group belong the elements C, H, O, N, S, P; to the second, K, Ca, Mg, Fe, Cl (?).

PIACENZA, a city of Italy, a bishop's see, and the chief town of a province, lies on the Lombard plain, 217 feet above sea-level, not far from the right bank of the Po, just below the confluence of the Trebbia. By rail it is forty-three miles southeast of Milan and thirty-five and a half northwest of Parma. Formerly a place of considerable strength, it is still surrounded by walls with bastions and fosse in a circuit of four miles. The population of the commune (which in this case is almost exactly identical with the city) was 34,985 in 1871 and 34,987 in 1881.

PIANOFORTE. The group of keyed stringed instruments, among which the pianoforte is latest in order of time, has been invented and step by step developed with the modern art of music, which is based upon the simultaneous employment of different musical sounds. In the tenth century the "organum" arose, an elementary system of accompaniment to the voice, consisting of fourths and octaves below the melody and moving with it; and the organ, the earliest keyed instrument, was, in the first instance, the rude embodiment of this idea and convenient means for its expression. There was as yet no keyboard of balanced key levers; batons were drawn out like modern draw-stops, to admit the compressed air necessary to make the pipes sound. About the same time arose a large stringed instrument, the organistrum, the parent of the now vulgar hurdy-gurdy; as the organ needed a blower as well as an organist, so the player of the organistrum required a handle-turner, by whose aid the three strings of the instrument were made to sound simultaneously upon a wheel, and, according to the well-known sculptured relief of St. George de Boscherville, one string was manipulated by means of a row of stoppers or tangents pressed inward to produce the notes. The other strings were drones, analogous to the drones of the bagpipes, and differing in effect from the changing "organum" of the organ. In the eleventh century, the epoch of Guido d'Arezzo, to whom the beginning of musical notation is attributed, the Pythagorean monochord, with its shifting bridge, was used in the singing-schools to teach the intervals of the plain-song of the church. Jean de Muris (*Musica Speculativa*, 1323) teaches how true relations may be found by a single-string monochord, but recommends a four-stringed one, properly a tetrachord, to gain a knowledge of unfamiliar intervals. He describes the musical instruments known in his time, but does not mention the clavichord or monochord with keys, which could not have been then invented.

A keyboard of balanced keys may have been first introduced in the little portable organ known as the regal so often represented in old carvings, paintings, and stained windows. It derived its name regal from the rule (*regula*) or graduated scale of its keys, and its use was to give the singers in religious processions the note or pitch.

The earliest known record of the clavichord occurs in some rules of the minnesingers, dated 1404, preserved at Vienna.

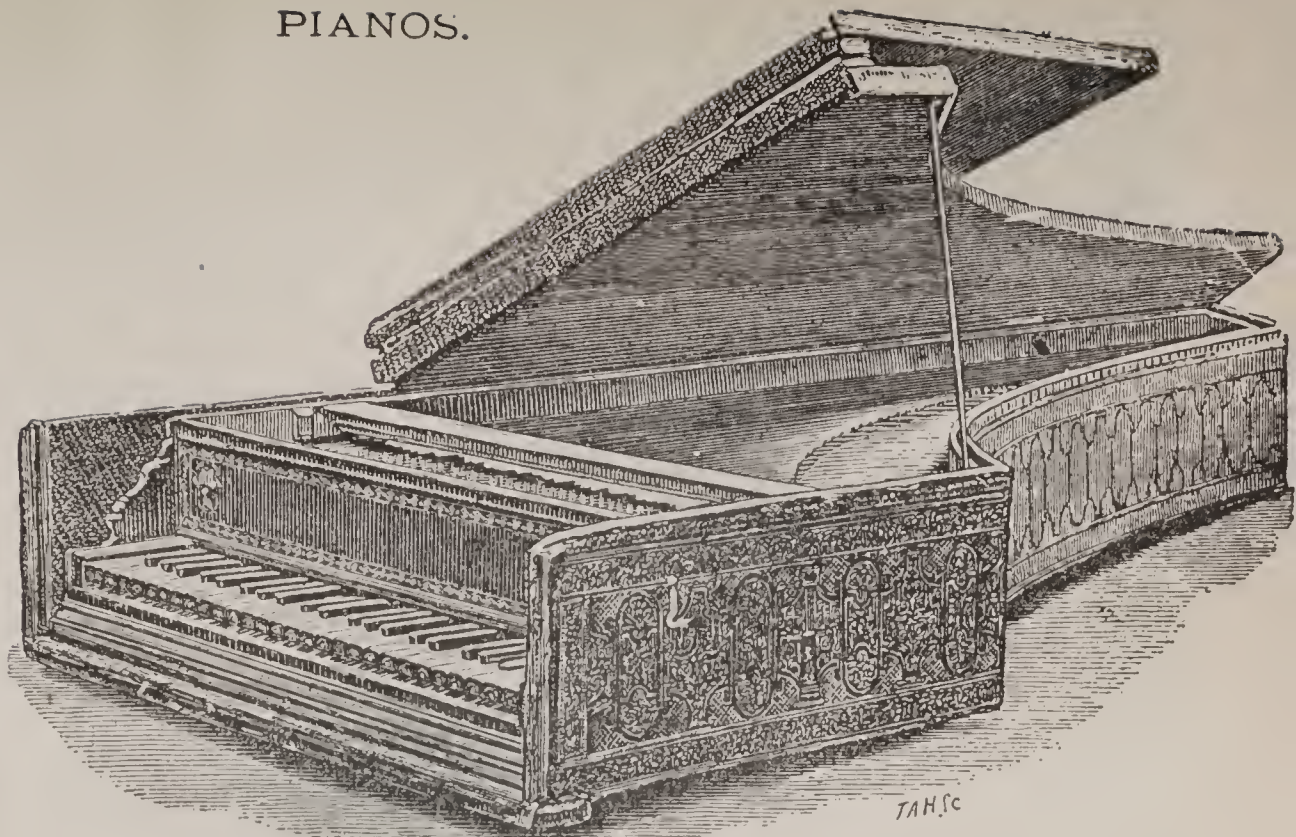
The next instrument described by Viridung is the virginal (*virginalis*, proper for a girl), a parallelogram in shape, with a projecting keyboard and compass of keys the same as the clavichordium.

There would be no difference between the clavicimbalum and the virginal were it not for a peculiarity of keyboard compass, which emphatically refers itself to the Italian "spinetta," a name unnoticed by Viridung or by his countryman Arnold Schlick, who, in the same year, 1511, published his *Spiegel der Orgelmacher* ("Organ-

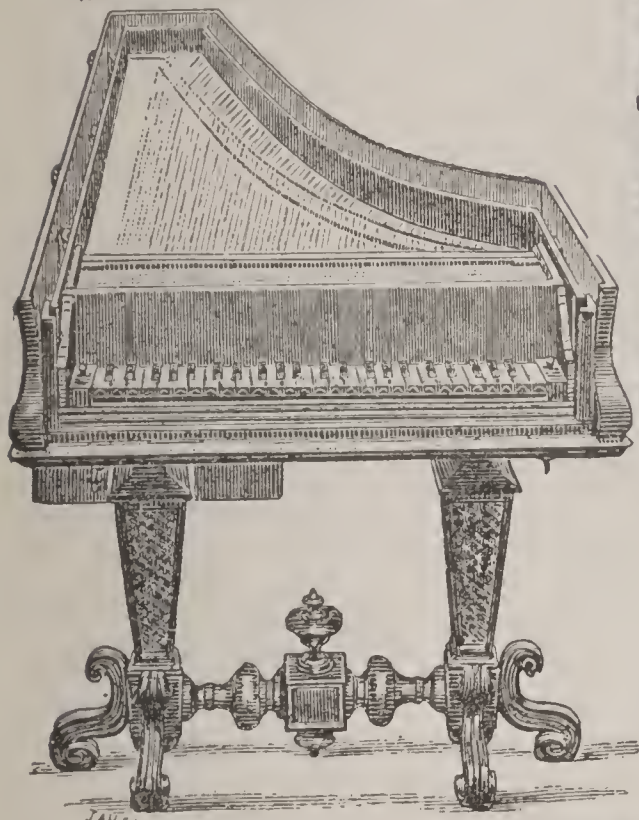
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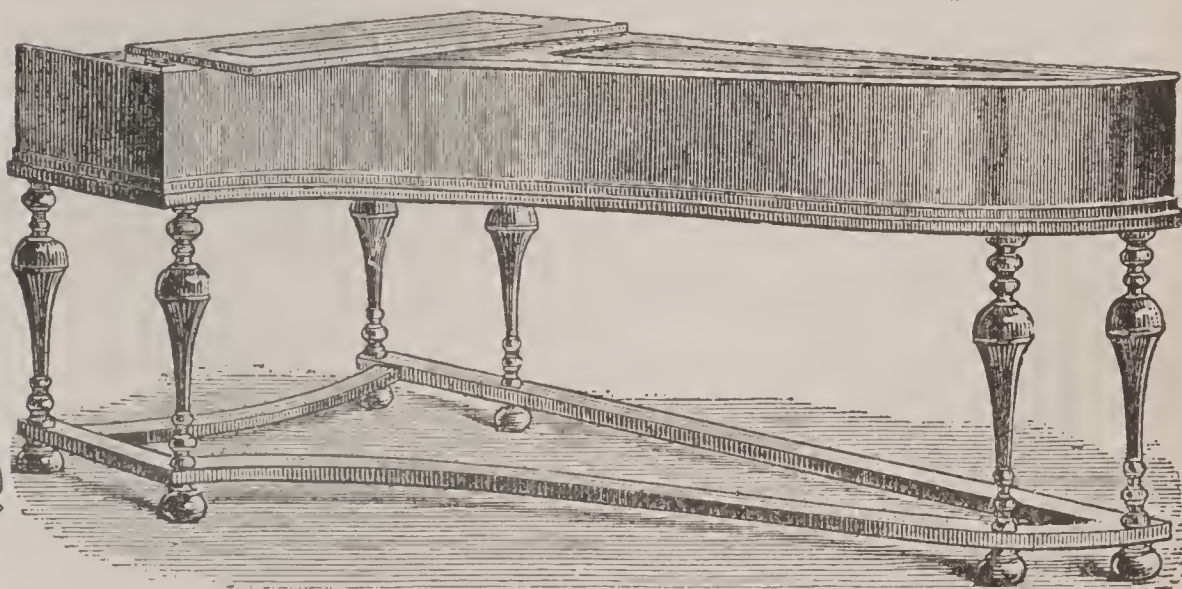
Earliest existing representation of a Keyed Stringed Instrument from St Mary's, Shrewsbury



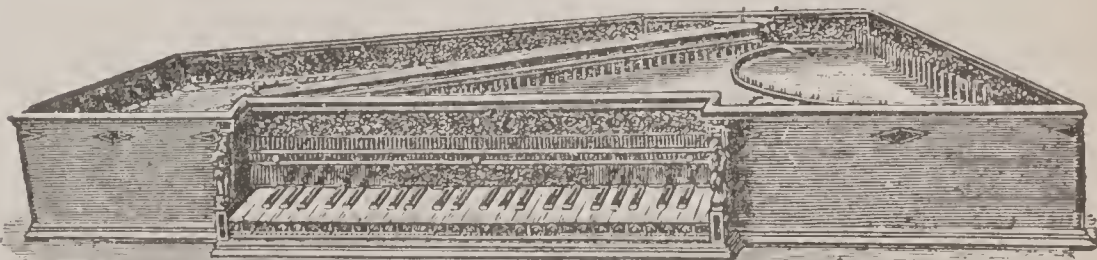
Roman Clavicembalo, by Geronimo of Bologna, 1521; South Kensington Museum.



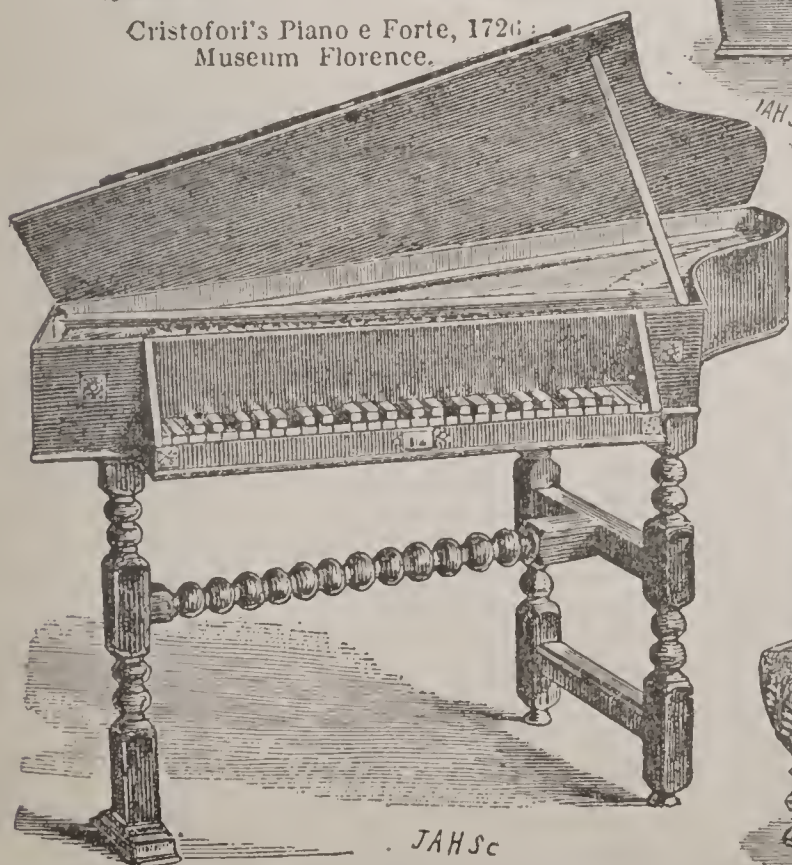
Cristofori's Piano e Forte, 1726; Museum Florence.



Silbermann Forte Piano; Stadtschloss, Potsdam, 1746. Engraved by permission the Crown Princess of Prussia.



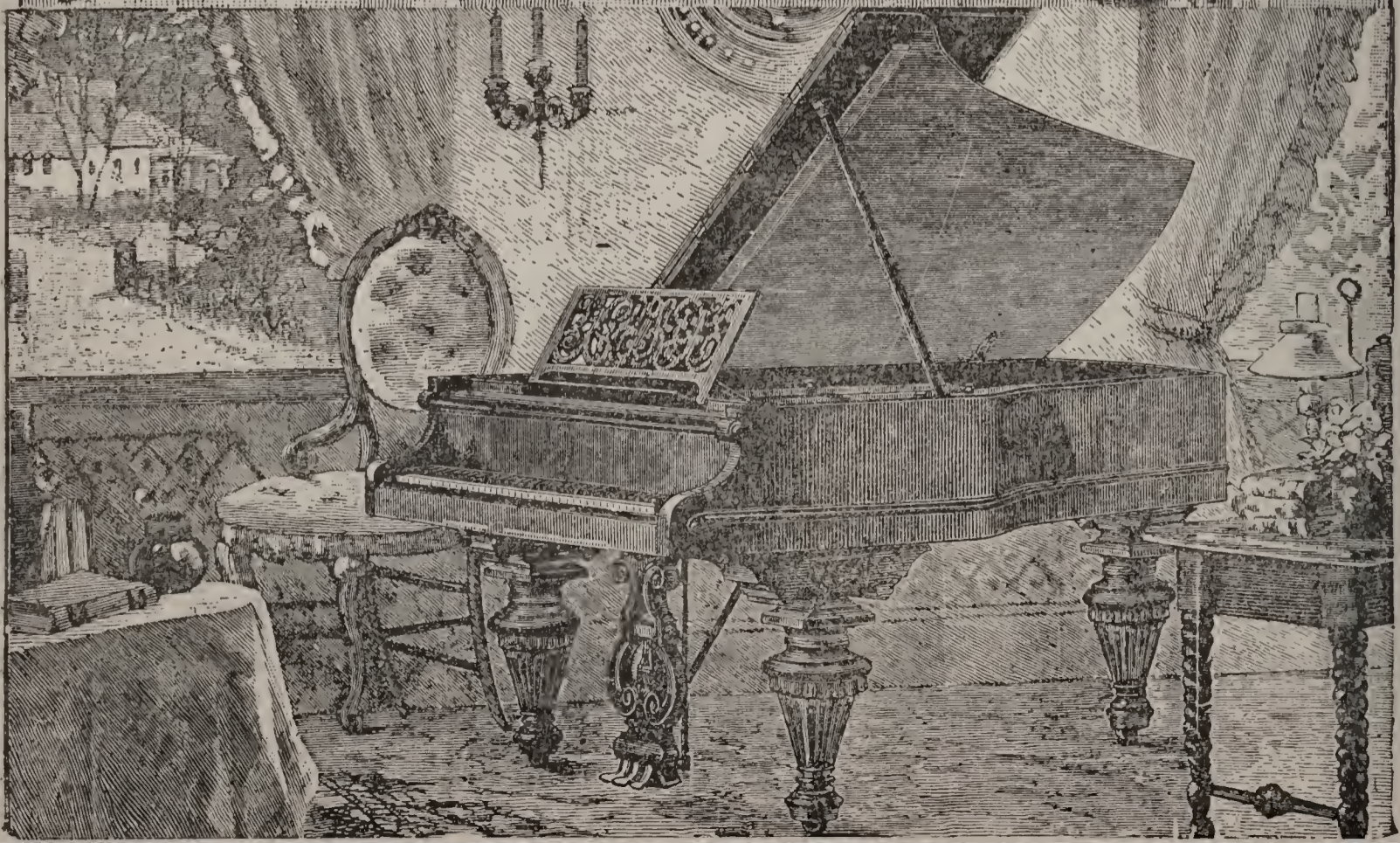
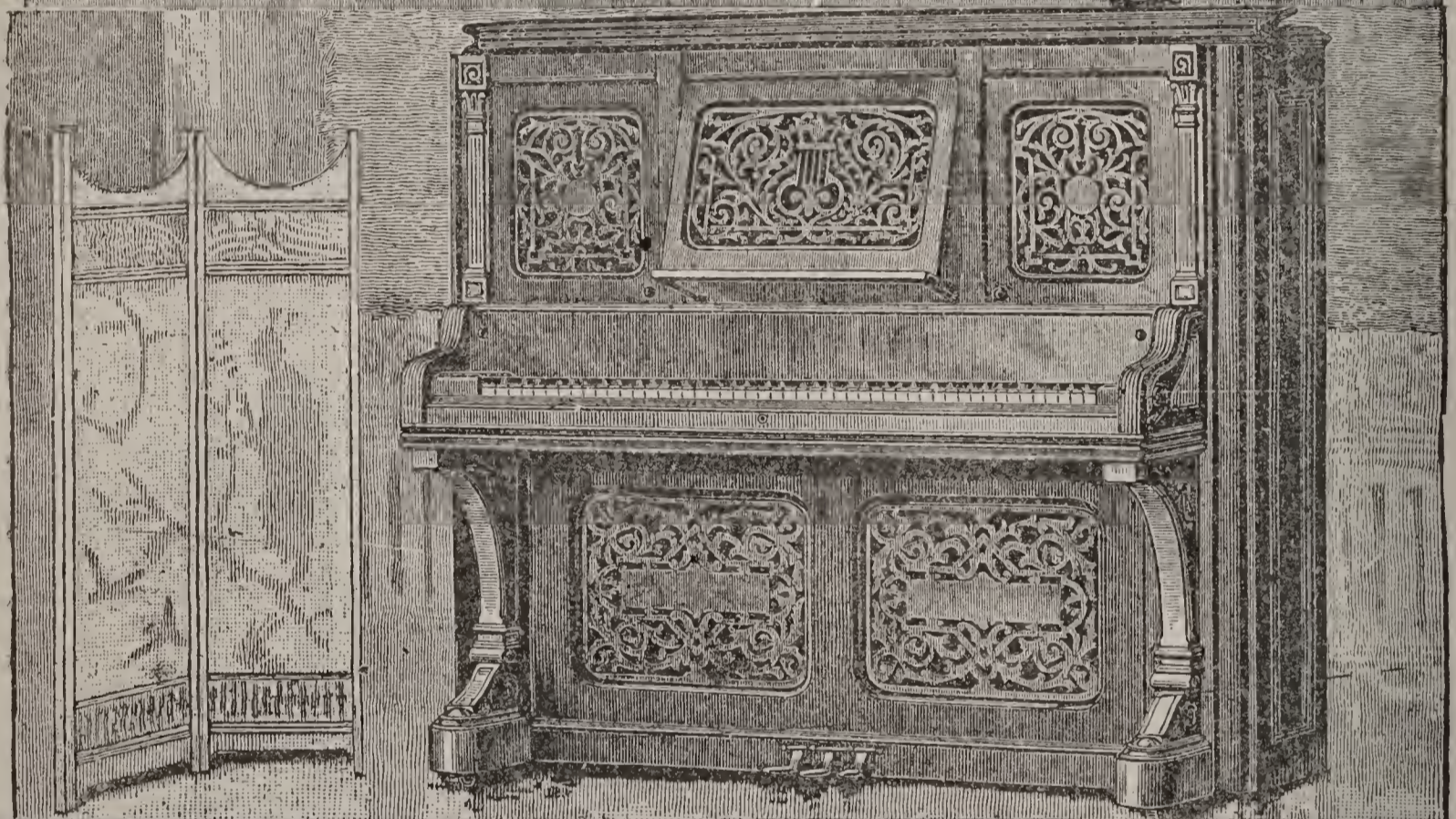
Milanese Spinetta, by Annibale Rosso, 1555; South Kensington



English Spinnet (Spinetta Traversa), by Carolus Haward. Collection of Mr W. Dale, London.



Spinetta Tavola (Virginal). 1568; collection of M. Terme



builders' Mirror"), and named the clavichordium and clavicimbalum as familiar instruments. After this date there are frequent references to spinets in public records and other documents, and we have fortunately the instruments themselves to put in evidence, preserved in public museums and in private collections. The oldest spinet we can point out is in the Conservatoire, Paris. It is a pentagonal instrument made by Francesco di Portalupis at Verona, 1523.

Mersenne gives three sizes for spinets—one two and a half feet wide, tuned to the octave of the "ton de chapelle" (in his day a half tone above the present English medium pitch), one of three and a half feet, tuned to the fourth below, and one of five feet, tuned to the octave below the first—the last being, therefore, tuned in unison to the chapel pitch. He says his own spinet was one of the smallest it was customary to make, but from the lettering of the keys in his drawing it would have been of the second size, or the spinet tuned to the fourth.

Thomas Hitchcock (for whom we have a date 1703 upon a spinet jack in an instrument of older model with two cut sharps by Edward Blunt) and his son John made a great advance in constructing spinets, giving them the wide compass of five octaves, from G to G, with very fine keyboards in which the sharps were inlaid with a slip of the ivory or ebony, as the case might be, of the naturals. Their instruments, always numbered, and not dated as has been sometimes supposed, became models for the contemporary and subsequent English makers.

We have now to ask what was the difference between Scaliger's harpichordum and his clavicymbal. Galilei, the father of the astronomer of that name (*Dialogo della Musica Antica e Moderna*, Florence, 1581), says that the harpichord was so named from having resembled an "arpa giacente," a prostrate or "couched" harp,—proving that the clavicymbal was at first the trapeze-shaped spinet; and we should therefore differentiate harpichord and clavicymbal as, in form, suggested by or derived from the harp and psaltery, or from a "testa di porco" and an ordinary trapeze psaltery. We are inclined to prefer the latter. The Latin name "clavicymbalum," having early been replaced by spinet and virginal, was in Italy and France bestowed upon the long harpichord, and was continued as clavicembalo (gravecembalo, or familiarly cembalo only) clavecin. Much later, after the restoration of the Stuarts, the first name was accepted and naturalized in England as harpsichord, which we will define as the long quill instrument shaped like a modern grand piano, and resembling a wing, from which it has gained the German appellation "Flügel."

Double keyboards and stops in the long cembalo or harpsichord came into use in the Netherlands early in the sixteenth century. We find them imported into England.

After the Antwerp make declined, London became preëminent for harpsichords—the representative makers being Jacob Kirckmann and Burckhard Tschudi, pupils of a Flemish master, one Tabel, who had settled in London, and whose business Kirckmann continued through marriage with Tabel's widow. The first idea of pedals for the harpsichord to act as stops appears to have been John Hayward's (?Haward) as early as 1676, as we learn from Mace's *Musick's Monument*. The French makers preferred a kind of knee-pedal arrangement known as the "genouillère," and sometimes a more complete muting by one long strip of buff leather, the "sourdine." As an improvement upon Plenius' clumsy swell, Shudi in 1769 patented the Venetian swell, a framing of louvres, like a Venetian blind, which

opened by the movement of the pedal, and, becoming in England a favorite addition to harpsichords, was early transferred to the organ, in which it replaced the rude "nag's-head" swell. A French harpsichord-maker, Marius, whose name is remembered from a futile attempt to design a pianoforte action, invented a folding harpsichord, the "clavecin brisé," by which the instrument could be disposed of in a smaller space. One, which is preserved at Berlin, probably formed part of the camp baggage of Frederick the Great.

It was formerly a custom with kings, princes, and nobles who were well-disposed toward music to keep large collections of musical instruments—not, as now, for beauty of decoration, form, and color, or historical associations, but for actual playing purposes in the domestic and festive music of their courts. There are records of their inventories, and it was to keep such a collection in playing order that Prince Ferdinand dei Medici engaged a Paduan harpsichord-maker, Bartolommeo Cristofori, the man of genius who invented and produced the pianoforte. We fortunately possess the record of this invention in a literary form from a well-known writer, the Marchese Scipione Maffei; his description appeared in the *Giornale dei letterati d'Italia*, a publication conducted by Apostolo Zeno. The date of Maffei's paper was 1711. Rimbault reproduced it, with a technically imperfect translation, in his *History of the Pianoforte*. We learn from it that in 1709 Cristofori had completed four "gravecembali col piano e forte"—keyed-psalteries with soft and loud—three of them being of the long or usual harpsichord form. A synonym in Italian for the original cembalo (or psaltery) is "salterio," and if it were struck with hammers it became a "salterio tedesco" (the German *hackbrett*, or chopping board), the latter being the common dulcimer. Now the first notion of a pianoforte is a dulcimer with keys, and we may perhaps not be wrong in supposing that there had been many attempts and failures to put a keyboard to a dulcimer or hammers to a harpsichord before Cristofori successfully solved the problem. There are two pianofortes by Cristofori in Florence, dated respectively 1720 and 1726, which show a much improved, we may even say a perfected, construction, for the whole of an essential piano movement is there. The earlier instrument has undergone some restoration, but the 1726 one, which is in the Kraus Museum, retains the original leather hammerheads. To Cristofori we are indebted not only for the power of playing *piano* and *forte*, but for the infinite variations of tone, or *nuances*, which render the instrument so delightful.

Cristofori died in 1731. He had pupils, but did not found a school of Italian pianoforte-making, perhaps from the peculiar Italian conservatism in musical instruments we have already remarked upon.

It has been repeatedly stated in Germany that Frederici of Gera, in Saxony, an organ-builder and musical-instrument maker, invented the square or table-shaped piano, the "forte bien" as he is said to have called it, about 1758-60. No square piano by this maker is forthcoming, but M. Victor Mahillon of Brussels has acquired a Frederici "upright grand" piano, dated 1745. In Frederici's upright grand action we have not to do with the ideas of either Cristofori or Schroeter; the movement is practically identical with the hammer action of a German clock.

Another piano action had, however, come into use about that time, or even earlier, in Germany. The discovery of it in the simplest form is to be attributed to M. Mahillon, who has found it in a square piano belonging to M. Henri Gosselin, painter, of Brussels. The principle of this action is that which was later perfected by the addition of a good escapement by Stein of

Augsburg, and was again later experimented upon by Sebastian Erard. Its origin is perhaps due to the contrivance of a piano action that should suit the shallow clavichord and permit of its transformation into a square piano; a transformation, Schroeter tells us, had been going on when he wrote his complaint. It will be observed that the hammer is, compared with other actions, reversed, and the axis rises with the key, necessitating a fixed means for raising the hammer, in this action effected by a rail against which the hammer is jerked up. It was Stein's merit to graft the hopper principle upon this simple action; and Mozart's approbation of the invention, when he met with it at Augsburg in 1777, is expressed in a well-known letter addressed to his mother. No more "blocking" of the hammer, destroying all vibration, was henceforth to vex his mind. He had found the instrument that for the rest of his short life replaced the harpsichord. M. Mahillon has secured for his museum the only Johann Andreas Stein piano which is known to remain. It is from Augsburg, dated 1780, and has Stein's escapement action, two unisons, and the knee-pedal, then and later common in Germany.

The first square piano made in France is said to have been constructed in 1776 by Sebastian Erard, a young Alsatian. In 1786 he went to England, and founded the London manufactory of harps and pianofortes bearing his name. He did not, however, succeed in producing his famous repetition, or double escapement action, until 1821; it was then patented by his nephew, Pierre Erard, who, when the patent expired in England in 1835, proved a loss from the difficulties of carrying out the invention, which induced the House of Lords to grant an extension of the patent.

Although some great pianists have been opposed to double escapement, notably Kalkbrenner, Chopin, and Dr. Hans von Bülow, Erard's action, in its complete or a shortened form as introduced by Herz, is now more extensively used than at any former period. Erard invented, in 1808, an upward bearing to the wrest-plank bridge, by means of agraffes or studs of metal through holes in which the strings are made to pass, bearing against the upper side. The wooden bridge with down-bearing strings is clearly not in relation with upward-striking hammers, the tendency of which must be to raise the strings from the bridge, to the detriment of the tone. A long brass bridge on this principle was introduced by William Stodart in 1822. A pressure-bar bearing of later introduction is claimed for the French maker, M. Bord, and is very frequently employed, by German makers especially. The first to see the importance of iron sharing with wood (ultimately almost supplanting it) in pianoforte framing was a native of England, and a civil engineer by profession, John Isaac Hawkins, who has been best known as the inventor of the ever-pointed pencil. He was living at Philadelphia, Penn., when he invented and first produced the familiar cottage pianoforte—"portable grand," as he then called it. He patented it in America, his father, Isaac Hawkins, taking out the patent for him in England in the same year, 1800.

The next important addition to the grand piano in order of time was the harmonic bar of Pierre Erard, introduced in 1838.

The introduction of iron into pianoforte structure has been differently and independently effected in America, the fundamental idea here being a single casting for the metal plate and bars, instead of forging or casting them in separate pieces. Alphæus Babcock was the pioneer to this kind of metal construction. He also was bitten with the compensation notion, and had cast an iron ring for a square piano in 1825, which is

not said to have succeeded, but gave the clew to a single casting resistance framing, which was successfully accomplished by Conrad Meyer, in Philadelphia, in 1833, in a square piano which still exists, and was shown in the Paris Exhibition of 1878. Meyer's idea was taken up and improved upon by Jonas Chickering of Boston, who applied it to the grand piano as well as to the square, and brought the principle up to a high degree of perfection—establishing by it the independent construction of the American pianoforte.

The chief centers of the pianoforte trade are London, Paris, Berlin, Leipsic, Dresden, Stuttgart, Hamburg, Vienna, St. Petersburg, Brussels, New York, Boston, Chicago, and Baltimore. The greatest centralizations are found in London and Paris—very few pianofortes being made in the United Kingdom or France, excepting perhaps at Marseilles, out of those cities. But in Germany and the United States there are pianoforte-makers in many towns besides those we have named. Pianofortes are made in Italy at Turin, Milan, Florence, Naples, and Palermo, and in Spain at Barcelona (principally), Madrid, and Saragossa. The large export trade belonged formerly to England and France, but it has been weakened of late years by the commercial activity of the Germans, who have besides copied successfully and with the advantage of much lower wages recent American models. German pianofortes are now much found in Great Britain, where free trade has favored their introduction, and in the Australian colonies; they have also outrivalled the French in Holland; but we believe France still keeps the trade of Southern Europe, as the United States mainly supply Canada. English exports of good makers will be found all over the world; but some important markets have been lost through the inferior instruments consigned or sold because they were cheap, and were supposed to be good enough.

The United States and Germany appear to employ the greatest number of workmen in the pianoforte handicraft, Germany producing the largest numbers of instruments. In adopting, however, the statistics given, we must not forget to take into account that custom of advertising which leavens nearly every statement. There are said to be upward of 8,000 workmen employed in piano-making in America. The Messrs. Steinway claim for America an annual production of 25,000 pianofortes of all kinds, and it may be more. We hardly feel disposed to allow Germany 73,000, with a less number of workmen, viz., 7,834; but such is the statement put forward by a semi-official source, the *Deutsche Consulats-Zeitung*. It must be borne in mind that machinery adds its power indefinitely to the number of men employed, but this occurs more in America than in Germany. A recent strike in Paris represented the pianoforte trade society as consisting of 5,000 members; and we may safely credit that city with a production of 20,000 instruments yearly. The number made in London annually may be taken as reaching at least 35,000; it is probably larger.

PIARISTS, the popular name of the "clerici regulares scholarum *piarum*," the Pauline Congregation of the Mother of God, which was founded by Joseph Calasanza (Josephus a Matre Dei) at Rome in the beginning of the seventeenth century. Calasanza, a native of Calasanz, in the province of Huesca, in Aragon, was born on September 11, 1556; studied at Lerida and Alcala, and after his ordination to the priesthood removed to Rome. Here he became zealously interested in the education of poor and orphan children, and with this end he organized, in 1607, a brotherhood which ultimately, in 1617, became an independent congregation, numbering at that time fifteen priests, under Cal-



asanza as their head. To the three usual vows they added a fourth, that of devotion to the gratuitous instruction of youth. Calasanza, who died on August 22, 1648, was beatified in 1748, and canonized in 1767.

PIATRA, a town of Roumania (Moldavia), at the head of the department of Neamtsu, on the left bank of the Bistritza, an affluent of the Sereth. It is about forty-five miles by road from Roman, a station on the railway from Galatz. Population, 13,890.

PIAZZA ARMERINA (Sicilian, *Chiazza*), a city of Italy, in the province of Caltanissetta, Sicily, on a hill thirty-nine miles by road east-southeast of the city of that name, and thirty miles north of Terranova on the coast. Population, 17,038.

PIAZZI, GIUSEPPE. See ASTRONOMY.

PICARDY, one of the old feudal provinces of France, was bounded north by Hainault, Artois, and the English Channel, east by Champagne, south by Île-de-France, and west by Normandy and the Channel. Northern Picardy (subdivided into Upper and Lower Picardy) was formed into one of the great military governorships of the kingdom, while Southern Picardy was included in the governorship of Île-de-France. The territory is now divided among the departments of Pas-de-Calais, Somme, Aisne, Oise, and Nord.

PICCINI, or PICCINNI, NICCOLA, musical composer, was born at Bari in 1728, and educated, under Leo and Durante, at the Conservatorio di San Onofrio in Naples. His first opera, *Le Donne Dispettose*, produced in 1754, won him a high reputation, which he maintained creditably until 1760, when he composed, at Rome, the *chef d'œuvre* of his early life, *La Cecchina, ossia la Buona Figliuola*, an *opera buffa*, which attained a European success, little less remarkable than that of Pergolesi's *Serva Padrona*. Six years after this Piccini was invited to Paris. All his next works were successful; but, unhappily, the directors of the Grand Opéra conceived the mad idea of deliberately opposing him to Gluck, by persuading the two composers to treat the same subject—*Iphigénie en Tauride*—simultaneously. Gluck's masterly *Iphigénie* was first produced on May 18, 1779. Piccini's *Iphigénie* followed on January 23, 1781, and, though performed seventeen times, was afterward consigned to oblivion. He died at Passy, May 7, 1800.

PICENUM. See ITALY.

PICHEGRU, CHARLES, the conqueror of Holland, was born at Arbois, in the Jura, on February 16, 1761. In 1783 he entered the first regiment of artillery, where he rapidly rose to the rank of adjutant-sub-lieutenant. In 1793, when Dumouriez had deserted, and all generals of noble birth had been superseded, Carnot and Saint Just were sent to find *roturier* generals who could be successful; Carnot discovered Jourdan, and Saint Just discovered Hoche and Pichegru. In December, 1793, he superseded Hoche, became commander-in-chief of the united armies of the Rhine and Moselle, whence he was summoned to succeed Jourdan in the army of the North in February, 1794. It was now that he fought his three great campaigns of one year. The English and Austrians held a strong position along the Sambre to the sea. After vainly attempting to break the Austrian center, Pichegru suddenly turned their left, and defeated Clerfayt at Cassel, Menin, and Courtrai, again at Rouselaer and Hooglede.

Pichegru began his second campaign by crossing the Meuse on October 18th, and, after taking Nimeguen, drove the Austrians beyond the Rhine. On December 28th he crossed the Meuse on the ice, and stormed the island of Bommel, then crossed the Waal in the same manner, and, driving the English before him, entered Utrecht on January 19th, and Amsterdam on January 20th, and soon occupied the whole of Holland. Hon-

ored by the Republicans, and with the greatest military reputation in France, Pichegru then took command of the armies of the North, the Sambre and Meuse, and the Rhine, and crossing the Rhine in force took Mannheim in May, 1795. When his fame was thus at its height he became a traitor, and for the promise of a marshal's baton, the governorship of Alsace, the castle of Chambord, 1,000,000 francs in cash, and 200,000 francs a year, sold his army and his country. He allowed Jourdan to be beaten before Mannheim, and betrayed all his plans to the enemy. His intrigues were suspected, and when he offered his resignation to the Directory in October, 1795, it was to his surprise promptly accepted. He went to Paris in August, 1803, with Georges Cadoudal to head a royalist rising against Napoleon; but, betrayed by a friend, he was arrested on February 28, 1804, and on April 15th was found strangled in prison.

PICKLES. The term pickle was originally applied to herrings preserved in salt brine, and by a pickle is still meant any preservative solution for either animal or vegetable food, that for flesh and fish being a brine of common salt, usually with saltpeter, sugar, and certain spices added, while for vegetable substances vinegar is the principal pickling medium.

PICO, GIOVANNI, OF MIRANDOLA, was born in 1463, the youngest son of Giovanni Francesco Pico, prince of Mirandola, a small territory about thirty Italian miles west of Ferrara, afterward absorbed in the duchy of Modena. The family was illustrious and wealthy, and claimed descent from Constantine. Like most men with brilliant faculties of acquisition and assimilation, Pico was constitutionally an eclectic; and he owes his place in the history of learning and thought to the indefatigable spirit of inquiry which left him dissatisfied with current teaching and drove him to studies then new and strange. His learned wanderings ended at Rome, where he set forth for public disputation a list of 900 questions and conclusions in all branches of philosophy and theology. The pope prohibited the little book in which they were contained, and Pico had to defend the impugned theses in an elaborate *Apologia*. His personal orthodoxy was, however, finally vindicated by a brief of Alexander VI., dated June 18, 1493. He died at Florence in 1494.

PICTOR, FABIVS. See FABIVS PICTOR; also LIVY.

PICTS. See SCOTLAND.

PIEDMONT, a region of northern Italy, bounded north by Switzerland, west by France, south by Liguria, and east by Lombardy. Physically it may be briefly described as the upper gathering-ground and valley of the river Po, inclosed on all sides except toward the Lombard plain by the vast semicircle of the Pennine, Graian, Cottian, Maritime, and Ligurian Alps. In 1859 it was divided into the four provinces of Alessandria, Cuneo, Novara, and Torino (Turin), which still remain as provinces of the kingdom of Italy. In 1889 its population was 3,297,157.

The name of Lombardy was used as inclusive of the upper valley of the Po as late as 1091, when the house of Savoy lost most of its Italian possessions by the death of Adelaide; but in the time of Thomas I. (1177-1233), duke of Savoy, while the name Savoy was applied more especially to the ducal territory on the French side of the Alps, that of Piedmont came into use as a collective term for the territory on the Italian side.

PIERCE, FRANKLIN, fourteenth president of the United States, was descended from an old yeoman family of New England, and was born at Hillsboro, N. H., November 23, 1804. His father, Benjamin Pierce, served through the Revolutionary war, after

ward attaining the rank of major-general, and became governor of his State. The son entered Bowdoin College, Brunswick, Me., in 1820. After leaving college in 1824 he studied law and came to the bar in 1827. From the first he was a zealous supporter of the Democratic party, and he took an active part in promoting the election of Andrew Jackson to the presidency. In 1829 he was elected by his native town to the State legislature, of which he was speaker in 1832-33. In the latter year he was chosen a member of Congress, and in 1837 he was elected to the senate of the United States. In 1842 he resigned his seat in the senate, and returned to the practice of the law. His reputation at the bar was very high, his success being largely due to his power of identifying himself with his client's cause, and his strong personal influence over a jury. In 1846 he was offered the position of attorney-general of the United States, but declined it. On the outbreak of the Mexican War he joined as a volunteer one of the companies raised in Concord. He was soon after appointed colonel of the ninth regiment, and in March, 1847, brigadier-general. At the battle of Contreras on August 19th he was severely injured by the fall of his horse. At the close of the war in December, 1847, he resigned his commission. In 1850 he was president of the convention for revising the constitution of New Hampshire. In 1852, as candidate of the Democratic party, he was elected president of the United States by 254 electoral votes against 42 given to Gen. Winfield Scott. The special feature of his inaugural address was the support of slavery in the United States, and the announcement of his determination that the Fugitive Slave Act should be strictly enforced. This was the keynote of his administration, and pregnant with vital consequences to the country. From it came during his term the Ostend conference and "manifesto," the repeal of the Missouri compromise, and the troubles in Kansas and Nebraska, which crystallized the opposing forces into the Republican party, and led later to the great rebellion. President Pierce, surrounded by an able cabinet, among them Jefferson Davis as Secretary of War, firmly adhered throughout his administration to the pro-slavery party. He failed, notwithstanding, to obtain renomination, but was succeeded by James Buchanan, March 4, 1857, and retired to his home in Concord, N. H., after spending some years in Europe. During the war of 1861-65 his sympathies were wholly with the South, but, with the exception of delivering a strong speech at Concord in 1863, he took no very active part in politics. He died October 8, 1869.

PIERO (or PIETRO) DE' FRANCESCHI, a leading painter of the Umbrian school, was born in 1415. The earliest trace that we find of Piero as a painter is in 1439, when he was an apprentice of Domenico Veneziano. In 1451 he was by himself, painting in Rimini, where a fresco still remains. His most extensive extant series of frescoes is in the choir of S. Francesco in Arezzo—the *History of the Cross*, beginning with legendary subjects of the death and burial of Adam, and going on to the entry of Heraclius into Jerusalem after the overthrow of Chosroes. This series is, in relation to its period, remarkable for effect, movement, and mastery of the nude. He died in October, 1492.

PIERRÉ, the capital of South Dakota and the county seat of Hughes county, is situated on the Missouri, at the mouth of the Bad river. Originally there was an Indian post here but the town was settled several years ago and after a stubborn contest Pierre was designated as the permanent capital of the new State of South Dakota. Buildings for the accommodation of the legislature and State officers are being erected and Pierre is rapidly extending. Population, 3,660.

PIETISM. Pietism is the name of an exceedingly influential, instructive, and interesting movement in the Lutheran church which arose toward the end of the seventeenth and continued during the first half of the following century. The direct originator of the movement was Philip Jacob Spener by religious meetings at his house (*Collegia pietatis*). These meetings were largely attended, produced a great sensation, and were soon imitated elsewhere. They gave rise to the name "Pietists."

PIETRO. See PIERO.

PIG. See SWINE.

PIGALLE, JEAN BAPTISTE, French sculptor, was born at Paris on January 26, 1714. Although he failed to obtain the Great Prize, after a severe struggle he entered the Academy and became one of the most popular sculptors of his day. He died on August 21, 1785.

PIGAULT-LEBRUN, CHARLES ANTOINE GUILLAUME, sometimes called PIGAULT DE L'ÉPINOY, the chief fiction writer of the first empire, and the most popular light novelist of France before Paul de Kock, was born at Calais on April 8, 1753. His youth was decidedly stormy. He twice carried off young ladies of some position, and was in consequence twice imprisoned by *lettre de cachet*. His first love, a Miss Crawford, the daughter of an English merchant whose office Pigault had entered, died almost immediately after her elopement; the second, Mademoiselle de Salens, he married. Although he had tried dramatic writing, he does not seem to have attempted prose fiction till he was forty, but from that time he was a fertile writer of novels for nearly thirty years. In his old age he took to graver work, and executed an abridgment of French history in eight volumes, besides some other work. His *Œuvres Complètes* were published in twenty volumes between 1822 and 1824. He died on July 24, 1835.

PIGEON (see also POULTRY). The word Pigeon, doubtless of Norman introduction as a polite term, seems to bear much the same relation to dove, the word of Anglo-Saxon origin, that mutton has to sheep, beef to ox, veal to calf, and pork to bacon. Perhaps the best-known species to which the name is exclusively given in common speech is the Wild Pigeon or Passenger-Pigeon of North America, *Ectopistes migratorius*, which is still plentiful in many parts of Canada and the United States, though no longer appearing in the countless numbers that it did of old. The rapid and sustained flight of these Pigeons is also as well-established as their former overwhelming abundance. The Passenger Pigeon is about the size of a common turtle-dove, but with a long, wedge-shaped tail. The male is a dark slate-color above, and purplish-bay beneath, the sides of the neck being enlivened by gleaming violet, green, and gold. The female is drab-colored above and dull white beneath, with only a slight trace of the brilliant neck-markings.

Among the multitudinous forms of Pigeons is the Wonga-wonga or White-fleshed Pigeon of Australia, *Leucosarcia picta*, a bird larger than the ring-dove, of a slaty-blue color above and white beneath, streaked on the flanks with black. It is said to be excellent for the table. As regards flavor, however, those who have been so fortunate as to eat them declare that the Fruit-Pigeons of the genus *Treron* (or *Vinago* of some authors) and its allies surpass all birds. These inhabit tropical Africa, India, and especially the Malay Archipelago. Hardly less esteemed are the Pigeons of the genus *Ptilopus* and its kindred forms, which have their headquarters in the Pacific Islands, though some occur far to the westward, and also in Australia. Among them are found the most exquisitely-colored of the

whole family. There may be mentioned the strange Nicobar Pigeon, *Calanas*, an inhabitant of the Indian Archipelago, about half a dozen species of the genus *Goura* and known as Crowned-Pigeons, which belong to New Guinea and the neighboring islands.

At least 500 species of Pigeons have been described, and many methods of arranging them suggested; but a new monograph of the Pigeons, containing all the recent discoveries, is much wanted.

PIGMENTS are colored powders which, when mixed with oil, water, or other fluids, in which they are insoluble, form paints. They are distinguished from dyes and washes by their entire insolubility in the media in which they are mixed, whereas dyestuffs are tinctorial substances applied in solution. Insoluble colors, when used in printing textile fabrics, are distinguished as pigment colors. The sources of materials available as pigments are numerous; many are native colored earths, others are separated from native metallic compounds and other mineral substances; a large number are artificially prepared from inorganic—principally metallic—sources; an important class consist of animal and vegetable coloring principles, forming with earthy bodies insoluble powders called lakes; and the dyestuffs artificially obtained from organic sources are also similarly utilized. But there are many qualities practically essential in a pigment which limit the range of available substances. A consideration of the first importance is the "body" or covering power of a pigment—that is, the property of fully covering and concealing with an opaque coating the surface over which it is spread. It is also important that the material should work well in, and be unaffected in appearance and constitution by the medium with which it is made into a paint, and that it should spread in an even, uniform coat, which should dry well and quickly in the air and adhere firmly to the surface to which it is applied. When dry it should possess durability and resist change under the action of weather and other influences to which paint is exposed. On their artistic side, as decorative and pictorial materials, pigments should possess purity and brightness of color with intensity of tinting power, capacity for mixing or coming into contact with other colors without injuriously affecting these or being themselves deteriorated, and permanence and unalterability of tone after long exposure.

PIKE, freshwater fishes generally distributed over the rivers and lakes of Europe, northern Asia, and North America, and forming a small family (*Esocidae*) of soft-rayed fishes. They are readily recognized by their elongate compressed body covered with small scales, a long head, long and spatulate snout, and very large mouth armed with strong and long teeth in the jaws and broad bands of smaller teeth on the palate and tongue. The teeth point backward or can be depressed so as to offer no obstruction to any object entering the gape, but prevent its withdrawal in the opposite direction. The dorsal and anal fins are placed far back on the tail, thus greatly increasing the propelling power of the fish, and, although Pike are bad swimmers and lead rather a sedentary than a roving life, they are excelled by no other freshwater fish in rapidity of motion when, by a single stroke of their tail, they dash upon their prey or dart out of reach of danger. The European species occurs also in North America, and is common in the eastern United States southward to northern Ohio. But North America is tenanted by other species of Pike besides, of which the largest is the Muskelunge or Maskinonge of the Great Lakes (*Esox nobilior*); it commonly attains to the large size which is exceptionally recorded of *Esox lucius*. The other American Pike are of smaller size, and generally named "pickrel." The European Pike, like its

brethren, is the most voracious of freshwater fishes; it probably exceeds the shark, to which it has been compared by many writers, in the relative quantity of food it consumes. Pike are wholesome food, and much esteemed in inland countries—the smaller (of 20 to 24 inches in length) being preferred to the larger individuals. They are prolific, and not easily exterminated, in a water in which they have been once allowed to spawn. According to season and climate they spawn in April or May, and sometimes as early as February.

PIKE-PERCH (*Lucioperca*), freshwater fishes closely allied to the perch, but with strong canine teeth standing between the smaller teeth of the jaws and palate. In Europe two species occur, the more celebrated being the "Zander" of North Germany or "Schiel" of the Danube (*Lucioperca sandra*). In North America several Pike-Perches have been described, but in the most recent works only two are distinguished, viz., *Lucioperca americana*, which grows to a weight of twenty pounds, and the much smaller *Lucioperca canadensis*; both are abundant in the Canadian lakes and upper Mississippi, and the latter also in the Ohio.

PILATE, PONTIUS, the fifth Roman procurator or "governor" of Judæa, Samaria, and Idumæa, succeeded Valerius Gratus in 26 A.D. By rank he was a Roman eque, possibly of Samnite extraction; his official appointment he owed to the influence of Sejanus. His ordinary residence as procurator was at Cæsarea, the capital, but from time to time he visited Jerusalem, especially at the greater feasts, and on these occasions he had his *bema* in the magnificent palace of Herod the Great, hence called the *prætorium*. Apart from the supreme (to him, likely enough, most trivial) incident in his life ("suffered under Pontius Pilate") the few facts that are known of him indicate a somewhat exceptional recklessness about awakening Jewish fanaticism, and unscrupulousness as to the means used in quelling its manifestations. According to Eusebius (*H. E.*, ii. 7) he was banished to Vienne in Gaul, where various misfortunes caused him at last to commit suicide; the *Chronicle* of Malalas alleges, with less probability, that he was beheaded under Nero. Later legend (see, for example, the apocryphal *Mors Pilati*, "Death of Pilate") has a good deal more to say: his suicide was anticipatory of Caligula's sentence; the body was thrown into the Tiber, and there caused disastrous tempests and floods; it afterward produced similar effects in the Rhine at Vienna, and finally had to be consigned to a deep pool among the Alps. The fact that Pilate allowed Jesus to be crucified is by no means out of keeping with what we know of his indifference to the claims alike of justice and of mercy; that he obviously wished to spare him if this could be done without too much inconvenience to himself has, however, gained him in some quarters very generous recognition; thus Tertullian speaks of him as "jam pro sua conscientia Christianum," the Copts regard him as a martyr, and the Abyssinian Church has given him a place in its calendar (June 25). This view is reflected in the spurious *Paradosis Pilati*. Pilate's wife, known to tradition as Procla or Claudia Procula, is represented as having been a proselyte of the gate and a secret disciple of Jesus. She is commemorated as a saint in the Greek Church (October 27th).

PILCHARD (*Clupea pilchardus*), a fish of the herring family (*Clupeidae*), abundant in the Mediterranean and on the Atlantic coasts of Europe, northward to the British Channel. Sardine is another name for the same fish, which on the coast of Brittany and Normandy is also called *Célan* or *Céléren*.

The Pilchard is so nearly like the herring that they

can with difficulty be distinguished from one another. In the early spring they are found in immense shoals off the coast of Cornwall, where they are caught by the inhabitants and used for food, but principally for exportation. These shipments are made chiefly to Sicily and Sardinia, whence they are returned to Europe as sardines.

PILES. See HÆMORRHOIDS.

PILGRIMAGE (see CRUSADES). The word Pilgrimage denotes the act of journeying to some place deemed sacred, for the purpose of discharging a religious obligation, or to obtain some supernatural assistance or benefit. The practice is common to many religions, and counts back to prehistoric ages. It is ultimately traceable to the nature of tribal religion, in its early form of worship of a deity regarded as purely local in the sphere of his special influence.

The first Pilgrimages of which we have any trustworthy knowledge are those of ancient Egypt. Herodotus notices that, instead of having but one yearly national festival, the Egyptians had six, the principal of which was that of Artemis (*i.e.*, Bast or Sekhet) at Bubastis, to which the pilgrims went in boats crowded with both sexes, playing on castanets and flutes, and singing to this accompaniment. Next to this ranked the festival of Isis at Busiris, attended with ceremonies of mourning, most probably in memory of the sufferings of Osiris. Third in order was the feast of Athene (Neith) at Sais, celebrated at night, with illuminations. Fourth was the festival of the Sun (Ra) at On or Heliopolis; fifth that at Buto in honor of Latona (Buto or Uat).

Among the Phoenicians there are clear traces of at least two great Pilgrimages in honor of Ashtoreth, one to Aphaca (probably the Apek of Scripture), celebrated for a yearly miracle of a ball of fire appearing on the mountain summit, and thence falling into the sea. The obscene rites for which this temple was famous led to its destruction by Constantine the Great (Euseb., *Vit. Const.*, iii. 56). The other great Ashtoreth pilgrimage was to Hierapolis in Syria, frequented by votaries from all the Semitic races except the Jews.

Directing our attention to an entirely different region of the world, we learn that in 1519, when Cortes entered Cholula in Mexico, he found it a great resort of pilgrims to the huge temple of Quetzalcoatl, then of unknown antiquity, as founded by a race earlier than the Aztecs, and built upon a colossal mound, vying in dimensions with the largest pyramids of Egypt. And what is yet more curious, besides this principal shrine, there were subsidiary tribal temples in the city, restricted to the uses of the several allied or kindred nations, who desired to have their own sanctuary in the holy city, precisely as churches of different nationalities are found in Jerusalem and in Rome to-day. And similarly in Peru, the great Temple of the Sun at Cuzco, with its encircling girdle of chapels dedicated to minor deities, was visited by pilgrims from all parts of the empire; nay, it was even regarded as a misfortune to fail in accomplishing the journey.

India, however, is above all others the land of Pilgrimages, for it has observed them during a longer unbroken period than any other country of which we possess sufficient records, and for frequency and multitude it would be difficult to find any parallel. The most celebrated of them are those to the temple of Jagan-nâth at Puri in Orissa, Benares, Hurdwar, Ganga-Sagara, Gangotri, Jumnotri, Prayâga (Allahabad), Râmêswara, Gaya in Behar, and Ayodhya or Oudh. Apart from the motives, common to all pilgrims, of acquiring religious merit or expiating sins, these Indian shrines are frequented for the performance of *sradâha* ceremonies in honor of

deceased ancestors or as votive acts for the recovery of the sick, or, again, to carry the ashes of deceased kindred to be scattered in the waters of some sacred or purifying river.

In China Pilgrimages are made to several of the more sacred spots by both Buddhists and Confucianists. Wutaishan in Shan-si is the chief resort of Buddhist pilgrims, and Tai-shan, the mountain sacred to Confucius, that of Confucianists (Williamson, *Journeys in North China*). In Japan both the older Shintô nature-worship and the newer Buddhist creed have their several sanctuaries and Pilgrimages. The principal Shintô Pilgrimages are those to Isé in the department of Watarai, and to the sacred mountain Fuji. There are two temples at Isé, ranking in sanctity first of all Shintô shrines, and the special seat of the worship of Ten-shôkô-daigin, the Sun-Goddess, from whom the Mikado is held to descend.

Under the judges and the kings we find many traces of Pilgrimage, not only to the sanctuary of the ark at Shiloh, and afterward to Jerusalem, but to local high places, such as Ophrah, Mizpeh, Dan, Bethel, and Beersheba. In truth, it is not till the post-exilic period that the supremacy of one national sanctuary is assured (though a Pilgrimage even after the destruction of the temple is recorded in Jeremiah xli. 5, showing that the mere sight was held sacred), for the local devotion of the high places resisted all the efforts of the reforming party under Hezekiah and Josiah even in the kingdom of Judah itself. There is properly only one Moslem Pilgrimage of obligation, that to Mecca, which still often draws an annual contingent of from 70,000 to 80,000 pilgrims (see MECCA). It is in truth a pagan survival which proved too powerful for extirpation by Mohammed. The Kaaba had been constituted the national sanctuary of Arabia about 100 B.C., and contained, besides the famous Black Stone, some 360 idols of various Bedouin tribes, united in one pantheon, exactly as with the Capitol of Rome; and though it was possible to sweep the idols out of the Kaaba, it was not so easy to deconsecrate the spot, but far more convenient to give it a new sanction.

Christian Pilgrimages were at first limited to Jerusalem and its immediate neighborhood, including Bethlehem. But this is matter of conjecture rather than of knowledge. There is no actual proof of very early Christian Pilgrimage to the holy places, though the belief was already current at the close of the fourth century that the custom had prevailed unbroken from apostolic times, as is distinctly asserted by Paula and Eustochium in their letter to Marcella, written in 386, wherein they state also that of which they are more trustworthy witnesses, that pilgrims then flocked from Armenia, Persia, India, Ethiopia, and even Gaul and Britain, to visit the cradle of Christianity. But another kind of pilgrimage, destined to be more powerful than that to Jerusalem, began to be popular nearly at the same time, that to the tombs of distinguished martyrs or confessors. So much did the notion begin to prevail that Pilgrimage was almost a necessity of religion, and that prayer could be heard more assuredly in particular places, that warnings against error of the kind were uttered by teachers whose own acts had helped to propagate the opinion in question.

What makes the devotion to the tombs of saints such a powerful factor in ecclesiastical history is that, after the Holy Sepulcher itself, no grave had such a hold on Christian imagination as that where the bodies of the two chief apostles, St. Peter and St. Paul, were held to rest in Rome. And consequently, as the division of the empire lessened the intercourse between East and West, as the decay of the old lines of communication made

traveling more difficult, and as the advance of Mahomedanism in Syria and Palestine made it more dangerous also in that direction, Rome gradually supplanted Jerusalem to a great degree in the West as the goal of Pilgrimage, and the enthusiasm of the visitors did much to consolidate the papal monarchy over Latin Christendom. Nowhere was the Pilgrimage to Rome more popular than in Saxon England, and among the crowds of penitents who made the journey were four kings, Ceadwalla, Ine, Coinred, and Offa, all of whom died in Rome, two of them as monks. The Pilgrimage to Jerusalem received fresh stimulus in the ninth century by the first occurrence of the alleged miracle of the heavenly fire on Easter Eve at the Holy Sepulcher, and continued to be frequented till checked by the fanaticism of the caliph Hakem-Biamr'illah about 1018, and more severely and permanently by the Seljukian Turks on their conquest of Syria, which occasioned those armed Pilgrimages, the crusades, to whose history this branch of the subject thenceforward belongs. Meanwhile, a third class of sanctuaries had been steadily coming into notice and popularity, consisting neither of the seats of great historical events nor of the ascertained resting-places of eminent saints. One of the earliest and most famous of these was that of Compostella, where the relics of St. James the Great were said to be discovered in 816, and, after being again hidden for many centuries, to have been discovered afresh in 1884. This was one of the most frequented by English pilgrims, no fewer than 2,460 licenses being granted for the journey in the one year 1434. Another, which became the Bethlehem of the West, as Rome had become its Jerusalem, was Loreto, where, ever since 1295, the Santa Casa, declared to be the home of the Holy Family, miraculously transported from Nazareth, has been frequented by pilgrims till very recent times, when its popularity has waned. Other famous shrines, some few of which even still attract yearly crowds of pilgrims, are Einsiedeln in Switzerland; Assisi, Oropa, Varese, and Vicovaro in Italy; Monserrat and Guadalupe in Spain; Mariazell in Austria; Oetting and Eberhardsclausen in Germany; Walsingham, Becket's shrine at Canterbury, Peterborough, St. Davids, and Holywell in England and Wales; St. Andrews in Scotland; Chartres, Notre Dame de Liesse, Notre Dame de Rocamadour, and Notre Dame des Victoires, Ste. Anne d'Auray in Brittany, with Lourdes in France; and Hal in Belgium.

There is a further small class of Pilgrimages, differing from all others in being neither permanent nor yearly, but periodical at various long intervals. They are usually connected with the exposition of the principal relic or relics in some important church, an event which rarely occurs. Such are the Pilgrimages of Cologne, to the shrine of the Three Kings, and that of Treves, where the alleged seamless coat of Christ has been displayed for popular devotion, and has been visited by vast crowds of pilgrims.

Pilgrims in the Middle Ages were known by a peculiar garb and various badges, the hood and cape, the staff and scrip and water-bottle, and the low-crowned hat, turned up in front, and fastened with strings, being common to all, while the palm specially marked a pilgrim from the Holy Land; a shell, one from Compostella; a bottle or bell, one from Canterbury, and so forth. They had many privileges and advantages. Nevertheless they declined in repute, not only by reason of the feigned devotees who joined them for purposes of vagrancy and mendicancy, and even from worse motives, but because many notorious criminals were customarily sent on Pilgrimage as a punishment, with no care to isolate them from their innocent companions.

**PILLORY.** This was a mode of punishment by

public exposure of the offender on a platform or scaffold long used in most countries of Europe, originating probably with the Anglo-Saxons, one of whose methods of punishment as described by Strutt is nearly identical with the instrument which eventually became known as the pillory.

**PILOT.** The English Merchant Shipping Act of 1854 defines a pilot as being a person duly licensed by any pilotage authority to conduct ships to which he does not belong as one of the crew. Pilots are in fact taken on board to superintend the steering of the vessel, where the navigation is difficult and dangerous, in consequence of their special knowledge of particular waters; and it is to this class alone that the term now applies, whereas in early times the pilot was the steersman, or the individual who conducted the navigation of a ship across the ocean and out of sight of land. The word seems to be of Dutch origin, and to mean primarily a person who conducts a ship by the sounding line (*peillood*); Cowell (*Law Dict.*), describing *lodemanage*, speaks of it as the hire of a pilot for conducting a vessel from one place to another—a *lodesman* (Ang. Sax. *lad-man*, a leader) being a pilot for harbor and river duty. The laws of pilotage in the United States are regulated by the individual States according to the Acts of Congress.

**PILOT-FISH**, a pelagic fish of the family of Horse-Mackerels, well known to sailors from its peculiar habit of keeping company with ships and large fishes, especially sharks. It occurs in tropical and sub-tropical seas, and is common in the Mediterranean, but becomes scarcer in higher latitudes. In summer pilots will follow ships as far north as the south coast of England into port, where they are generally speedily caught. It is, however, extremely doubtful whether the pilot's connection with a shark serves a more special purpose than its temporary attachment to a ship. It accompanies both on account of the supply of food which it derives from them, picking up the crustaceans, cirripeds, or other marine animals swarming about the ship's bottom or parasitic on the shark, offal thrown overboard, or smaller pieces of flesh which are left unnoticed by the shark when it tears its prey.

**PILPAY.** See BIDPAI.

**PILSEN**, the second town of Bohemia, lies at the confluence of the Radbasa and the Mies, fifty miles to the southwest of Prague. It consists of the town proper, which is regularly built and surrounded with promenades on the site of the old ramparts, and of three suburbs. The staple article of manufacture and commerce is beer, of which about 6,000,000 gallons are brewed here annually. Other industrial products are machinery, enameled tinware, leather, alum, paper, earthenware, stoves, and spirits, while a tolerably brisk trade is carried on in wool, feathers, cattle, and horses. In the neighborhood are several coal-pits, iron-works, and glass-works, as well as large deposits of kaolin. The population in 1880 was 38,883, consisting of Germans and Czechs in nearly equal proportions, and is now (1890) about 44,000.

**PIMENTO**, also called **ALLSPICE** and **JAMAICA PEPPER**, is the dried immature fruit of *Eugenia Pimenta* or *Pimenta officinalis*, an evergreen tree about thirty feet high, belonging to the natural order *Myrtaceæ*. It is indigenous in the West India Islands, growing on limestone hills near the sea.

**PIN.** A pin is a small spike, usually of metal, with a bulbed head, or some other arrangement for preventing the spike passing entirely through the cloth or other material it is used for fastening together. The ordinary domestic pin had become in the fifteenth century an article of sufficient importance in England to warrant legislative

notice, as in 1483 the importation of pins was prohibited by statute. At that time pins of good quality were made of brass; but a large proportion of those against which the legislative enactment was directed were made of iron wire blanché, and passed as brass pins. In 1636 the pinmakers of London formed a corporation, and the manufacture was subsequently established at Bristol and Birmingham, the latter town ultimately becoming the principal center of the industry. So early as 1775 the attention of the enterprising colonists in Carolina was drawn to the manufacture by the offer of prizes for the first native-made pins and needles. At a later date several pin-making machines were invented in the United States. During the war of 1812, when the price of pins rose enormously, the manufacture was actually started, but the industry was not fairly successful till about the year 1836. Previous to this an American, Mr. Lemuel W. Wright, of Massachusetts, had in 1824 secured in England a patent for a pin-making machine, which established the industry on its present basis. (See BROOCH.)

PINDAR, the greatest lyric poet of ancient Greece whose work is represented by large remains, was born about 522 B.C.; his birthplace the village of Cynoscephalæ near Thebes in Bœotia. He is said to have received his first lessons in flute-playing from one Scopelinus at Thebes, and afterward to have studied at Athens under the musicians Apollodorus (or Agathocles) and Lasus of Hermione. In his youth, as the story went, he was defeated in a poetical contest by the Theban Corinna—who, in reference to his use of Theban mythology, is said to have advised him "to sow with the hand, not with the sack." The facts that stand out from these meager traditions are that Pindar was precocious and laborious.

His versatility as a lyric poet is one of the characteristics remarked by Horace (*Carm.* iv. 2), and is proved by the fragments, though the poems which have come down entire represent only one class of compositions—the *Epinicia*, or odes of victory, commemorating successes in the great games. The lyric types to which the fragments belong, though it cannot be assumed that the list is complete, are at least numerous and varied. Pindar's genius was boldly original and his place in Greek literature is regarded as leading that of all contemporaries in the domain of lyric poetry. He is said to have died at Argos at the age of seventy-nine 443 B.C.

PINE (*Pinus*), a name given by the ancients to some of the resinous cone-bearing trees to which it is now applied, and, as limited by modern botanists, the designation of a large genus of true conifers (*Abietinæ*), differing from the firs in their hard woody cone-scales being thickened at the apex, and in their slender needle-shaped leaves growing from a membranous sheath, either in pairs or from three to five together—each tuft representing an abortive branch, springing from the axil of a partially deciduous scale-leaf, the base of which remains closely adherent to the stem. The numerous male catkins are generally arranged in dense whorls around the bases of the young shoots; the anther-scales, surmounted by a crest-like appendage, shed their abundant pollen by longitudinal slits; the two ovules at the base of the inner side of each fertile cone-scale develop into a pair of winged seeds, which drop from the opening scales when mature—as in the allied genera.

The pines are widely distributed over the north temperate zone, in the southern portions chiefly confined to the mountains, along which in Central America, a few are found within the tropics; in more northern regions they frequently form extensive forests, sometimes hardly mingled with other trees. Their soft,

straight-grained, resinous, and often durable wood gives to many kinds a high economic value, and some are among the most esteemed of timber trees.

Of the two-leaved species, *P. sylvestris*, the pine of northern Europe, may be taken as a type. When growing in perfection it is one of the finest of the group, and perhaps the most picturesque of forest trees; attaining a height of from 70 to 120 feet, it is of conical growth when young, but in maturity acquires a spreading cedar or mushroom-like top with a straight trunk of from two to four feet in diameter at the base, and gnarled twisted boughs, densely clothed at the extremities with glaucous green foliage, which contrasts strongly with the fiery red-brown bark. The leaves are rather short, curved, and often twisted; the male catkins, in dense cylindrical whorls, fill the air of the forest with their sulphur-like pollen in May or June, and fecundate the purple female flowers, which, at first sessile and erect, then become recurved on a lengthening stalk; the ovate cones, about the length of the leaves, do not reach maturity until the autumn of the following year, and the seeds are seldom scattered until the third spring. *P. sylvestris* is found in greater or less abundance, from the hills of Finmark and the plains of Bothnia to the mountains of Spain, and even the higher forest-slopes of Etna, while in longitude its range extends from the shores of the North Sea to Kamchatka.

In Britain natural forests of Scotch fir of any extent are only now found in the Highlands, chiefly on the declivities of the Grampians, and most of the great woods have been much curtailed in recent times, while the larger trees are generally felled as soon as they attain a timber size. The Scotch fir is a very variable tree, and certain varieties have acquired a higher reputation for the qualities of their timber than others. The heart-wood of the finer kinds of Scotch fir is of a deep brownish-red color, abounding in the resin to which its durability is probably due. For all indoor and most outdoor purposes it is as lasting as oak, and for ship planking is perhaps little inferior; from its lightness and elasticity it is well adapted for the construction of yachts and other small fast-sailing craft, and is said to be the best of all wood for masts and large spars; its weight varies from thirty to forty pounds the cubic foot.

The pine is an important tree in the economy of the northern nations of Europe. In Scandinavia and Russia houses are chiefly constructed of its timber, and log-huts are made of the smaller trunks, and lined and roofed with the bark. The inner bark is twisted into ropes, and, like that of the spruce, is kiln dried, ground up, and mixed with meal in times of scarcity; in Kamchatka it is macerated in water, then pounded, and made into a kind of substitute for bread without any admixture of flour. In recent days the fiber of the leaves has been extracted in some quantity and applied to textile purposes under the name of *waldwolle*, both in Germany and in Sweden. It is prepared by boiling the needles in a solution of soda to remove the resin, which process loosens the fiber and renders its separation easy; it has some resemblance to coarse wool, and is spun and woven into blankets and garments that are said to be warm and durable; it is also used for stuffing cushions; an essential oil, obtained by a previous distillation of the leaves, has medicinal virtues attributed to it by some German practitioners.

Large quantities of turpentine are extracted from this pine in Sweden and Russia, also in the Carolinas, Florida, and Georgia, by removing a strip of bark, terminating below in a deep notch cut in the wood, into which the turpentine runs, and from which it is

scooped as it accumulates; but the product is not equal to that of the silver fir and other species. Tar is prepared largely from *P. sylvestris*; it is chiefly obtained from the roots, which, mingled with a few logs, are arranged in a conical or funnel-shaped hollow made on the steep side of a hill or bank; after filling up, the whole is covered with turf and fired at the top, when the tar exudes slowly and runs into an iron vessel placed below, from the spout of which it is conveyed into barrels. Most of the so-called Stockholm tar is thus prepared, chiefly in the province of Bothnia.

Closely allied to the Scotch pine is the dwarf *P. pumilio*, the "krumholz" or "knieholz" of the Germans. The Red Pine of Canada and New England (so-called from the color of its bark), *P. resinosa*, is a tree of considerable size, sometimes attaining the dimensions of *P. sylvestris*. The tree is of quick growth and the wood strong and resinous, but it is less durable than Scotch fir, though much employed in shipbuilding; according to Emerson, trunks exist in Maine four feet in diameter. Red pines abound in Nova Scotia and Newfoundland, and the tree is rather widely distributed over the northern parts of the continent; it rarely forms extensive woods, but grows chiefly in clumps among other trees, at least in its more southern habitats. Nearly allied is *P. Banksiana*, the Gray or Labrador Pine, sometimes called the Scrub Pine; it is the most northerly representative of the genus in America, and is chiefly remarkable for its much recurved and twisted cones, about two inches long. The trunks are too small to be of great economic value, but the light wood is used by the natives for their canoes.

*P. Laricio*, the Corsican Pine, is one of the noblest trees of this group, growing to a height of 100 or even 150 feet, with a straight trunk and branches in regular whorls, forming in large trees a pyramidal head. This pine abounds in Corsica, and is found in more or less abundance in Spain, southern France, Greece, and many Mediterranean countries; it occurs on the higher mountains of Cyprus. The tree is of very rapid growth, but produces good timber, much used in southern dockyards and very durable, though less strong than that of *P. sylvestris*; the heart-wood is of a brownish tint.

The Black Pine, *P. austriaca*, derives its name from the extreme depth of its foliage tints—the sharp, rigid, rather long leaves of a dark green hue giving a somber aspect to the tree. The light-colored, glossy, horizontal cones are generally in pairs, but sometimes three or four together. The tree is conical when young, but when old forms a spreading head; it often attains a large size. Southern Austria and the adjacent countries are the natural habitats of this pine; it seems to flourish best on rocky mountain sides, but in England grows well on sandy soils. The timber is valued in its native country, and is said to be durable and to stand exposure to the weather well; various resinous products are extracted from it. *P. pyrenaica* is a handsome species of pyramidal form, attaining a large size on the mountains of northern Spain. The leaves are long and of a bright green; the cones are solitary, oblong, conical, and of a yellow tint. The timber is used in Spanish dockyards, but opinions vary as to its quality.

*P. Pinaster*, the Cluster Pine or Pinaster, is an important species from its vigorous growth in the sand-drifts of the coast, especially on the dunes of the Bay of Biscay. Growing to a height of from forty to seventy feet, the deeply-furrowed trunk occasionally reaches a diameter of three feet or more at the base, where, like most sand trees, it usually curves upward gradually, a form that enables the long tap-roots to withstand better the strain of the sea gale; when once established, the tree is rarely overthrown even on the loosest sand.

These forests of pinaster, apart from the production of timber, have a great economic value as a source of turpentine, which is largely obtained from the trees by a process analogous to that employed in its collection from *P. sylvestris*. In England the cluster-pine has been largely planted on sandy districts near the sea, and has become naturalized in Purbeck and other wild tracts in the southern counties, but the summer heat is too small to permit of its resinous products acquiring any value; *P. bruttia*, the Calabrian Pine, a kindred form, is remarkable for its numerous densely clustered radiating cones; its wood is considered good in southern Italy.

*P. Pinea* is the Stone-Pine of Italy; its spreading rounded canopy of light green foliage, supported on a tall and often branchless trunk, forms a striking feature of the landscape in that country, as well as in some other Mediterranean lands.

The tree has been naturalized in many warm countries, even in China; in England it seldom attains any large size, as the deficient summer heat prevents the wood from maturing; but trees occur occasionally in plantations twenty or thirty feet in height; the wood, though soft and deficient in the resin that gives durability to the timber of some species, is valued by the southern carpenter and cabinetmaker for its lightness, its fineness of grain, and the ease with which it is worked. *P. mitis*, the Yellow Pine of the northern and middle States of America, is rather allied to the three-leaved section, but the leaves are mostly in pairs. It is a tree of large size, often attaining a height of seventy feet and upward, though rarely more than two feet in diameter at the root; the lower branches spread horizontally, the upper, converging toward the trunk, give the tree somewhat the aspect of a spruce, hence it is called in some districts the "spruce-pine." The yellow pine is one of the most important timber trees of the genus; the heart-wood being very durable is largely employed in shipbuilding and for house timber, being nearly equal to that of *P. sylvestris*; large quantities are exported to Britain under the name of "New York yellow pine;" the sapwood is perishable. The three-leaved group includes several of the most valuable trees of America; among them is *P. rigida*, the Pitch-Pine of the northern States, a tree of from forty to fifty feet in height with rugged trunk; occasionally three feet in diameter. The wood is very hard and abounds with resin, but on swampy land is of inferior quality and of little value except for fuel, for which the pitch-pine is highly prized; on drier ground the grain is fine from the numerous knots. Large quantities of tar and pitch are obtained from this species. The tree is one of the few that will flourish in salt marshes. *P. australis* is the "Georgia Pitch-Pine," or Yellow Pine of the southern States; it abounds on the sandy soils that cover so much of Georgia, the Carolinas, and Florida, and on those dry lands attains its highest perfection, though occasionally abundant on moist ground, whence it is sometimes called *P. palustris*. The most marked feature of the tree is its long tufted foliage—the leaves, of a bright green tint, springing from long white sheaths, being often a foot in length. The tall columnar trunk furnishes the most valuable pine timber of the States; close-grained and resinous, it is very durable and polishes well; it is largely employed in American shipyards, and immense quantities are exported, especially to Britain and the West India Islands. This tree yields an abundant supply of tar and turpentine of good quality, which products are collected and manufactured in the "pine-barrens" on a large scale.

*P. Teda*, the "Loblolly Pine" of the backwoodsman, a tall tree with straight trunk and spreading top, covers

great tracts of the "pine-barrens" of the Southern States, but also frequently spreads over deserted arable lands that have been impoverished by long and bad farming. It is a fine species 80 or 90 feet high, having sometimes a girth of 6 or 8 feet, with a broad spreading head. The timber of this pine is indifferent, but the forests of it are of importance from the quantity of turpentine they yield; the trees also furnish much firewood of good quality. *P. ponderosa*, a pine of western America belonging to this section, is a fine timber tree; deserving of notice from the extreme density of its wood, which barely floats in water; it abounds in some parts of the western range of the Rocky Mountains. In Oregon and California several large pines of this group are found. *P. Coulteri*, or *macrocarpa*, is remarkable for its enormous cones (sometimes a foot long, six inches in diameter, and weighing more than four pounds). Nearly related to this is *P. Sabiniana*; the Nut-Pine of California, the cones of which are of nearly equal size, also with hooked scales; the large nut-like seeds are eaten by the Indians; the tree is one of the largest of the section, sometimes attaining a height of 120 feet and upward, while trunks have been found, it is said, 10 or 12 feet in diameter. *P. longifolia* is a Nepal species, known in India as the "Cheer-Pine;" the wood is good, resinous, and moderately durable; the tree is common on the foot-hills of the Himalayas. *P. Gerardiana*, another Nepal species, is a large tree with a conical head, growing on the more elevated parts of the mountain range; it furnishes edible seeds. *P. canarinesis*, which forms forests on the mountains of Grand Canary and Teneriffe, growing at an elevation of 6,000 feet, also belongs to this group. The beautiful Monterey-Pine, *P. insignis*, distinguished by the brilliant color of its foliage, has been planted in the southwestern parts of England, but is scarcely hardy. The pines with five leaves in each tuft have generally deciduous sheaths. The most important economic species is the well-known White Pine, *P. Strobus*, from its large growth and abundance, as well as the soft even grain of its white wood, one of the most valuable of American trees. The tree abounds from Canada to Georgia, and is also found in British Columbia, but in the eastern States has been so long sought for by the lumberer that most of the old trees have long disappeared, and large white pine timber is now only found in quantity in the Canadian Dominion. Formerly Maine and Vermont were celebrated for the size of their pines, but few of these great trees now exist in New England; one that stood near the banks of the Merrimack in New Hampshire is said to have had a trunk nearly 8 feet in diameter, and Michaux measured a stump 6 feet across. On a deep rich soil *P. Strobus* attains a height of 150 or even 200 feet, and trunks without a branch are sometimes found 80 or 90 feet long; in the earlier stages of growth it has a pyramidal form, in open glades the lower boughs often touching the ground, but in old age it acquires a wide almost cedar-like top. The wood of the white pine is durable for indoor use, especially when protected by paint, but when exposed to moist air it rapidly decays, and it is very liable to dry rot; it is said to be best when grown on sandy soils. Immense quantities are still exported, especially from Canada, its smooth easily-worked grain rendering it a favorite wood for the house-carpenter and joiner; it weighs about twenty-eight pounds per cubic foot. Nearly approaching this is *P. excelsa*, the Bhotan Pine. It is found in Kumaon and Bhotan and on some of the Nepal ranges, but does not grow in the moist climate of the Sikkim Himalayas; it is found at a height of 6,000 to 7,000 feet, and attains large dimensions; the wood is highly resinous, and is said to be durable;

great quantities of a white clear turpentine exude from the branches when injured. The Bhotan pine is quite hardy in southern England, and has been largely planted of late as an ornamental tree.

*P. Lambertiana*, the Giant Pine or Sugar-Pine of California, is the largest of the genus, rising to the height of 200 feet, with a trunk 20 to 30 feet in girth, and, it is said, occasionally attaining much larger dimensions. The head is of a pyramidal form, the lower branches drooping like those of a Norway spruce; its foliage is of a light bright green color. The pendant cones are very large, sometimes eighteen inches long and four inches in diameter, with large nut-like seeds, which, pounded and baked, are eaten by the Indians. The tree abounds in some sandy districts, but more generally occurs singly or in small groups dispersed through the woods, attaining its greatest dimensions in light soils. The wood is soft and nearly white, but contains much resin, which when fire has run through the forest exudes, and, having in this half-burnt condition a sweetish taste, has given the common name to the tree; the wood seems to be formed slowly; from its smooth grain it is valued for indoor carpentry; the saccharine burnt resin is used as a laxative in California. *P. Cembra* is the Stone-Pine of Siberia and central Europe. It abounds on the Alps, the Carpathians, and the Siberian ranges, in Switzerland being found at an altitude of 6,800 feet in some localities. It is a straight-growing tree, with gray bark and whorls of horizontal branches, growing often from the ground, giving a cylindro-conical outline. The growth of *P. Cembra* is slow, but the wood is of remarkably even grain, and is employed by the Swiss wood-carvers in preference to any other. The *Cembra* is the "zirbel" or "zirbel-kiefer" of the Germans, and is known locally in Switzerland as the "aroile," "aloies," and "arve." *P. occidentalis*, a five-leaved pine with pale green foliage and small ovate cones, is found on the high mountains of St. Domingo. Many members of the group occur on the Mexican isthmus, one of which, *P. cembroides*, produces edible seeds. *P. Ayacahuite*, a large tree growing on the mountains of Guatemala, with glaucous foliage like *P. Strobus*, yields a valuable resin. *P. filifolia* and *P. macrophylla*, likewise natives of Central America, are remarkable for the extreme length of their leaves; the former is said to attain a large size.

PINE-APPLE. The pine-apple so-called consists in reality of the inflorescence of the plant, the originally separate flowers of which, together with the bracts supporting them, become fleshy and consolidated into one mass. The pine, *Ananassa sativa*, is a member of the Bromeliad family, supposed to be of tropical American origin, and has been found wild in Mexico, Central America, Guiana, and Brazil, but is now widely dispersed in all tropical and semitropical countries.

PINE BLUFFS, the capital of Jefferson county, Ark., is conspicuously located on a bluff on the right bank of the Arkansas river, 120 miles from its junction with the Mississippi. It is also on the Little Rock, Mississippi and Texas Railway, 46 miles south of Little Rock, and enjoys substantial advantages by reason of the means of rapid communication with St. Louis, Chicago, Memphis, Vicksburg, and New Orleans, afforded by rail and water. Owing to these and other causes the city has developed rapidly, and its progress has been almost phenomenal. It contains a number of churches and schools, a Jewish synagogue, the Pine Bluff normal institute, 2 papers, 2 banks, 4 hotels, upward of 100 stores; also a court-house and high school. In addition to the Pine Bluff iron works, one of the leading industries of the State, there are 2 saw-mills, 1 shingle-mill, 1 planing, sash, door and blind factory, 2 carriage fac-



ories, 1 ice manufactory, 1 machinery manufacturing works, 1 furniture factory, 1 mill and elevator company, water works, electric light works, and lines of street railway, besides flour mills, cotton seed oil works, and brick-yards. It is the shipping point for the cotton raised in the surrounding country, and its population in 1890 was returned at 9,952.

PINEL, PHILIPPE, a distinguished French physician, was born at the chateau of Rascas, Saint-André, in the department of Tarn, France, on April 20, 1745. He studied at Lavour and afterward at the university of Toulouse, where he took his doctor's degree in 1773. From Montpellier, where he taught mathematics and at the same time carried on his medical studies, he removed in 1778 to Paris, engaging there chiefly in literary work connected with his profession. He died at Paris, October 26, 1826.

PINEROLO, a city of Italy, in the province of Turin (Piedmont), is built in a straggling manner on a hill-side just above the junction of the valleys of the Chisone and the Lemina, at a height of 1,237 feet above the sea, twenty-three and one-half miles by rail southwest of Turin. It is the terminus of the branch railway from Turin by Sangone or Nichellino, and has steam tramways running up to Perosa (twelve miles) and south to Saluzzo. Cotton, silk, wool, and hemp are among the local manufactures. The population of the city in 1889 was 13,000.

PINK. As usually applied this word corresponds to a genus of *Caryophyllaceæ*, the *Dianthus* of botanists. It is characterized by the presence of opposite simple leaves proceeding from thickened nodes, a cymose inflorescence, a tubular calyx surrounded by a number of overlapping bracts, a showy corolla of five free long-stalked petals, ten stamens proceeding, together with the petals, from a short stalk supporting the ovary, which latter has two styles and ripens into an oblong pod which splits by two valves. It is a native chiefly of southern Europe and the Mediterranean region, a few being found in temperate Asia and South Africa. One species only is native to America, and that only in the northwest. Four species are wild in Britain, with two others which are more or less naturalized. These two are the more interesting as being the originals of the pinks and of the carnations and picotees of English gardens.

PINKERTON, JOHN, archæologist, numismatist, historian, geographer, and miscellaneous writer in prose and verse, was born at Edinburgh, February 17, 1758, and died in 1826.

PINSK, a district town of the government of Minsk, Russia, is situated in a marshy region at the confluence of the Strummen and Pina Rivers, 172 miles to the southwest of Minsk. It has a population in 1890 estimated at 26,950.

PINTO, FERNÃO MENDES, a noted Portuguese adventurer, was born in 1509 or 1510 at Montemor-o-Velho, near Coimbra, and died near Lisbon, July 18, 1583.

PINTURICCHIO, whose full name was BERNARDINO DI BETTI, the son of a citizen of Perugia, Benedetto or Betto di Biagio, was one of a very important group of painters who inherited the artistic traditions and developed the style of the older Perugian painters such as Bonfigli and Fiorenzo di Lorenzo. According to Vassari he was a pupil of Perugino. He painted a large number of frescoes, including *The Annunciation*, *Nativity*, *Magi*, *Resurrection*, etc., and died in 1513.

PINZON, a family of wealthy Spanish navigators, of Palos de Moguer, in Andalusia, three members of which—Alonzo, Francesco, and Vicente, brothers—were associated with Columbus in his great discovery.

MARTIN ALONZO PINZON, born about the middle of

the fifteenth century. In the expedition of 1492 Alonzo commanded the *Pinta*, on board of which his brother Francesco was pilot; another brother, Vicente Yañez, had command of the *Nina*. It was at Alonzo's persuasion that on October 7th the course of the expedition was changed to the southwest; the island of Guanahani or San Salvador, four days after, was sighted. On November 21st, off the coast of Cuba, Alonzo separated himself from the expedition, hoping to be the first to arrive at the land of gold of which they had heard the natives speak. After an absence of six weeks he rejoined Columbus, who accepted the excuses he gave for his absence. On the return journey Alonzo again separated from his leader, probably by design, and when Columbus arrived at Palos on March 15, 1493, he learned that Alonzo had already landed at Bayona in Galicia. If his object was to forestall Columbus and obtain the credit of being the discoverer of the New World, his intentions were foiled; he was refused the audience which he craved of the sovereigns, and very shortly after died, it is supposed of chagrin.

VICENTE YANEZ PINZON, who commanded the *Nina*, remained loyal to his leader throughout. In after years he made important discoveries on his own account. After 1523 all traces of Vicente are lost.

PIOMBO, SEBASTIANO DEL. See SEBASTIANO.

PIOTRKÓW, the chief town of a government of the same name in Russian Poland, and formerly the seat of the high court of Poland, is situated on the railway from Warsaw to Vienna, ninety miles by rail to the southwest of the capital, five miles to the west of the river Pilica. In April, 1889, it had 23,050 inhabitants, including 3,000 military. Its manufactures are still insignificant; it has a few flour-mills, saw-mills, soap-works, and breweries.

PIOZZI, HESTER LYNCH, the daughter of John Salisbury, of Bodville, Carnarvonshire, was born there, as it would appear from a protracted dispute between Croker and Macaulay, January 27, 1741. After an education which extended considerably beyond that given to most ladies of her period, she was married in 1763 to Henry Thrale, a brewer of Southwark, whose house was at Streatham, on the southeast corner of Tooting Beck Common. In this retreat she drew around her many of the most distinguished men of letters of the age. She was introduced to Johnson by Arthur Murphy in the year after her marriage, and for nearly twenty years the sage remained on the closest intimacy with her. At the time of Mr. Thrale's death Doctor Johnson was in declining health, and he soon began to think himself slighted, nor was his indignation abated at the announcement in the spring of 1783 of her engagement to Piozzi, an Italian musician. For a time the engagement was broken off, but it was quickly resumed, and on July 25, 1784, they were married. The union provoked the resentment of her children, and the undying denunciations of Doctor Johnson; but, when her husband was found to be a man of quiet and inoffensive manners and a careful guardian of his wife's resources, her children acquiesced in the marriage and most of her friends returned to her. Baretti, always her enemy, abused her, and Boswell ridiculed her, but her character has survived the insinuations of the one and the open malevolence of the other, as well as the satiric attacks of Peter Pindar. Piozzi died of gout at Brynbella, March 1809, and she at Clifton, May 2, 1821.

PIPE (see MUSIC and ORGAN). Strutt, in his *Sports and Pastimes of the People of England*, gives representations of the pipe and tabor as used in England in the fourteenth century to accompany a dancing-dog, a cock on stilts, a horse rearing, etc.

PIPE, TOBACCO. The smoking of tobacco in pipes is a custom which prevailed in America for a period of

unknown duration previous to the discovery of that continent by Columbus. The most ancient pipes of which remains exist have been found in mounds or tumuli called pipe mounds, principally in the States of Ohio, Indiana, Illinois, and Iowa. These mound pipes, which are carved in porphyry and other hard stones, are very uniform in type. In the commonest forms the bowl is a simple cylinder or urn, but in many cases remarkable artistic skill has been displayed in carving the bowls into miniature figures of birds, mammals, reptiles, and human heads, often grotesque and fantastic, but always vigorously expressed. These mound or platform pipes with carved human and animal forms are objects of the highest ethnographic interest and importance, being among the most characteristic remains of the ancient inhabitants of the Mississippi valley. The wide area over which they, as well as remains of baked clay pipes, are found throughout the American continent testifies to the universal prevalence of smoking in the pre-Columbian era. Many of the ancient clay pipes found in Mexico, etc., are elaborately molded and ornamented, while others show considerable similarity to the early clay pipes of Europe. Among the North-American Indian tribes the tobacco pipe occupies a position of peculiar symbolic significance in connection with the superstitious rites and usages of the race. The favorite material for Indian pipe bowls is the famous red pipe stone (catlinite), a fine-grained easily-worked stone of a rich red color of the Côteau des Prairies, west of the Big Stone Lake in Dakota. The Babeen Indians of the British-Columbian coast carve from a soft blue clay slate very elaborate and massive pipes with intricate pierced work and fantastic animal forms, the pipe tube being pierced from some protruding part of the sculpture.

There is considerable dispute as to whether pipes for smoking were at all known in Europe previous to the discovery of America. Throughout Great Britain and Ireland small clay pipes are frequently dug up, in some instances associated with Roman relics. The introduction of the tobacco-pipe into Europe is generally ascribed to Ralph Lane, first governor of Virginia, who in 1586 brought an Indian pipe to Sir Walter Raleigh, and taught that courtier how to use the implement. The pipe-makers of London became an incorporated body in 1619, and from England the other nations of Europe learned the art of making clay pipes.

The regular pipe-making industries divide into many branches, of which the more important are the clay pipe, meerschaum (real and artificial), and wooden bowl trades. Clay pipes are made in prodigious numbers by hand labor with an iron mold and a steel wire for forming the tube of the stem. The pipes are very lightly fired, so as to keep them soft and porous; and so cheaply made are they that the commoner kinds can be retailed at a profit for one-half cent each. The principal center of the clay-pipe industry in England is at Broseley, in Staffordshire, where the trade has been established since the early part of the seventeenth century, and in the United States in Powhatan county, Va., the product of which locality has a reputation superior to all other clay pipes made, usually costing 15 to 25 cents each. Meerschaum pipes (see MEERSCHAUM) are the expensive luxury of the European smoker, but modern ingenuity has succeeded in providing a remarkably clever imitation of both meerschaum and amber; so that a large portion of the so-called meerschaum pipes are factitious.

PIPE-FISHES, small marine fishes, which with the sea-horses form a distinct family, *syngnathidæ*, of the order of Lophobranchiate fishes. The name is derived from the peculiar form of their snout, which is produced

into a more or less long tube, ending in a narrow and small mouth which opens upward and is toothless. The body and tail are long and thin, snake-like, incased in hard integuments which are divided into regularly arranged segments. Pipe-fishes are abundant on such coasts of the tropical and temperate zones as offer by their vegetation shelter to these defenseless creatures. They are very bad swimmers, slowly moving through the water by means of the rapid undulatory movement of the dorsal fin. Their tail, even when provided with a caudal fin, is of no use in swimming, and not prehensile as in sea-horses.

PIPIT, French *Pipit*, cognate with the Latin *Pipio*, the name applied by ornithologists to a group of birds having a great resemblance in both habits and appearance to the LARKS (*q.v.*), with which they were formerly confounded by systematists as they are at the present day in popular speech, but differing from them in several important characteristics, and, having been first separated to form the genus *Anthus*, which has since been much broken up, are now generally associated with the WAGTAILS (*q.v.*) in the family *Motacillidæ*. Pipits, of which over fifty species have been described, occur in almost all parts of the world, but in North America are represented by only two species—*Neocorys spragueii*, the prairie-lark of the northwestern plains, and *Anthus ludovicianus*, the American titlark, which last is very nearly allied to the so-called water-pipit of Europe, *A. spipoletta*.

PIPPI, GIULIO, the head of the Roman school of painting in succession to Raphael. This prolific painter, modeler, architect, and engineer is currently named GIULIO (or JULIO) ROMANO, from the place of his birth—Rome, in the Macello de' Corbi. His name in full was Giulio di Pietro di Filippo de' Giannuzzi—Giannuzzi being the true family name, and Pippi (which has practically superseded Giannuzzi) being an abbreviation from the name of his grandfather Filippo.

The date of Giulio's birth is a little uncertain. Visari (who knew him personally) speaks of him as fifty-four years old at the date of his death, November 1, 1546; thus he would have been born in 1492. Other accounts assign 1498 as the date of birth.

PIPPIN, or PEPIN, a name borne by several members of the Carolingian family. (1) Pippin of Landen, or Pippin the Old, mayor of the palace, died 639. (2) His grandson, Pippin of Heristal, the father of Charles Martel, died 714. (3) Martel's son, Pippin, the Short, king of the Franks, died 768. (4) Pippin, son of Charles the Great (776-810), was his father's deputy in Italy, and as such was anointed "king for Italy" by Pope Adrian I. in 781. (5) Pippin, second son of Louis the Pious, appointed king of Aquitaine by his father in 817, died in 838, after a reign spent in the family conflicts of the period. (6) The son of the last-named Pippin was called to the throne by the Aquitanians on his father's death, and maintained himself with varying fortunes against Charles the Bald, to whom Louis had given the vacant throne, till, in 864, he was taken by treachery, and soon died in confinement.

PIQUA, a city of Miami county, Ohio, is situated in a rich agricultural district on the Miami river, on the Miami and Erie Canal; and on the Pittsburgh, Cincinnati and St. Louis and the Cincinnati and Michigan railways, about ninety miles north-by-east of Cincinnati. Beside a large agricultural trade the city has woolen manufactures, iron foundries, and agricultural machine works. The population, 3,277 in 1850, was 5,967 in 1870, 6,131 in 1880, and 9,090 in 1890.

PIQUET, a game at cards. The name, of uncertain etymology, is probably from *pique* (the spade-suit). The Germans had formerly a *Schwerter* game, the packs

used being like piquet packs. The *pique* of French cards corresponds to the *spade* (sword) of Italian, and to the *espadas* of Spanish cards. Hence *piquet* may be the *sword game*.

Piquet is played by two persons, with a pack of thirty-two cards—the sixes, fives, fours, threes, and twos being thrown out from a complete pack. Until recently the *partie* was the best of five games of 100 up (a player not obtaining fifty losing a double game). But now the *partie* is generally determined in six hands, the player making the largest aggregate score being the winner. The number of points won is the difference between the two scores, with 100 added for the game. If, however, the loser fails to make 100 in six hands, the number of points won is the two scores added together, with 100 for the game. Piquet played in this way is called *Rubicon Piquet*.

PIRACY. Sir Edward Coke describes a pirate (Latin *pirata*) as *hostis humani generis*, and as a rover and robber upon the sea. Piracy may be defined in law as an offense which consists in the commission of those acts of pillage and violence upon the high seas which on land would amount to felony.

PIRÆUS. See ATHENS.

PIRANESI, GIOVANNI BATTISTA, an eminent Italian engraver of ancient architectural subjects, was born in the former half of the eighteenth century, and studied his art at Rome. He did not slacken in his exertions till his death in 1778. The plates of Piranesi, in which the severity of burin work is largely supplemented by the freer lines of the etching-needle, were collected and preserved by his son and coadjutor Francesco. They were published, to the number of about 2,000, in 29 vols. fol., Paris, 1835-37.

PIRMASENS, a small manufacturing town of the Bavarian palatinate, lies in a hilly district, nearly forty miles west-by-south of Spire.

PIRNA, an ancient town of Saxony, lies on the left bank of the Elbe, on the margin of the "Saxon Switzerland," eleven miles above Dresden.

PIRON, ALEXIS, the foremost epigrammatist of France, was born at Dijon on July 9, 1689, and died in 1773.

PISA, which has always been one of the most important cities of central Italy, is situated on the banks of the Arno at a short distance from the sea, in the midst of a fertile plain backed by marble mountains wooded with pines and other forest trees.

The origin of Pisa is very ancient, and is involved in obscurity. The Romans believed it to date from the days of Troy, and also gave a legendary account of its foundation by colonists from Greece. Galileo Galilei was a native of Pisa; he taught in its university; he made his first experiments in gravity from its bell tower, discovered, by observing the swing of the cathedral lamp, the law of the oscillation of the pendulum, and began there his stupendous reform of natural philosophy.

As to Pisa, it is enough to mention that its population within the walls had been reduced in 1551 to 8,574 souls, and that by 1745 it had only risen to the number of 12,406. Under the house of Lorraine, or more correctly during the reign of that enlightened reformer Pietro Leopoldo (1765-1790), Pisa shared in the general prosperity of Tuscany, and its population constantly increased. By 1840 it contained 21,670 souls, exclusive of the suburbs and outlying districts. At the present day Pisa is again one of the most flourishing cities of Tuscany. Population, 37,704.

PISA, LEONARDO OF. See PISANUS.

PISANELLO. See PISANO, VITTORE.

PISANO, ANDREA. Andrea da Pontadera, generally known as Andrea Pisano, the chief pupil of GIO-

VANNI PISANO (*q.v.*), was born about 1270, and first learned the trade of a goldsmith, as did many other afterward celebrated artists. In 1347 he was appointed architect to the duomo of Orvieto, which had already been designed and begun by Lorenzo Maitani. The exact date of his death is not known, but it must have been shortly before the year 1349.

PISANO, GIOVANNI, son of NICCOLA PISANO (see below), born about 1250, was but little inferior to his father either as an architect or as a sculptor. He died in 1330.

PISANO, NICCOLA, one of the chief sculptors and architects of mediæval Italy, was born about 1206, and died in 1278. Though he called himself *Pisanus*, from Pisa, where most of his life was spent, he was not a Pisan by birth.

PISANO, VITTORE, commonly called PISANELLO, the greatest of Italian medalists, was a native of San Vigilio sul Lago in the territory of Verona, and was born in 1380. During the latter portion of his life he lived in Rome, where he enjoyed great repute. He died in 1456.

PISANUS, LEONARDUS (Leonardo of Pisa), an Italian mathematician of the thirteenth century who has left the stamp of his name on a whole period in the history of the science. Of Leonardo's personal history few particulars are known. In 1202 Leonardo Fibonacci (*i.e.*, son of Bonaccio) was in Italy and published his great work *Liber Abaci*. Leonardo certainly was in relation with some persons belonging to that circle when he published in 1220 another more extensive work, *De Practica Geometriæ*, which he dedicated to the imperial astronomer Dominicus Hispanus. Some years afterward (perhaps in 1228, as is related by an author on the authority of a manuscript only once seen by him) Leonardo dedicated to another courtier, the well-known astrologer Michael Scott, the second edition of his *Liber Abaci*. We know nothing of Leonardo's fate after he issued that second edition.

PISCICULTURE. This art as at present pursued is not limited to those animals which are grouped by zoölogists in the class of *Pisces*. "Fishery" is now understood to signify the exploitation of all products of the sea, lake, and river, the capture of whales, turtles, pearls, corals, and sponges, as well as of fish proper. The purpose of fish-culture (or *aquiculture*, as it is in France more appropriately named) is to counteract by reparative and also by preventive measures the destructive effects of fishery.

The possibility of exterminating aquatic animals within the restricted limits of a lake or a river cannot be doubted; authorities are decidedly at variance, however, as to the extent of the influence of man upon the abundance of life in the open seas.

Fishes in ponds, lakes, or streams are quickly exterminated unless the young be protected, the spawning season undisturbed, and wholesale methods of capture prohibited. Salmon and trout streams are preserved in all countries of northern Europe; and in Canada also a large service of fishery wardens is maintained. In the United States there are in many of the older commonwealths excellent codes of laws for the preservation of fish and game, which are enforced by anglers' clubs. A river may quickly be emptied of its anadromous visitors, salmon, shad, and alewives, by over-fishing in the spawning season, as well as by dams which cut off the fish from their spawning-grounds. Numerous rivers in Europe and America might be named in which this has occurred. In the same way, sea fishes approaching the coasts to spawn in the bays or upon the shoals may be embarrassed, and the numbers of each school decimated—particularly if, as in the case of the herring, the

eggs are adhesive and become entangled in nets. Sea fishes spawning in estuaries are affected much in the same manner as the salmon in rivers, though in a less degree, by wholesale capture in stationary nets. The shad and alewife fisheries of the United States are protected by an extensive code of laws, varying in the several States and in the different rivers of each State. The most satisfactory laws appear to be those which regulate the dates when fishery must commence and end, and prescribe at least one day in each week, usually Sunday, during which the ascent of the fish may not be interrupted. Migratory, semi-migratory, or wandering fishes, ranging singly or in schools over broad stretches of ocean, the mackerels, the tunnies, the sardines or pilchards, the menhaden, the bluefish, the bonitoes, and the squeteague, stand apparently beyond the influence of human agency, especially since, so far as is known, they spawn at a distance from the coast, or since the adults, when about to spawn, cannot be reached by any kind of fishery apparatus. Their fecundity is almost beyond comprehension, and in many instances their eggs float free near the surface, and are quickly disseminated over broad areas. The conclusions gained by Professor Baird, United States commissioner of fisheries, agree exactly with those of Professor Huxley, that the number of any given kind of oceanic fish killed by man is perfectly insignificant when compared with the destruction effected by their natural enemies. Almost any body of water, be it a bay or sound, or be it the covering of a ledge or shoal at sea, may be over-fished to such a degree that fishing becomes unprofitable, especially if fishing be carried on in the spawning season. In this manner, no doubt, have the coasts of England been robbed of the formerly abundant supplies of turbot and sole.

The character of the various destructive influences which man brings to bear upon the inhabitants of the water and their effects having thus been briefly noticed, the student of fish culture is confronted by the question, What can be done to neutralize these destructive tendencies? There are evidently three things to do:—(1) to preserve the fish waters, especially those inland, as nearly as it may be possible in their normal condition; (2) to prohibit wasteful or immoderate fishing; and (3) to put into practice the art of fish breeding—(a) to aid in maintaining a natural supply, (b) to repair the effects of past improvidences, and (c) to increase the supply beyond its natural limits rapidly enough to meet the necessities of a constantly increasing population.

The preservation of normal conditions in inland waters is comparatively simple. A reasonable system of forestry and water-purification is all that is required; and this is needed not only by the fish in the streams but by the people living on the banks. It has been shown that a river which is too foul for fish to live in is not fit to flow near the habitations of man. Obstructions, such as dams, may, in most instances, be overcome by fish ladders. The salmon has profited much by those devices in Europe, and the immense dams in American rivers have been made passable even for shad and alewives by the new system of fishway construction devised by Colonel McDonald, and now being applied on the Savannah, James, and Potomac, and other large rivers.

The protection of fish by law is what legislators have been trying to effect for many centuries, and the success of their efforts must be admitted to have been very slight indeed. Great Britain has at present two schools of fishery-economists—the one headed by Professor Huxley, opposed to legislation, save for preservation of fish in inland waters; the other, of which Dr. Francis Day is the chief leader advocating a strenuous legal regula-

tion of sea fisheries also. Continental Europe is by tradition and belief committed to the last-named policy. In the United States, on the contrary, public opinion is generally antagonistic to fishery legislation; and Professor Baird, the commissioner of fisheries, after carrying on for many years, with the aid of a large staff of scientific specialists, investigations upon this very question, never became satisfied that laws are necessary for the perpetuation of the sea fisheries, nor has he ever recommended to congress the enactment of any kind of fishery laws.

The salmon rivers of the Pacific slope of the United States, the shad rivers of the east, and the whitefish fisheries of the lakes are now so thoroughly under control of the fish-culturist that no one will contradict the proposition that it is cheaper to make fish plentiful by culture than to protect those already existing.

Fish-culture in a restricted sense must sooner or later be resorted to in all densely populated countries, for, with the utmost protection, nature unaided can do but little to meet the natural demand for fish to eat. Pond-culture (*Teichwirthschaft*), has been practised for many centuries, and the carp and the gold-fish have become domesticated like poultry and cattle. The culture of carp is an important industry in China and in Germany, though perhaps not more so than it was in England three or four centuries ago; the remains of ancient fish-stews may be seen upon almost every large estate in England, and particularly in the vicinity of old monasteries. Strangely enough, not a single well-conducted carp-pond exists in England to-day to perpetuate the memory of the tens of thousands which were formerly sustained, and the carp, escaping from cultivation, have reverted to a feral state and are of little value. Until improved varieties of carp are introduced from Germany, carp-culture can never be made to succeed in England. Carp-culture is rapidly coming in favor in the United States; a number of young scale carp and leather carp were imported in 1877 for breeding purposes, and the fish commission has since distributed them to at least 30,000 ponds. Two railway cars especially built for the purpose are employed during the autumn months delivering cargoes of carp, often making journeys of over three thousand miles, and special shipments have been made to Mexico and Brazil. The carp is not recommended as a substitute for the salmon, but is especially suited to regions remote from the sea where better-flavored fish cannot be had in a fresh condition.

A kind of pond-culture appears to have been practised by the ancient Egyptians, though in that country as in ancient Greece and Rome, the practice seems to have been similar to that now employed in the lagoons of the Adriatic and of Greece, and to have consisted in driving the young fish of the sea into artificial inclosures or vivaria, where they were kept until they were large enough to be used.

The discovery of the art of artificially fecundating the ova of fish must apparently be accredited to Stephen Ludwig Jacobi of Hohenhausen in Westphalia, who, as early as 1748, carried on successful experiments in breeding salmon and trout. The importance of this discovery was thoroughly appreciated at the time, and from 1763 to 1800 was a fruitful subject of discussion in England, France, and Germany. George III. of England in 1771 granted to Jacobi a life pension.

Fish-culture in Britain was inaugurated in 1837 by Mr. John Shaw, gamekeeper to the duke of Buccleuch at Drumlanrig, who, in the course of ichthyological investigations, had occasion to fecundate the eggs of salmon and rear the young; and, as regards France, an illiterate fisherman, Joseph Remy, living in the mountains of the Vosges, rediscovered, as it is claimed, or at

any rate successfully practised, in association with Antoine Gehin, the culture of trout in 1842. The originality and practical influence of Remy and Gehin's work appear to have been exaggerated by French writers. On the other hand the establishment in 1850 at Huningue (Hünigen) in Alsace by the French Government of the first fish-breeding station, or "piscifactory," as it was named by Professor Coste, is of great significance, since it marks the beginning of public fish-culture. The art discovered in Germany was practised in Italy as early as 1791 by Baufalini, in France in 1820, in Bohemia in 1824, in Great Britain in 1837, in Switzerland in 1842, in Norway under government patronage in 1850, in Finland in 1852, in the United States in 1853, in Belgium, Holland, and Russia in 1854, in Canada about 1863, in Austria in 1865, in Australasia, by the introduction of English salmon, in 1862, and in Japan in 1877.

The distinction between private and public fish-culture must be carefully observed. The maintenance of ponds for carp, trout, and other domesticated species is an industry to be classed with poultry-raising and bee-keeping, and its interest to the political economist is but slight. The proper function of public fish-culture is the stocking of the public waters with fish in which no individual can claim the right of property. This is being done in the rivers of the United States, with salmon, shad, and alewives, and in the lakes with whitefish. The use of steamships and steam machinery, the construction of refrigerating transportation cars, two of which, with a corps of trained experts, are constantly employed by the United States Fish Commission, moving fish and eggs from Maine to Texas, and from Maryland to California, and the maintenance of permanent hatching stations, seventeen in number, in different parts of the continent, are forms of activity only attainable by government aid. Equally unattainable by private effort would be the enormous experiments in transplanting and acclimatizing fish in new waters—such as the planting of Californian salmon in the rivers of the east, land-locked salmon and smelt in the lakes and rivers of the interior, and shad in California and the Mississippi valley, and the extensive acclimatization of German carp; the two last-named experiments carried out within a period of three years have met with successes beyond doubt, and are of the greatest importance to the country; the others have been more or less successful, though their results are not yet fully realized. It has been demonstrated, however, that the great river fisheries of the United States, which produced in 1880 48,000,000 pounds of alewives, 18,000,000 pounds of shad, 52,000,000 pounds of salmon, besides bass, sturgeon, and smelt, and worth "at first hand" between \$4,000,000 and \$6,000,000, are entirely under the control of the fish-culturist to sustain or to destroy, and are capable of immense extension.

Public fish-culture exists only in the United States and Canada. European fish-culturists have always operated with only small numbers of eggs. The hatchery of Sir James Maitland at Howieton near Stirling, Scotland, may be specially mentioned in this connection, since it is undoubtedly the finest private fish-cultural establishment in the world. It is described in one of the Conference papers of the International Fishery Exhibition.

PISEK, a small town of Bohemia, fifty-five miles to the south of Prague, lies on the right bank of the Wotawa, which is here crossed by an interesting stone bridge of great antiquity.

PISIDIA, in ancient geography, was the name given to a country in the south of Asia Minor, immediately north of Pamphylia, by which it was separated from the Mediterranean, while it was bounded on the north by

Phrygia, on the east by Isauria, Lycaonia, and Cilicia, and on the west and southwest by Lycia and a part of Phrygia. It was a rugged and mountainous district, comprising some of the loftiest portions of the great range of Mount Taurus, together with the offshoots of the same chain toward the central tableland of Phrygia.

PISISTRATUS, citizen and afterward tyrant of Athens, was the son of Hippocrates, through whom he traced his pedigree to Meleus and Nestor, princes of Messene in the Heroic Age. One day, not long after a violent dispute with Megacles in the public assembly, Pisistratus drove into the market-place, himself and his mules bleeding from wounds which he had inflicted with his own hand, but which he pretended to have received from his political enemies. The indignant people decreed a guard for the protection of their champion. Of this guard the champion soon availed himself in order to seize the Acropolis and make himself master of Athens (560). Megacles and the Alcæonidæ fled, but Solon remained and continued to lift his voice against the usurper, who, however, treated the old man with the utmost deference, as a valued friend and counsellor. Solon did not long survive his country's freedom; he died in the next year (559). The government of Pisistratus was marked by great moderation; he maintained the existing laws, to which he exacted obedience from all, and set the example of it himself. Being once accused of murder, he appeared in court like a private citizen to answer the charge, which, however, the accuser did not venture to press. He was twice driven out of Athens, but each time returned and repossessed himself of the tyranny, which he thenceforward held till his death.

The well-known story that Pisistratus was the first to collect and publish the poems of Homer in their present form rests on the authority of late writers (Cicero being the earliest), and seems to be sufficiently disproved by the silence of all earlier authorities (see HOMER).

PISTACHIO NUT, see NUT. The pistachio nut is the species named in Gen. xliii. 11 (Heb. פִּסְטָאִיּוֹת, Ar.

*botm*) as forming part of the present which Joseph's brethren took with them from Canaan, and in Egypt it is still often placed along with sweetmeats and the like in presents of courtesy.

PISTOIA, or PISTOJA, a well-walled ancient city, twenty-one miles northwest of Florence, on a slight eminence near the Ombrone, one of the tributaries of the Arno; it now contains about 12,500 inhabitants.

PITCAIRN, or PITCAIRN'S ISLAND, an island of the eastern Pacific, in 25° 4' N. latitude and 130° 8' W. longitude, may be considered as a member or appendage of the Paumotu, Tuamotu, Low or Dangerous Archipelago, but is nearly 100 miles south of Oeno. It is not more than three miles long from east to west and about two miles broad. The island was settled by mutineers from the ship *Bounty*—some of their descendants yet living on the island.

PITCAIRNE, ARCHIBALD, a distinguished Scottish physician, born at Edinburgh in 1652, and died in 1713.

PITCH. See TAR.

PITCHER PLANTS. See INSECTIVOROUS PLANTS.

PITHOM, a city of Egypt, mentioned in Exod. i. 11, along with RAMESES, (*q.v.*)

PITHOU, PIERRE, lawyer and scholar, was born at Troyes, France, on November 1, 1539, and died in 1596.

PITT, WILLIAM, FIRST EARL OF CHATHAM. See CHATHAM.

PITT, WILLIAM, the second son of William Pitt, earl of Chatham, and of Lady Hester Grenville, daughter of Hester, Countess Temple, was born on May 28, 1759. He inherited a name which, at the

time of his birth, was the most illustrious in the civilized world. The child's genius and ambition displayed themselves with a rare and almost unnatural precocity. At seven the interest which he took in grave subjects, the ardor with which he pursued his studies, and the sense and vivacity of his remarks on books and on events amazed his parents and instructors. Before the lad had completed his fifteenth year his knowledge both of ancient languages and of mathematics was such as very few men of eighteen then carried up to college. He was therefore sent toward the close of the year 1773, to Pembroke Hall, in the university of Cambridge. At seventeen he was admitted, after the bad fashion of those times, by right of birth, without any examination, to the degree of master of arts.

One of the young man's visits to the House of Lords was a sad and memorable era in his life. He had not quite completed his nineteenth year when, on April 7, 1778, he attended his father to Westminster. A great debate was expected. It was known that France had recognized the independence of the United States. The duke of Richmond was about to declare his opinion that all thought of subjugating those States ought to be relinquished. Chatham had always maintained that the resistance of the colonies to the mother country was justifiable. But he conceived, very erroneously, that on the day on which their independence should be acknowledged the greatness of England would be at an end. Though sinking under the weight of years and infirmities, he determined, in spite of the entreaties of his family, to be in his place. His son supported him to a seat. The excitement and exertion were too much for the old man. In the very act of addressing the peers, he fell back in convulsions.

His eldest son, now earl of Chatham, had means sufficient, and barely sufficient, to support the dignity of the peerage. The other members of the family were poorly provided for. William had little more than \$1,500 a year. It was necessary for him to follow a profession. In the spring of 1780 he came of age. He then quitted Cambridge, was called to the bar, took chambers in Lincoln's Inn, and joined the western circuit. In the autumn of that year a general election took place; and he offered himself as a candidate for the university; but he was at the bottom of the poll. He was, however, at the request of an hereditary friend, the duke of Rutland, brought into parliament by Sir James Lowther for the borough of Appleby.

On February 26, 1781, he made his first speech in favor of Burke's plan of economical reform. Fox stood up at the same moment, but instantly gave way. The readiness and fluency of the youth created a great impression, and called forth the plaudits of both Fox and Burke. On two subsequent occasions during that session Pitt addressed the House, and on both fully sustained the reputation which he had acquired on his first appearance. In the summer, after the prorogation, he again went the western circuit, held several briefs, and acquitted himself in such a manner that he was highly complimented by Buller from the bench, and by Dunning at the bar.

To Pitt was offered, through Shelburne, the vice-treasurership of Ireland, one of the easiest and most highly paid places in the gift of the crown; but the offer was without hesitation declined. The young statesman had resolved to accept no post which did not entitle him to a seat in the cabinet; and a few days later he announced that resolution in the House of Commons. In 1782 Lord Rockingham died and the ministry went to pieces, Fox and Burke resigning. In the new cabinet, Pitt, then only twenty-three years of age, became chancellor of the exchequer. In January, 1783, the pre-

liminary treaty of peace with the new government of the United States was presented, and the Shelburne ministry were beaten and resigned; Pitt going into opposition with his party. After an interregnum of several weeks the famous "coalition" ministry was formed. The duke of Portland was its nominal head; Fox and North secretaries of state with power ostensibly equal, but Fox was the real Prime Minister, although not such in name.

Pitt now turned his attention to the great question of parliamentary reform, in the advocacy of which he seems to have been in earnest, but his proposal for an increase of county and metropolitan members and the disfranchisement of rotten boroughs was half a century too early for the legislature. In November of 1783, the coalition proposed a measure for the government of India, which contemplated the abolition of the East India Company and the transfer of all power to seven commissioners to be named by parliament and not to be removable by the crown. This bill was rejected by the peers at the instance of the king; Fox and North resigned, and Pitt, at the age of twenty-five, became first lord of the treasury and chancellor of the exchequer. At the general election which followed in March, 1784, the supporters of the coalition were routed, horse, foot, and dragoons, and Pitt, returned at the head of the poll for the university of Cambridge, found himself with a solid parliamentary backing which was to support him in office for seventeen long years. He was the favorite at once of the king, the parliament, and the people, and wielded a power greater than that ever held in England by a subject.

The eight years which followed the general election of 1784 were tranquil and prosperous as any in the history of England. Trade increased and manufactures flourished, there was contentment at home and peace abroad. The taxes resulting from the great war debt were heavy, but the people were content to believe that in some mysterious way Pitt's sinking-fund scheme would pay the debt without calling upon the taxpayer for any additional subscriptions. France and Spain were compelled to peace, and even Ireland ceased to disturb the equanimity of the British. But in 1788 King George developed actively his latent mental defect, and the proposition was made by the Whigs that his son should assume the regency with full powers. This Pitt opposed to the utmost, and succeeded in carrying his bill for a limitation of the power of the Regent. However, the king temporarily recovered. At this point, according to Macaulay, Pitt was at the zenith of his power. Not yet thirty years of age, he ruled England by the strength of an overwhelming parliamentary majority, backed by the sentiment of practically the entire people. During the period which elapsed from this date to the stirring times of the 1792 Revolution in France, Pitt did his best work. He made another essay at parliamentary reform, and in connection with Fox he succeeded in passing a law securing to some extent the liberties of the press against arbitrary prosecutions. In 1789 occurred the fall of the Bastille, and this event had a great effect upon the English people. At first the reforms in France were welcomed, but as they became more threatening of vested interests, the Tories, and Pitt with them, grew to be intolerant opponents of what they styled Jacobinism. The reaction against license abroad degenerated into a proscription of liberty at home, and Pitt went with the majority. He may have striven at first to stem the current of intolerance, but he yielded to it at last, and after 1793 he became the leader and director of the retrograde party. He plunged into the war with France, which was to grow into a war against Europe,

and he showed himself absolutely incompetent to manage the army or to save it from continuous defeats. Macaulay says: "The English army under Pitt was the laughing-stock of Europe. The English navy no mismanagement could ruin."

Meantime, in spite of the scores of successive defeats in battle and the enormous drain which the war caused upon the resources of the country, Pitt retained his ascendancy over the House of Commons. There was no want of vigor in his domestic policy, however weak and incapable he might show himself in dealing with the affairs of Europe. Obsolete statutes against sedition were revived, press prosecutions multiplied, and it was only because juries refused to be brow-beaten by Tory judges that men who advocated peaceable reforms escaped the dread penalties which follow a conviction for high treason. In 1798 came the rebellion in Ireland, suppressed with merciless severity. Pitt followed up his military operations against the rebels in the field by his corrupt scheme for the union between England and Ireland, and the extinction of the Irish parliament. By bribery of the most flagrant kind the sworn guardians of Irish liberty were induced to sign away the last vestiges of freedom, and to Pitt belongs all the odium which should attach to the manipulator of this villainous scheme.

It is claimed by his apologists that he intended to accompany the Act of Union by a bill for removing the political disabilities of Roman Catholics, and it is true that he resigned the premiership when the King refused to consent to the bill. Thus after seventeen years of unshackled power Pitt went into retirement, leaving the nation bankrupt in the midst of a war which threatened its very existence.

The new ministry had at its head Henry Addington, a weak man who surrounded himself with mediocrities. He made peace with France, and he abandoned Pitt's repressive domestic policy. Pitt sulked in retirement for many months, but when Napoleon again declared war the "great commoner" was once more called to assume direction of affairs. His second administration was of brief duration and full of disaster. The French were victorious at all points on land, and the Austrian defeat and surrender at Ulm broke Pitt's heart. Four days later the situation was temporarily redeemed by the tremendous naval victory of Trafalgar, but this was offset by the Napoleonic triumph at Austerlitz, followed in December, 1805, by the dissolution of the European coalition. As the new year opened it was evident that Pitt's days were numbered, and on January 23, 1806, he died. The day of his death was the twenty-fifth anniversary of his entry into parliament. He was in his forty-seventh year, and for nineteen years he had ruled England. He was given a public funeral in Westminster Abbey, and the House of Commons voted £40,000 to pay his debts.

Even the fact that although he had for many years enjoyed an income of \$50,000 a year, with an official residence and other advantages, yet had lived and died hopelessly bankrupt, was held to be to his honor. He never married, nor had he any entangling female alliances, had no election bills to pay, and was never known to bestow a penny in charity. But engrossed in his grand task of "managing" the House of Commons, and retaining himself in power, he permitted his servants to rob him in the most scandalous manner. He enjoyed, as a great poet said, the distinction of ruining Great Britain *gratis*, and while his character for honesty was beyond reproach, it yet seems strange that his bigoted adherents should attribute his very carelessness to him as an additional virtue.

Pitt was undoubtedly the greatest Englishman of his

time—the most prominent figure in English history from Cromwell to Gladstone. A Whig by birth, education and instinct, imbued even with liberal notions, as in the case of electoral reform and in the matter of freeing the Roman Catholics from their political disabilities, he yet persecuted pamphleteers who dared to advocate reform measures milder than his own, and became the administrator and obedient servant of a king whose blind and bigoted Toryism amounted to fatuity. He is spoken of as a great financier, probably because he added hundreds of millions sterling to the national debt, and as a successful statesman, it must be supposed, because he held office half his life. Yet he was a man of great talents and honest intentions, eminently qualified for the part of a parliamentary leader. But he was dwarfed by his education; he knew everything of books and nothing of men, and when called upon to face the greatest crisis of modern times he proved himself weak, irresolute, and unable to grasp the situation. We have said that under Pitt the battle record of England shows only one long series of disasters, redeemed solely by Nelson's naval victory, and it was not until after Pitt had passed from power and from life that the innate stubborn fighting qualities of Wellington's troops redeemed the reputation of England.

Pitt's foreign policy was, it is true, forced upon him by George III. and by the aristocracy in whose hands then lay all political power. To them Napoleon was the embodiment of anarchy and plunder; the restoration of the Bourbons to France and the maintenance of the balance of power in Europe the one political end worth striving for. This compelled Pitt to form his coalitions with the despotic Austrian, the barbarous Russian, and the other already condemned reminiscences of feudalism who at that time disgraced the thrones of Europe. At another time and under different auspices the gigantic powers of this phenomenal man might have been utilized to the good not only of England but of the world. As it was he wasted his vast strength in the attempt to bolster up a rotten system and died a broken and unsuccessful man.

PITTA, in Ornithology, from the Teluga *Pitta*, meaning a small bird, Latinized by Vieillot in 1816 (*Analyse*, p. 42) as the name of a genus, and since adopted by English ornithologists as the general name for a group of birds, called by the French *Brèves*, and remarkable for their great beauty. They were sometimes spoken of by English writers as "water thrushes" and "ant thrushes," although there was no evidence of their possession of aquatic habits, or of any special fondness on their part for ants as an article of diet. There are more than fifty species of Pittas in China, India and Australia, and they are abundant in the islands of the Malayan archipelago.

PITTACUS of Mytilene in Lesbos, one of the seven sages of Greece, was born in 651 B.C. About 611 B.C. Pittacus, along with the brothers of the poet Alcæus, overthrew Melanchrus, tyrant of Lesbos. In 589 his fellow-citizens intrusted Pittacus with despotic power for the purpose of protecting them against the exiled nobles, at the head of whom were Alcæus and Antimenides. He resigned the government after holding it for ten years, and died ten years later (569 B.C.)

PITTSBURG is a rising city of the United States, being in Pittsburg township, Mitchel county, Kan., and has grown into wealth and prominence within the past ten years. Its resources, manufacturing, mercantile, and in other particulars, are large in number and importance, and the business transacted is steadily augmenting in volume and value. The city contains public buildings, including schools, churches, and those used for banking and society purposes, several hotels, between

ninety and one hundred substantial commercial houses, roller and planing mills, two foundry and machine shops, two cigar factories, one carriage works, one bottling works, one zinc works, one zinc smelter, one agricultural implement works, gas works, and other facilities for rapid and economical production. The population in 1890 in round numbers approximated 8,000.

PITTSBURGH, the second largest city of Pennsylvania, and the leading iron, steel, and glass manufacturing center of the United States, lies at the confluence of the Allegheny and the Monongahela, which unite here to form the Ohio, 250 miles west-by-north of Philadelphia. The business quarter of the city is built on a nearly level triangular plain, between the two rivers, measuring about three-quarters of a mile on each side back to the hills which rise to the east.

The manufacturing establishments stretch for a distance of seven miles up the Allegheny, seven up the Monongahela, and two down the Ohio, and occupy the strip of low ground usually a few hundred feet broad between the river banks and the hills which generally face them. The slope of the hills to the east of the business quarter is closely built with residences and retail stores for the distance of a mile and a half, but the summits, 400 or 500 feet high, are partially unoccupied. Beyond the hills extends a rolling country which, for a space of about five miles long by two wide is occupied by the villas of the citizens. The hills facing the rivers are generally precipitous, and vary in height from 300 to 600 feet, but at different points they recede from the river banks and afford sites for the suburbs of Lawrenceville (on the Allegheny), Hazlewood, and Birmingham (on the north and south banks respectively of the Monongahela), which are within the municipality of Pittsburgh, and (on the north bank of the Allegheny and Ohio) for the city of Allegheny, which with its separate municipal government, is commercially and socially a part of Pittsburgh. The two cities together cover an irregular space of nine miles between the extreme eastern and western points, with a breadth varying from two to four miles.

From the character of its site, Pittsburgh would naturally be very attractive to the eye, but the free use of the bituminous coal, which was for a long time the principal agent in its development, brought upon it the, at one time, well-deserved epithet of the "Smoky City." Up to a very few years ago a sooty pall, evolved from the factories, rolling-mills, and glass-works, hung over the peninsula upon which Pittsburgh stands. From the hills along the Monongahela all that was visible was a pillar of cloud by day, a pillar of fire by night. The introduction of natural gas for use as fuel in the furnaces, factories, business houses, and even private residences has changed all that. To those who knew Pittsburgh a dozen years ago, and who revisit it at this time, the metamorphosis is wonderful. The really fine public buildings—the municipal hall, the new post-office and United States court house (1884), the new county court house, also built in 1884—present a striking appearance, and the eye is no longer offended by the unsightly discolorations which of old time marked the houses of the business district. Pittsburgh communicates with its sister city of Allegheny and its suburbs on the Monongahela river by means of ten public bridges and four railway viaducts, while six inclined-plane railways afford access to the summits of the hills, Mount Washington, Mount Oliver, and others. Seen from these hills Pittsburgh presents by night or day a most unique and picturesque appearance. The three rivers with their flotilla of steamers and the marked characteristics of the buildings unite to form a panorama of much beauty.

Pittsburgh is of historical interest from the struggle (1755-1758) for its possession between England and France in the Seven Years' War, and the fact that the public and military career of George Washington was commenced with those campaigns (see WASHINGTON). With the termination of that struggle in the capture of the ruins of Fort Duquesne by the British, the history of the place becomes that of an ordinary frontier town. A new fort was erected and named Fort Pitt in honor of the prime minister whose energy had urged the war forward to its capture, and wrested the Ohio valley and Canada from French control. After one or two Indian wars, in which the post was threatened, and on one occasion nearly taken, Fort Pitt lost its military character and became a trading town. The first streets were laid near the fort in 1764, and in 1769 the first survey of the unsettled lands in the vicinity was made for the proprietors, the heirs of William Penn, under the name of the manor of Pittsburgh. After the termination of the revolution, the legislature of Pennsylvania incorporated Pittsburgh as a village on April 22, 1794, and on March 18, 1816, its charter as a city was granted. During the colonial period a dispute arose between Virginia and Pennsylvania as to the possession of the territory surrounding the town, and in the first few years of its history under the United States it attracted attention from its proximity to the famous "Whisky Insurrection" of Western Pennsylvania. After it had attained a population of 30,000, it was visited on April 10, 1845, by a disastrous conflagration, in which the buildings in the business center, covering a space of fifty-six acres, and valued at \$5,000,000, were consumed.

In the Pittsburgh of to-day there is little besides names of streets, hills, and suburbs to recall the struggle which decided the Anglo-Saxon character of the country. The locality known as the Point, where Fort Duquesne stood, is covered with thickly built factories and dingy tenements. In a squalid and obscure court a portion of the wall of a blockhouse erected in 1763 by Colonel Boquet, one of the British commanders of Fort Pitt, still forms a part of a building, and on the wall of the staircase of Municipal Hall is a stone bearing the inscription with which that officer commemorated its erection. Immediately across the Monongahela a range of precipitous hills some 500 feet high bears the names of Mount Washington and Duquesne Heights. On the first hill rising to the east of the level part of the city, a red granite court-house, to cost \$2,000,000, is in process of construction near the spot where Major Grant was defeated and slain, and the new building will replace the brown stone structure which for many years fronted on the street bearing that unfortunate officer's name. Twelve miles away, the suburb long known as Braddock's Field and now as Braddock's, attracts attention chiefly by the roar and glare of its great steel manufacturing establishment.

Deriving its early importance in commerce from its position at the head of the Ohio, which was until 1855 the principal route between the middle States and the west and southwest, Pittsburgh has since obtained its greatest growth from the coal which underlies nearly all Western Pennsylvania. This has made the city and its immediate suburbs the most important manufacturing district in America, in both pig and bar iron and in steel, glass, and copper. The blast furnaces and rolling-mills of Pittsburg employ a capital of \$23,910,000 and 21,190 workmen, the steel industry \$10,170,000 and 7,060 workmen. Next in importance is the glass manufacture, in which seventy-five establishments are engaged, twenty-four making table ware, twenty-four window glass, ten green glass bottles, and nine lamp chimneys. The capital invested in them is \$5,985,000. They em-



ploy 6,442 hands, and the value of their last reported annual production is \$6,832,683. The coal and coke industry of the district, which is controlled mainly by Pittsburgh, comprises a capital of \$26,406,500, employs 23,621 miners and other laborers, and makes an annual output of 7,720,000 tons of coal and 2,760,000 tons of coke, valued at \$16,600,000. The total of all the manufacturing industries of the city is 1,380 establishments, with \$105,401,481 of capital, employing 85,936 workmen of all kinds, and producing to the value of \$149,721,619. The wholesale trade of the city is much less important than its manufacturing industries, and with a few exceptions is confined to the immediate vicinity. It includes ninety firms with an aggregate capital of \$11,206,000 and total sales of \$125,390,472. Within the last few years a new and unique industry has been developed. By drilling in the earth to a depth of 1,200 to 2,000 feet, what is practically the fire-damp of the coal mine is tapped in such quantity that it comes to the surface in great force. It has been found to be useful as a fuel for all the purposes of coal except the smelting of ores in blast furnaces; and, as it is cheaper both for making steam and for the heating of the iron and glass furnaces, its adoption has been general among the manufacturers.

As the railway system has developed, the important boating interest of Pittsburgh has become confined to the transportation of coal from the Monongahela river mines to the down-river cities. The coal is only taken out when freshets have raised the river, and at that time fleets of steamers, each towing from eight to fifteen barges, covering acres in extent and carrying thousands of tons of coal, start down stream.

Pittsburgh is stated to be the origin of more railway freight than any other point in the country. There are a large number of lines, under the control of three great companies. The most important is the Pennsylvania Railroad, whose trunk lines pass through the city, and number among their feeders the West Pennsylvania; the Allegheny Valley; the Pittsburgh, Virginia and Charleston; the Pittsburgh, Cincinnati and St. Louis; the Pittsburgh, Fort Wayne and Chicago; and the Cleveland and Pittsburgh railroads. The Pittsburgh division of the Baltimore and Ohio Railroad gives a connection with that trunk line, and by the Pittsburgh and Western, and the Pittsburgh, Cleveland and Toledo reaches the Chicago branch of the same system to the west. The Pittsburgh and Lake Erie affords the New York Central and the New York, Pennsylvania and Ohio lines an access to Pittsburgh, while its extension under the name of the Pittsburgh, MacKeesport and Youghiogheny penetrates the coal and coke district to the southeast.

In 1796, by the first accurate census on record, the population of Pittsburgh was 1,395. By 1810 it had increased to 4,968; by 1820 to 7,248; by 1830 to 12,452; by 1840 to 21,115; by 1850 to 36,601; by 1860 to 49,221; by 1870 to 86,076. In 1874 the consolidation of outlying boroughs made the population, according to the census of 1870, 121,799; and in 1890 this had increased to 238,617. These figures do not include the population of Allegheny. Including the manufacturing and residential suburbs, the total population by the census of 1880 was 274,160; and, with the large extension of manufacturing and building that has gone on since then, it was estimated in 1890 at 400,000.

The municipal governments of Pittsburgh and Allegheny are each composed of a mayor, controller, and treasurer, with city councils in two branches styled respectively select and common. These are elected by the people, and appoint other administrative officials to take charge of the police and fire departments, assessments, and public works.

The school system of each city is governed by a central board of education and ward boards, both elected by popular vote. The Pittsburgh system comprises a fine stone high school overlooking the city, and fifty-two ward schools, the approximate annual expenditure being \$550,000. In the Allegheny system there are the high school and eighteen ward schools, and an annual expenditure of about \$200,000. The principal institutions established by public taxation are the Riverside State Penitentiary, completed in 1884 in the lower part of Allegheny; the Morganza Reform School; the workhouse at Claremont, on the Allegheny river; and the Pittsburgh, Allegheny and County poorhouses.

The churches and chapels in Pittsburgh and Allegheny number 237.

Private charity has established the West Penn. Hospital with a large branch for the treatment of the insane at Dixmont, the Homeopathic Hospital, the Mercy Hospital, the Pittsburgh Infirmary, the Free Dispensary, the North Side Hospital, and St. Francis Hospital; and eighteen asylums for orphans and the aged and infirm are maintained throughout the two cities. The collegiate institutions comprise the Western University, the Western Theological Seminary (Presbyterian), the United Presbyterian Seminary, the Catholic College, the Pennsylvania Female College, and the Pittsburgh Female College.

PITTSFIELD, a borough and township of the United States, the shire town of Berkshire county, Mass., lies at a height of from 1,000 to 1,200 feet above the sea, on a plain between the Hoosacs on the east, and the Taconics on the west. As the northern terminus of the Housatonic railroad, and a junction on the Boston and Albany, and the Pittsfield and North Adams railroads, it is an important center of traffic. Most of the dwelling houses are built of wood. Among the public edifices are a court-house, in white marble; the Berkshire Athenæum, with a free library and reading-room; the Roman Catholic church of St. Joseph, in marble; the Methodist church, a spacious edifice in brick, the First Congregational church (rebuilt in 1853), for thirty years under the charge of Rev. John Todd, author of the *Student's Manual*; and the Maplewood Institute for young ladies. There is a small park with a fine soldiers' monument (1872) in the heart of the town, as well as a larger park with a race-course in the eastern suburb. Cotton and woolen goods, silk, knit goods, shoes, and tacks are among the local manufactures. The population in 1860 was 8,045; in 1870, 11,132; in 1880, 13,364; in 1890, 17,281.

PITTSSTON, a borough of Luzerne county, Pa., on the east bank of the Susquehanna, just below the confluence of the Lackawanna, 105 miles northwest of Philadelphia. It is the center of the Wyoming anthracite region, and the seat of the Pennsylvania Coal Company's operations, contains knitting mills, planing mills, terra cotta works, a stove factory, lumber yards, etc., and commands four distinct railway lines. The population was 6,760 in 1876, and 7,472 in 1880; 1890, 10,302. If West Pittston (a borough on the other side of the Susquehanna, with which Pittston communicates by two bridges) were included the total would be 15,000.

PIUS I. Hardly anything is known with certainty respecting Pius I., except that he was bishop of Rome from 158 to 167 A.D. He is said to have been born at Aquileia, and to have been the son of a certain Rufinus; it is added that he suffered martyrdom, but, although he is celebrated as a martyr in the breviary, there seems no other evidence for this assertion. A few letters extant under his name are spurious.

PIUS II. (Enea Silvio Piccolomini, commonly known

in literature as Æneas Sylvius), pope from 1458 to 1464, "whose character reflects almost every tendency of the age in which he lived," was born at Corsignano, in the Sienese territory, October 18, 1405. He died August 14, 1464, in his death as in his life a figure picturesque and significant far beyond the wont of Roman pontiffs. He was succeeded by Paul II.

PIUS III. (Francesco Todeschini), pope from September 22 to October 18, 1503, was born at Siena, May 9, 1439. He at once, on his accession to the papal see, took in hand the reform of the papal court, and arrested Cæsar Borgia; but after a brief pontificate of twenty-six days he died (October 18, 1503) of an ulcer in the leg, or, as some have alleged, of poison administered at the instigation of Pandolfo Petrucci, governor of Siena. He was succeeded by Julius II.

PIUS IV. (Giovanni Angelo Medici), pope from 1559 to 1565, was born of humble parentage at Milan, March 31, 1499. One of his strongest passions appears to have been that of building, which somewhat strained his resources in contributing to the adornment of Rome, and in carrying on the work of restoration, erection, and fortification in various parts of the ecclesiastical states. A conspiracy against him, headed by the Catholic fanatic Benedetto Accolti, was discovered and crushed in 1565. He died shortly afterward, on December 9th of that year, and was succeeded by Pius V.

PIUS V. (Michele Ghislieri), pope from 1566 to 1572, was born at Bosco in the duchy of Milan. January 17, 1504.

PIUS VI. (Giovanni Angelo Braschi), pope from 1775 to 1799, was born at Cesena, December 27, 1717. The circumstances of his election involved him in difficulties from the outset of his pontificate. General Berthier marched to Rome, entered it unopposed on February 10, 1798, and, proclaiming it a republic, demanded of the pope the renunciation of his temporal authority. Upon his refusal he was taken prisoner, and on February 20th was escorted from the Vatican to Siena, and thence from place to place—in succession to Florence, Parma, Piacenza, Turin, Grenoble, and Valence, where he died six weeks later, on the night of August 28, 1799. Pius VII. succeeded him.

PIUS VII. (Gregorio Luigi Barnaba Chiaramonti), pope from 1800 to 1823, was born at Cesena on August 14, 1742. At the death of Pius VI. the conclave met at Venice on December 1, 1799, with the result that Chiaramonti was declared his successor on March 14, 1800, and crowned on the 21st of that month. Encouraged by the intimation through Cardinal Martiniana of Napoleon's desire for the reestablishment of the Catholic religion in France, Pius appointed Caselli and Archbishop Spina to arrange a concordat with three nominees of Napoleon—Joseph Bonaparte, Cretet, and the Vendean priest Bernier. Difficulties having arisen, the aid of Consalvi was called in, and the concordat, signed at Paris on July 15th, was ratified by Pius on August 14, 1801. Its value, however, from the pontifical point of view was considerably lessened by the "Articles Organiques" appended to it by the French Government on April 8, 1802. In 1804 Napoleon opened negotiations to secure at the pope's hands his formal consecration as emperor. After some hesitation Pius was induced to perform the ceremony at Notre Dame and to extend his visit to Paris for four months. He returned to Rome on May 16, 1805, with many expressions of good will; but in the October following the French troops, in evacuating the kingdom of Naples, suddenly occupied Ancona upon the alleged necessity of protecting the Holy See. Resistance by force was out of the question, but to a requisition from

the emperor that all Sardinians, English, Russians, and Swedes should be expelled from the pontifical states, and that vessels of all nations at war with France should be excluded from his ports, Pius replied by asserting the independence and neutrality of his realm. After negotiations had dragged on for two years, in the course of which the French occupied the chief Adriatic ports, Civita Vecchia was seized and the papal troops placed under French officers. On February 2, 1808, Rome itself was occupied by General Miollis; a month later the provinces of Ancona, Macerata, Fermo, and Urbino were united to the kingdom of Italy, and diplomatic relations between Napoleon and Rome were broken off; finally, by a decree issued from Vienna on May 17, 1809, the emperor declared the papal states reunited to France by resumption of the grant of Charlemagne. Pius retaliated by a bull, drawn up by Fontana and dated June 10, 1809, excommunicating the invaders; and, to prevent insurrection, Miollis—either on his own responsibility, as Napoleon afterward asserted, or by order of the latter—employed General Radet to take possession of the pope's person. The palace on the Quirinal was broken open during the night of July 5th, and, on the persistent refusal of Pius to renounce his temporal authority, he was carried off, first to Grenoble, thence after an interval to Savona, and in June, 1812, to Fontainebleau. There he was induced, on January 25, 1813, to sign a new concordat, which was published as an imperial decree on February 12th. In conference with the cardinals, however, Pius withdrew his concessions and proposed a concordat upon a new basis. At first no attention was paid to this, and, when after the French armies were driven from Germany Napoleon endeavored to purchase a new concordat by offering to restore the papal possessions south of the Apennines, Pius refused to treat with him from any place other than Rome. The order for his departure thither reached him on January 22, 1814, and after a brief delay at Cesena he entered Rome on May 24, 1814. With his states restored to him by the congress of Vienna and freed from the Napoleonic terror, he devoted the remainder of his life to social and ecclesiastic reform in accordance with the modern spirit. His thigh having been broken by a fall in July, 1823, acute inflammation supervened, and he died on August 20th in that year. His successor was Leo XII.

PIUS VIII. (Francesco Xaviero Castiglioni), pope in 1829–30, was born at Cingoli November 20, 1761. His death took place at Rome on November 30, 1830. He was succeeded by Gregory XVI.

PIUS IX. (Giovanni Maria Mastai Ferretti), pope from 1846 to 1878, was born May 13, 1792, at Sinigaglia, near Ancona, the fourth son of Count Jerome and the Countess Catherine Vollazi of the same place.

On the death of Gregory XVI., he repaired to Rome, and on the evening of June 16, 1846, was elected to the papal chair as Pius IX., having chosen this name out of respect for his predecessor in the see of Imola, Pius VII. His election, at the final scrutiny, proved to be unanimous, the cardinals Patrizzi and De Angelis throwing all their influence in his favor. On the following morning, when it was too late, the Austrian ambassador received instructions from his government to veto the new pope's election.

Pius' first act in his new capacity was to proclaim a general amnesty for political offenses, whereby thousands of unhappy beings who had dragged out weary years in prison or in exile, ignorant, many of them, even of the offenses with which they were charged, were restored to society. With genuine catholicity of feeling he visited and relieved even the poor Jewish population in the city. He authorized the construction

of railways, organized a civil guard, and considerably modified the restrictions on the press. In order to develop further reforms he instituted a commission largely composed of laymen; and in 1847 he brought forward his scheme of a *Consulta*, or council of state, designed to assist him in the general temporal government. But, notwithstanding these concessions, the supreme power remained in the hands of ecclesiastics, and no measure passed by the council could acquire validity until it had been examined and approved in a conclave of cardinals. Hence, although both MAZZINI (*q.v.*) and Garibaldi were among his avowed supporters, the liberal party were still far from satisfied. His policy was regarded, on the one hand, with extreme dissatisfaction by Austria, and on July 17, 1847, that power sent a force of 1,500 men into Ferrara, where she was entitled by the treaty of 1815 to maintain a garrison. To this direct menace Pius replied by counter demonstrations and an indignant protest, but hostilities were ultimately averted. His policy was viewed with not less dislike at the court of Naples, but by the rest of Italy and throughout Europe he was at this time regarded as the champion of the national rights of his countrymen. Such was the posture of affairs when the revolution in Paris (February, 1848), fanned into flames the already smoldering elements of insurrection throughout Europe. The Austrians were driven out of Milan; a republic was proclaimed in Venice (see ITALY); and a "free Italy" became the general cry. At first Pius, who felt but little sympathy with the views represented by the son of Philippe Égalité, seemed disposed to head the movement.

A new ministry was formed, which, with two exceptions (Antonelli and Morichini), was composed of laymen. But at this juncture Pius began to waver. Although he had hitherto shown no sympathy with the Jesuits, he endeavored to protect them against the measures now brought forward with a view to their expulsion, and when his general, Durando, crossed the Po without his orders, and denounced the Austrians as "the enemies of the cross of Christ," he disowned, in an allocution (April 29th), all intention of participating in an offensive war for the purpose of rectifying the boundaries of Italy, and at the same time disavowed all complicity in the schemes then in agitation for creating an Italian federal republic, with himself as a nominal head. This apparent desertion of the national cause, at a time when the public mind had been roused to the highest pitch of excitement by the course of events at other centers, created an irreparable breach between Pius and the people. His new chief minister, Mamiani, who wished to see him a constitutional monarch, advocated further concessions—the handing over of the political government to the new assemblies and a responsible ministry. But after the Austrian successes in the north and Radetsky's entry into Milan (August 5th), Mamiani was dismissed, and his place was filled by Count Rossi, the French ambassador, a statesman of signal ability and intrepid character, but of conservative views. On November 15, 1848, as Rossi was alighting at the steps of the house of assembly, he was assassinated in broad daylight. It was an ominous symptom of the prevailing temper of the capital that this atrocious act elicited no expression of disapproval in the assembly, and drew forth no marks of sympathy with the victim's family. Two days later a numerous mob, largely composed of disbanded soldiers, assembled in the square of the Quirinal, and proffered fresh demands, at the same time intimating their intention, if these were not conceded, of commencing a general massacre of the inmates, excepting only the pope himself. After his secretary, Palma, had

been shot by an assassin, Pius, in order to avert further bloodshed, made the requisite concessions, and assented to the formation of a new ministry, while he himself was made a virtual prisoner. On November 24th he effected his escape, with the connivance of the French Government, to Gaeta, disguised as a dependant of Count Spaur, the Bavarian minister. Thus terminated what has been described as "the first and only attempt of a pope to govern in a liberal spirit."

The decisive defeat of the Sardinian forces at Novara by Radetsky (March 23, 1849), encouraged the papal party now to demand that Pius should be reinstated at Rome without any conditions being attached to his restoration. This demand created a divergence of opinion among the chief Catholic powers; eventually General Oudinot landed at Civita Vecchia with 10,000 French soldiers, and De Tocqueville, the French minister for foreign affairs, sought to induce Pius to resume his sovereignty on the basis of the *Statuto Fondamentale*. This he resolutely refused to do, and after the occupation of Rome by Oudinot's forces he was permitted to return (April 12, 1850), unfettered by any condition whatever.

Pius returned an altered man in relation to his state policy, in which, in fact, he was from this time guided almost entirely by Antonelli.

From the reduction of Ancona (1860), to the year 1870 Pius was maintained in Rome only by a French garrison. The emperor of the French was reluctant to appear altogether to desert the papal cause, while Cavour was unwilling, in like manner, to proceed to extremities. After the capture of Garibaldi at Aspromonte, however, Victor Emmanuel felt himself strong enough to put in a formal claim for Rome; and it was eventually arranged, by the convention on September 15, 1864, that the French should withdraw from the city before the end of 1866. This stipulation was duly observed, and on December 11, 1866, the last of the French forces quitted the capital. The engagement was, however, virtually violated by the entry, in the following year, of the Antibes legion, and for some time longer the French soldiery continued to ward off both the daring assaults of Garibaldi and the more insidious approaches of Ratazzi. In this manner, at the outbreak of the war of 1870, France had come again to be looked upon as the ally of the papacy; and the overweening claims put forward by Pius in convening a general council to proclaim the dogma of Papal Infallibility were generally interpreted as in a certain sense correlative with the aggressive designs of France on Protestant Germany. The dogma was decreed in the Vatican on July 18th, but not without strenuous opposition on the part of some of the most distinguished members of the Catholic episcopal order, who, at the same time, were staunch supporters of the temporal power (see OLD CATHOLICS). At nearly the same time the occupation by the French came definitively to an end. Their forces were withdrawn from Civita Vecchia at the outbreak of the war, when the Duc de Gramont announced that his Government relied on the convention of 1864, whereby Italy was bound not to attack the papal territory. That territory, being now, however, again exposed to the dangers of revolution, Victor Emmanuel, on receiving the tidings of the battle of Gravelotte, notified Pius that "the responsibility of maintaining order in the peninsula and the security of the Holy See" had devolved upon himself, and that his army must enter the pontifical dominions. This intimation was received by Pius with demonstrations of the liveliest indignation, but the appearance of the Sardinian troops was hailed by his own subjects with enthusiasm. On arriving outside Rome, General Cadorna summoned

the garrison to surrender, and after a short bombardment the white flag was hoisted. On the following day (September 21, 1870), the Zouaves, some 9,000 in number, after receiving, as they stood massed in the square of St. Peter's, the pontifical blessing, marched out of Rome, and the temporal power of the pope had ceased to exist.

For the rest of his days Pius IX. remained unmo-  
lestated at the Vatican, while the king resided at the Quirinal. The pontiff was virtually a prisoner; and his position, although viewed with comparative indifference in Rome, was regarded with not a little sympathy by the Catholic world at large.

Pius died February 8, 1878, and was succeeded by Cardinal Pecchi as Leo XIII.

PIZARRO, FRANCISCO, discoverer of Peru, and principal hero of its conquest, born at Truxillo in Estremadura, Spain, about the year 1471, was an illegitimate son of Gonzalo Pizarro. Of Pizarro's early years hardly anything is known. Shortly after the news of the discovery of the New World had reached Spain he was in Seville, and thence found his way across the Atlantic; there he is first heard of in 1510. On March 10, 1526, Pizarro, Almagros and Luque made compact to conquer and divide equally among themselves the great Southern empire still undiscovered, and Pizarro and Almagro, with a force of about 160 men, sailed from Panama. The force was too small to effect much at the time, and was at length recalled by the governor, but Pizarro was not to be shaken, and, though he was left for months with but thirteen followers on a small island without ship or stores, persisted in his enterprise till at length he had coasted as far as to about 9° S. latitude and obtained distinct accounts of the Peruvian empire. The governor still showing little disposition to encourage the adventurers, Pizarro resolved to apply to the sovereign in person for help, and with this object sailed from Panama for Spain in the spring of 1528, reaching Seville in early summer. After long and tedious delays, the queen, in Charles' absence, executed at Toledo on July 26, 1529 the famous *capitulation* by which Pizarro was upon certain conditions made governor and captain-general of the province of "New Castile" for the distance of 200 leagues along the newly discovered coast, and invested with all the authority and prerogatives of a viceroy. Sailing from San Lucar clandestinely (for his due complement was not yet made up) in January, 1530, Pizarro was afterward joined by his brother Hernando with the remaining vessels, and when the expedition left Panama in January of the following year it numbered three ships, 180 men, and twenty-seven horses. A footing was established on the mainland at Tumbes, whence Pizarro set out for the interior in May, 1532. San Miguel de Piura was founded a few weeks afterward, and Caxamarca entered on November 15th. The subsequent movements of Pizarro belong to the history of PERU, (*q.v.*) He died in 1541.

PLAGUE (*λοιμός, Pestis, Pestilentia*). This name has been given to any epidemic disease causing a great mortality, and in this sense was used by Galen and the ancient medical writers, but is now confined to a special disease, otherwise called Oriental, Levantine, or Bubonic Plague, which may be shortly defined as a specific febrile disease, transmissible from the sick to healthy persons, accompanied usually by buboes and sometimes by carbuncles. This definition excludes many of the celebrated pestilences recorded in history—such as the plague of Athens, described by Thucydides; that not less celebrated one which occurred in the reign of Marcus Aurelius and spread over nearly the whole of the Roman world (164–180 A.D.), which is referred to, though not fully described, by the contemporary

pen of Galen; and that of the third century (about 253), the symptoms of which are known from the allusions of St. Cyprian (*Sermo de Mortalitate*). There is a certain resemblance among all these, but they were very different from Oriental plague.

*Symptoms.*—There are two chief forms:—(1) mild plague, *pestis minor*, larval plague (Radcliffe), *peste fruste*, in which the special symptoms are accompanied by little fever or general disturbance; and (2) ordinary epidemic or severe plague, *pestis major*, in which the general disturbance is very severe. Cases which are rapidly fatal from the general disturbance without marked local symptoms have been distinguished as fulminant plague (*pestis siderans, peste foudroyante*).

1. In the minor form of the disease spontaneous swellings of the glands occur, chiefly in groins and armpits, but also in neck or other parts, which either undergo resolution or suppurate. There is a certain amount of fever; the temperature is rarely high, but has been known to be 104° Fahr. The duration of the disease is ten to twenty days usually, but may be eight weeks, for most of which time the general health is little impaired and the patient is able to go about as usual. It rarely, if ever, causes death, the only fatal case at Astrakhan in 1877 having been so through a complication.

2. As regards *pestis major*, or severe plague, the early symptoms are sometimes like those of ague (shivers, often long continued, and pains in the limbs), but combined with nervous symptoms. The patient becomes distracted, tosses about in constant fear of something he cannot describe, has a difficulty in understanding the questions put to him, and is slow in answering. He is often described as staggering like a drunken man. There is severe headache, intense thirst, and severe pain in the epigastrium. The eyes are red and turbid; the tongue swollen, dry and fissured, sometimes black, sometimes remarkably white (Colvill). This condition may pass into coma even before fever sets in. In other cases bilious vomiting is the earliest symptom. The fever which sets in may last twenty-four to thirty hours, or more. The temperature may be 100° to 107° Fahr., or even higher; but in the most rapidly fatal cases there may be little or no fever. Generally there is obstinate constipation, but sometimes diarrhoea. Besides these symptoms there are certain special ones especially characteristic of plague.

(a) Buboes or glandular swellings are observed in all except very rapidly fatal cases. They occur in 45 or 50 per cent. of the cases in the groin, in 35 per cent. in the axilla, also less frequently in the neck or other parts. These swellings may occur before the fever, simultaneously with it, or some hours after it has set in. A sudden pain like that of a stab is felt in some region of the body, which has given rise to the superstition that the unfortunate victim was wounded by the arrow of an invisible demon—a belief recorded in Constantinople in the sixth century, and said still to survive in Mohammedan countries. The buboes may suppurate, and free discharge of matter from them has in all times been held to be a favorable sign and conducive to recovery.

(b) Carbuncles were observed in about 2½ or 3 per cent. of the cases in recent epidemics in Irak. They are always an unfavorable sign.

(c) Petechiæ or hemorrhagic spots on the skin have always been regarded as signs of the worst omen. Under the name of "tokens" they were considered in the English epidemics of the sixteenth century as the infallible signs of approaching death. "They appear generally only a few hours before death" (Colvill). Hodges (1665) noticed hardness which showed the existence of hemorrhage under the skin. The skin is

sometimes so covered with petechiæ as to become of a dark livid hue after death, recalling the name Black Death (Cabiadis).

*Incubation.*—It is a very important question what time may elapse between a person receiving the poison and showing symptoms of the disease. The usual time of incubation appears to be from three to five days. In certain very malignant epidemics this period may be shortened, and, it is thought, reduced to even less than a day. In rare cases incubation may be prolonged to eight days. There are doubtful accounts of ten days' incubation. Generally a week's observation would show whether a suspected person was really affected or no. It has been thought that articles contaminated by contact with plague patients may retain the power of communicating the disease for weeks, months, or even years; but of this there is no adequate proof.

*Treatment.*—No special line of treatment has proved efficacious in checking the disease once established. Special symptoms are treated in accordance with the ordinary rules of practice, and need not here be considered. Free ventilation appears to be of the greatest service in preventing the spread of the disease, and probably in promoting recovery.

*Prevention.*—There can be no doubt whatever of the efficacy of hygienic measures in rendering a locality unsuitable for the spread of plague. Such measures include, not only personal cleanliness, but especially the removal of all foul organic matters, good drainage, and prevention of overcrowding; all such measures might be looked upon by our readers generally as matters of course, but are quite unknown in most of the homes of plague. Since there is no doubt that plague may be carried from places where it prevails epidemically, measures to prevent such importation cannot be neglected. The best known of such measures is the system of quarantine first produced about 1480. The efficiency of quarantine has been much discussed, and very strong opinions have been expressed for and against it. The subject is too large for discussion here; but it would appear that, while the system as originally applied in the Mediterranean, when traffic was comparatively slow and infrequent, and when European cities presented an extremely favorable soil for plague if introduced, was a real protection, the regulations have long ceased to correspond to the actual state of medical knowledge; and, in addition, it would be impossible to apply them to our crowded traffic. The alternative is a system of medical inspection of all arrivals in our ports, and strict isolation of ships in which plague has occurred or is suspected. Such a ship should then be treated as an infected house.

*History of the Plague.*—The first historical notice of the plague is contained in a fragment of the physician Rufus of Ephesus, who lived in the time of Trajan, preserved in the *Collections of Oribasius*.

It is not till the sixth century of our era, in the reign of Justinian, that we find bubonic plague in Europe, as a part of the great cycle of pestilence, accompanied by extraordinary natural phenomena, which lasted fifty years.

It is impossible to pass over the great cycle of epidemics in the fourteenth century known as the Black Death. Whether in all the pestilences known by this name the disease was really the same may admit of doubt, but it is clear that in some at least it was the bubonic plague.

In the fifteenth century the plague recurred frequently in nearly all parts of Europe. In the first quarter it was very destructive in Italy, in Spain (especially Barcelona and Seville), in Germany, and in England, where London was severely visited in 1400 and 1406, and again in 1428.

The sixteenth century was not more free from plague than the fifteenth. Simultaneously with a terrible pestilence which is reported to have nearly depopulated China, plague prevailed over Germany, Holland, Italy, and Spain in the first decade of the century, and revived at various times in the first half. In 1529 there was plague in Edinburgh; in London in 1537-39, and again in 1547-48; and also in the north of England, though probably not absent before.

The epidemic of 1563-64 in London and England was very severe, a thousand dying weekly in London. In Paris about this time plague was an everyday occurrence, of which some were less afraid than of a headache (Borgarucci). In 1570, 200,000 persons died in Moscow and the neighborhood, in 1572, 50,000 at Lyons; in 1568 and 1574 plague was at Edinburgh, and in 1570 at Newcastle.

In the first half of the seventeenth century plague was still prevalent in Europe, though considerably less so than in the Middle Ages. In the second half a still greater decline is observable, and by the third quarter the disease had disappeared or was disappearing from a great part of western Europe.

In 1656 one of the most destructive of all recorded epidemics in Europe raged in Naples; it is said to have carried off 300,000 persons in the space of five months. It passed to Rome, but there was much less fatal, making 14,000 victims only—a result attributed by some to the precautions and sanitary measures introduced by Cardinal Gastaldi.

*The Great Plague of London.*—The preceding enumeration will have prepared the reader to view the great plague of 1664-65 in its true relation to others, and not as an isolated phenomenon. The preceding years had been unusually free from plague, and it was not mentioned in the bills of mortality till, in the autumn of 1664 (November 2d), a few isolated cases were observed in the parishes of St. Giles and St. Martin's, Westminster, and a few occurred in the following winter, which was very severe. About May, 1665, the disease again became noticeable, and spread, but somewhat slowly. Boghurst, a contemporary doctor, notices that it crept down Holborn and took six months to travel from the western suburbs (St. Giles) to the eastern (Stepney) through the city. The mortality rapidly rose from 43 in May to 590 in June, 6,137 in July, 17,036 in August, 31,159 in September, after which it began to decline. The total number of deaths from plague in that year, according to the bills of mortality, was 68,596, in a population estimated at 460,000, out of whom two-thirds are supposed to have fled to escape the contagion. This number is likely to be rather too low than too high, since of the 6,432 deaths from spotted fever many were probably really from plague, though not declared so to avoid painful restrictions. In December there was a sudden fall in the mortality which continued through the winter; but in 1666 nearly 2,000 deaths from plague are recorded.

After 1666 there was no epidemic of plague in London or any part of England, though sporadic cases appear in bills of mortality up to 1679; and a column filled up with "o" was left till 1703, when it finally disappeared.

The last outbreak of plague on European soil was that of 1878-79 on the banks of the Volga, which caused a panic throughout Europe.

PLAICE (*Pleuronectes platessa*), a species of Flatfish, common on the coasts of northern Europe from Iceland to the Bay of Biscay. It is readily recognized by the yellow or orange-colored spots which are placed in a row along the dorsal and anal fins, and scattered over the body.

PLAINFIELD, located in Union county, N. J., is a

city in which beauty of location and other natural advantages have served to attract as residents a large number whose places of business are in New York city, Brooklyn, etc. It is situated on the Central Railroad of New Jersey, eleven miles north of New Brunswick, twelve miles west-southwest of Elizabeth, and twenty-five miles in the same direction from New York. It contains fifteen churches, two national and one savings bank, several public school buildings, a young ladies' seminary, two weekly papers, upward of 150 stores, and manufactures of carpets, clothing, cigars, oilcloth, hats, carriages, machinery, extracts, sash, tools, printing presses, etc.; also dye, electric light, and gas works. It is separated from North Plainfield by Green Brook, and in 1890 contained a population of 11,267.

PLAIN SONG, or PLAIN CHANT (*Gregorian Music*; Lat., *Cantus planus*; Ital., *Canto Gregoriano*; Fr., *Plain Chant*), a style of music, easily recognized by certain strongly-marked characteristics, some very ancient fragments of which are believed to have been in use under the Jewish dispensation from a remote period, and to have been thence transferred to the ritual of the Christian church.

PLANARIANS. The name *Planaria* was first applied by O. F. Müller in his *Prodromus Zoologie Danica* (1776) a group of worms, inhabitants of fresh and salt water, characterized so far as was then known, by a flattened leaf-like form. Ehrenberg in 1831 changed this name to *Turbellaria* on account of the cilia with which the body is furnished by means of which the worms create a whirlpool in the surrounding water. The extent of this group was subsequently more restricted, and at present the name *Turbellaria* is applied to all those (mainly free-swimming) Platyhelminths whose body is clothed externally with a ciliated epidermis, and which possess a mouth (with the exception of one division) an alimentary canal, but are without an anus. The *Turbellarians*, excluding the NEMERTINES, (*q.v.*), which until recently were classed with them, form an order of the class *Platyhelminthes*, and the old name *Planaria* is now confined to a group of the fresh-water representatives of this order.

*Size and External Characters.*—Many forms of the Turbellarians are so minute as to be hardly visible with the naked eye, while others attain to a length of several inches, and a land Planarian of no less than nine inches in length has been described by Moseley. The fresh water forms are generally small, the largest representatives of the order being marine or terrestrial. The smaller species are mostly cylindrical, or convex dorsally and flat ventrally; the anterior extremity is commonly truncated and the posterior extremity pointed. The larger aquatic forms are thinner in proportion to the increasing surface of the body, so that they come to resemble thin leaf-like lamellæ while the large land Planarians instead of increasing in superficies grow in length, so that they may be best compared to leeches. The larger aquatic forms are frequently provided with tentacles in the shape of paired finger-like processes or ear-like folds of the anterior part of the body; sometimes the tentacles are papillary outgrowths of the dorsal surface; the land Planarians are often to be distinguished by a crescent-shaped area at the fore end of the body, which is separated off from the rest. In many cases the whole dorsal surface is beset with papillæ. The aperture of the mouth varies greatly in its position; sometimes it is situated at the anterior extremity, sometimes in the middle of the ventral surface of the body, occasionally quite close to the posterior extremity; the single common or distinct male and female generative aperture are also situated

upon the ventral surface of the body, and the former in rare cases open in common with the mouth; the genital apertures always lie behind the mouth. Many Turbellarians have a sucker which serves to attach the animal to surrounding objects, or to another individual during copulation.

PLANCK, GOTTLIEB JAKOB, theologian and church historian, was born at Nürtingen in Württemberg, where his father was a notary, on November 15, 1751. His death took place on August 31, 1833.

PLANE-TREE, a forest tree of the genus *Planus*, and generally known as the buttonwood. It has also been mentioned as the Sycamore-tree (but this is disputed by some), and classed with the bread-fruit species, from its suggestive resemblance thereto. The Plane-tree proper is recognized by its broad leaves, globular fruit, and watery juice. The infant leaves are covered with a layer of down which is dissipated with its growth. When inhaled it has the effect of causing a disagreeable cough. The catkins, male and female, are globular in shape and of small dimensions. The flowers are equally diminutive, being almost imperceptible. The stamens are numerous, the seeds small, and the bark of the tree is comparatively tender. The plane is regarded with great favor as a shade-tree and grows to great size, the oriental species (*Platanus Orientalis*) for example, rising to the height of nearly 100 feet. It is a native of the east. The buttonwood of the United States (*P. Occidentalis*) is a tree of massive proportions at the base, gracefully tapering from the ground up, and attaining the height of from 70 to 100 feet. It is to be found at all points in the United States, also as far north as Montreal, Canada, and is generally to be found near the water; the banks of western rivers particularly being favored, where the tree grows rapidly and luxuriantly. The leaves are large, the foliage is heavy, the bark astringent, and the wood, when grown on dry soil, invaluable as fuel. The leaves have also been considered a specific for the poison of serpents. The California plane (*P. racemenses*) is indigenous to the Pacific coast, and is distinguished from other varieties by the singular appearance its long pendular racemens create. The wood is far better than that of the occidental plane.

PLANTAGENET. This surname, distinctive of a line of kings who ruled in England for more than three hundred years, was first adopted by Geoffrey, count of Anjou, in reference to a sprig of broom (*planta genista*) which he is said to have worn in his bonnet. He became the husband of Henry I.'s daughter Maud, and through her the progenitor of the dynasty of the Plantagenets. The Plantagenets succeeded to the throne in the person of Henry II.

Henry, the son of Geoffrey of Anjou and the empress Maud, was born at Le Mans in the year 1133, and was just twenty-one years of age when he attained the crown. Personally a man of fiery temperament and strong passions, his patience as a politician is remarkable. Bit by bit he built up a strong empire, and even kept the pretensions of the church within definite and reasonable bounds. But a single angry word undid the work of years. He was responsible for Becket's murder. He had to do penance and make his peace with the church, and to humiliate himself before Becket's grave.

His dynastic policy seemed almost an equal failure, but was productive of wide and far-reaching consequences. His ungrateful sons rebelled against him, and when he heard that even John had joined the confederacy he felt that he had nothing more to live for. His eldest son, Henry, whom he had been so anxious to make a king during his own life, sickened and died in



Covered Cup of solid gold, 6 inches high, circa 1660-70.



—Ancient Gold Phiale, found at Agrigentum, now in the British Museum. It is shown in section below. It is 5 inches in diameter.



—Silver Cup, 8½ inches high, usually attributed to Jamnitzer, but more probably by Paul Flint. Made at Nuremberg about the middle of the 16th century. (S. K. M.)



—Silver Cup, 4¾ inches high, with embossed gold band; found in a grave in the east of Seeland (Denmark). This cup dates from the earlier part of the Iron Age.



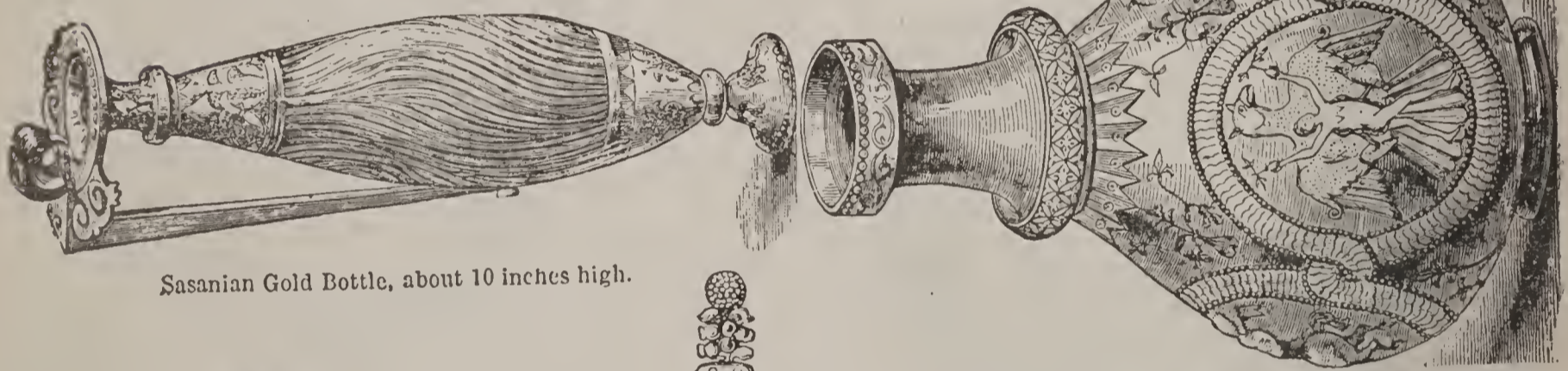
—Greek Silver Vase, 5 inches high, c. 4th century B.C.



Silver Crater, found in Ithaca. 3 3/4 inches high.



Silver Crater, 15 1/2 inches high, from Hildesheim



Sasanian Gold Bottle, about 10 inches high.

Gold Ewer, 15 inches high, from the Petrossa treasure



FIG. 14.—Silver Cup, with translucent enamels. Probably French work of the 14th century.

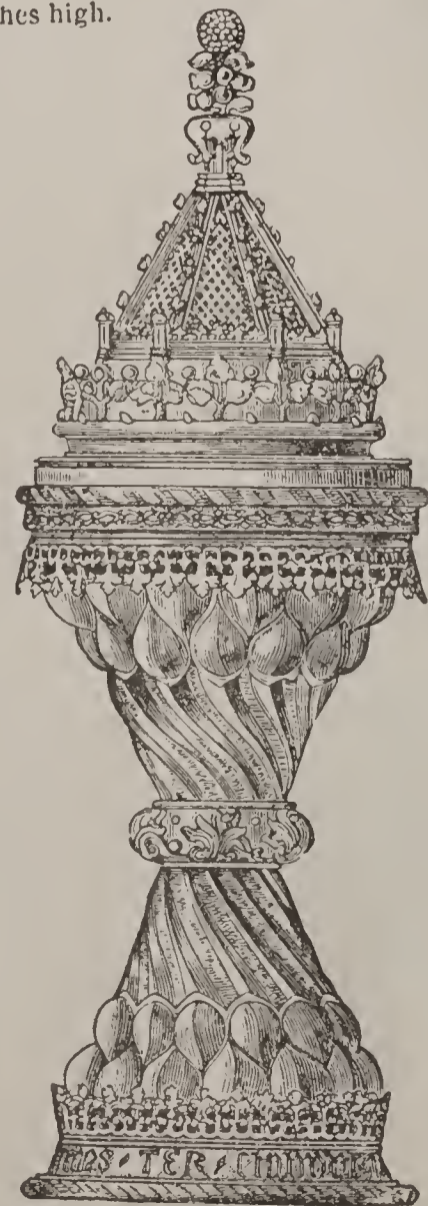


FIG. 15.—Silver-gilt Salt-cellar, 14 1/2 inches high. Given to New College, Oxford



—Silver Beaker, decorated with open work, filled in with translucent enamels. German or Flemish, of the 15th century. (S. K. M.)



France after flagrant acts of ingratitude and impiety. Geoffrey, to whom he had secured the duchy of Brittany, soon followed his brother; and there remained but Richard and John, besides three daughters, who were all disposed of in marriage to Continental princes. As Richard, though he came to the crown, also died without legitimate issue, the male line was continued in the two sons of John, Henry III. and Richard, king of the Romans, and the issue of the latter became extinct in the next generation.

The time of Edward III. with his great family was the climax in the fortunes of the house of Plantagenet. Nor need we pursue the family history further, as the story of its descent after the days of Edward III. will be found sufficiently treated elsewhere (see LANCASTER, HOUSE OF, and YORK, HOUSE OF).

Of the alliances of this great dynasty the most important after the days of Henry II. were those of the house of Lancaster. Henry III. married his daughter Margaret to Alexander III. of Scotland, and another daughter to the duke of Brittany. Edward I. had for his son-in-law Gilbert de Clare, earl of Gloucester, the duke of Brabant, and the earl of Holland. A daughter of Edward II. married a duke of Gueldres. But "the aspiring blood of Lancaster" spread itself over Europe by alliances with Castile and Portugal, Navarre and Denmark, Bavaria and other foreign states. It has reigned in Portugal to the present day, and it continued to reign in Spain till the end of the 17th century.

PLANTAIN (Lat. *plantago*), a name given to plants with broad palm-like leaves. This is the case with certain species of *Plantago*, *Alisma*, and *Musa*, to all of which the term is popularly applied.

PLANTAIN-EATER. See TOURAKOO.

PLANTIN, CHRISTOPHE, French publisher, born in a village near Tours (probably Saint-Avertin) in 1514, learned book-binding and book-selling at Caen, and, having married in that town, settled in 1549 as a bookbinder in Antwerp. He died in 1589.

PLANTING. See ARBORICULTURE.

PLASENCIA, a city of Spain and an episcopal see, in the north of the province of Caceres (Estremadura), is pleasantly situated on the right bank of the Xerte or Jerte, a sub-tributary of the Tagus, and at the foot of the sierras of Bejar and Vera, continuations of the Guadarrama range.

PLASTER OF PARIS. See GYPSUM.

PLATA, LA. See ARGENTINE REPUBLIC.

PLATA, RIO DE LA. See PLATE RIVER.

PLATÆA, or PLATÆÆ, a celebrated city of ancient Greece, lay at the foot of the northern slope of Mount Cithæron in Bœotia, about six and one-half miles by road south of Thebes, or a little over five geographical miles in a direct line. Its territory was separated from that of Thebes by the river Asopus. The Thebans claimed to have founded Platæa, but, however this may have been, Platæa was always at feud with its more powerful neighbor. In 519 B.C. the Platæans, being hard pressed by Thebes, applied for help to the Spartan king Cleomenes, who advised them to place themselves under the protection of Athens. They did so, and Athens and Platæa were thenceforward fast friends.

PLATE. The word *plate* (connected with the Greek flat, the late Latin *plata*=*lamina*, and the Spanish *plata*, silver) is usually employed to denote works in silver or gold which belong to any class other than those of personal ornaments or coins.

On account of the ease with which it can be worked and the pure state in which it is generally found, it is probable that gold was the first metal used by man; and it is certain that, in some countries at least, he attained

to the most marvelous skill in its manipulation at a time when the other arts were in a very elementary condition. The use of silver appears to belong to a rather later period, probably because, though a widely spread metal in almost all parts of the world, it is usually found in a less pure state than gold, and requires some skill to smelt and refine it. Though both these precious metals were largely and skillfully used by prehistoric races, they were generally employed as personal ornaments or decorations for weapons. Except in Scandinavian countries but little that can be called "plate" has been discovered in the early barrows of the prehistoric period in western Europe.

*Ancient Egypt.*—An enormous amount of the precious metals was annually brought as tribute to the Egyptian kings; according to Diodorus, who quotes the authority of Hecataeus, the yearly produce of the royal gold and silver mines amounted to 32,000,000 of minæ—that is, about \$765,000,000 of American modern money. Though this estimate is probably an exaggeration, the amount must have been very great. The gold chiefly came from the mines in the Bishári desert, about eighteen days' journey southeast of Kum Ombos. These mines were constantly worked down to the time of the Arab caliphs, but now appear to be exhausted. It is not known where the silver came from.

The chief existing specimens of Egyptian plate are five silver *phialæ* or bowls, found at the ancient Thumuis in the Delta, and now in the Bulak Museum (Nos. 482 to 486 in the catalogue). These are modeled in the form of a lotus blossom, most graceful in design, but are apparently not earlier than the fifth century B.C.

*Assyrian and Phœnician Plate.*—Among the many treasures of early art found by General Cesnola in the tombs of Cyprus none are of more interest than a large number of Phœnician silver *phialæ* or saucer-like dishes, enriched with delicate repoussé and tooled reliefs, which in their design present many characteristics of Assyrian art mingled with a more or less strong Egyptian influence. A considerable number of bowls and *phialæ* found in Assyria itself are so exactly similar to these Cyprian ones, in both shape and ornamentation, that they cannot but be classed together as the production of the same people and the same age. The British Museum possesses a fine collection of these bowls, mostly found in the palace at Nimrud.

*Etruscan Plate.*—The Etruscan races of Italy were specially renowned for their skill in working all the metals, and above all in their gold work. Large quantities of the most exquisite gold jewelry have been found in Etruscan tombs, including, in addition to smaller objects, scepters, wreaths of olive, and massive head-pieces. The Museo Kircheriano in Rome possesses a magnificent specimen of the last form of ornament; it is covered with nearly a hundred little statuettes of lions arranged in parallel rows. Little, however, that can be classed under the head of plate has yet been found. The British Museum (gold ornament room) possesses a fine specimen of early plate found at Agrigentum in Sicily.

*Hellenic Plate.*—Discoveries made of late years on the plains of Troy, at Mycenæ, and at Camirus in Rhodes have brought to light a large quantity of gold and silver plate of very remote antiquity. These early specimens of plate are all very similar in character, graceful in shape, hammered, cast, and soldered with great skill, but, with the exception of weapons and ornaments, mostly devoid of surface decoration. The most remarkable find was that which Doctor Schliemann calls "Priam's treasure," including a large number of silver vases and bowls, with fine massive double-handled cups in gold, and a very curious spherical gold bottle.

In the best times of Greek art, the chief works in gold and silver seem to have been dedicated to religious purposes, and to have been seldom used for the ostentatious pomp of private individuals. Vessels for the use of the temples, tripods in gold or silver of the richest work, and statues of the gods were the chief objects on which the precious metals were lavished.

The gold used by the Greeks probably came from Asia Minor or Egypt, while the mines of Laurium, in the mountains which form the promontory of Sunium in Attica, supplied an abundant amount of silver for many centuries.

Though a large quantity of later Græco-Roman plate still exists in various museums, the specimens of Greek silver-work of the best period are extremely rare, and most unimportant in point of size. In 1812 Doctor Lee discovered at Ithaca a very beautiful vase or cyathus  $3\frac{3}{4}$  inches high and a phiale or patera,  $9\frac{1}{2}$  inches across, both of silver, repoussé and chased, with very rich and graceful patterns of leaves and flowers—suggesting a slight tinge of Assyrian style. These are probably not later than the fifth century B. C.

*Græco-Roman and Roman Plate.*—Of what may be called Græco-Roman plate a much larger number of specimens still exist. The finest collection of these was found in 1869 at Hildesheim in Hanover, and is now in the Berlin Museum. They consist of a large number of cups, bowls, vases, dishes, and tripods, all of silver, some decorated with gilding and enriched in the most elaborate way with figure and scroll-work reliefs of the greatest beauty and finish; these, except one or two of very rude work, can hardly be later in date than the first century after Christ.

The museum at Naples contains a very large number of silver cups found in Pompeii, incrustated with figure-subjects or branches of ivy and vine in relief. In cases of this sort the cup is made double, with a smooth inner skin to hide the sinkings produced by the repoussé work in relief on the outside. Silver vessels ornamented in relief were called by the Romans *calata* or *aspera* to distinguish them from plain ones, which were called *levia*.

Among later specimens of Roman plate the most remarkable is the gold patera, nearly ten inches in diameter, found at Rennes in 1777, and now in the Paris Bibliothèque—a work of the most marvelous delicacy and high finish—almost gem-like in its minuteness of detail. Though not earlier than about 210 A. D., a slight clumsiness in the proportion of its embossed figures is the only visible sign of decadence.

The British Museum possesses good specimens of Roman silver work in its last stage of decline. These are two large caskets or toilet boxes, with silver unguent vases, oblong *lances*, pateræ, ewers, spoons, and other objects, all found in Rome in 1793.

*Plate from the Crimea.*—The finest collection of early gold and silver plate is that in the Musée de l'Ermitage at St. Petersburg, the result of many years' excavation in the tombs of the Cimmerian Bosphorus. Most of these magnificent pieces of plate, both in style of workmanship and in the character of their decoration, resemble the work of Greek artists; in some cases nothing but the costume of the figures embossed upon them shows that they were not produced in Athens.

*Oriental Plate.*—Some very curious pieces of plate in both gold and silver have been found in northern India; these appear to be of native workmanship, but the subjects with which they are embossed, and the modeling of the figures, show that they were produced under late Roman influence, or in some cases possibly even Greek influence in a highly degraded state, handed down from the time of Alexander's Indian conquests.

The gold and silver work of Russia resembles in style that of Byzantium at an early period. Shrines and other magnificent pieces of plate in the treasury of the cathedral at Moscow (see Weltmann, *Le trésor de Moscou*, 1861), though executed at the end of the fifteenth century, are exactly similar in design to Byzantine work of the eleventh or twelfth century, and even since then but little change or development of style has taken place.

*Early Medieval Plate.*—The Gothic, Gaulish, and other semi-barbarian peoples, who in the sixth century were masters of Spain, France, and parts of central Europe, produced great quantities of work in the precious metals, especially gold, often of great magnificence of design and not without some skill in workmanship. In 1837 a large number of pieces of very massive gold plate were found at Petrossa, in Roumania; much of this find was, unfortunately, broken up and melted, but a considerable portion was saved, and is now in the museum at Bucharest.

In the sixth century Byzantium was the chief center for the production of large and magnificent works in the precious metals.

During the seventh century France and other Western countries were but little behind Italy and Byzantium in their production of massive works, both secular and religious, in the precious metals. St. Éloy, the French goldsmith bishop, made a number of most splendid shrines and other sacred furniture in beaten gold—among them large shrines for the relics of St. Denis, St. Geneviève, and St. Martin, as well as gold thrones, plate, and jewelry for the French kings Clothaire II. and Dagobert I.

The existing examples of magnificent early work in the precious metals mostly belong to a somewhat later period. The chief are the gold and silver altar in Sant' Ambrogio at Milan, of the ninth century; the *Pala d'Oro*, or gold retable, in St. Mark's at Venice, begun in the tenth century; and the gold altar frontal given by the emperor Henry II. and his wife Cunigunde, at the beginning of the eleventh century, to the cathedral at Basel.

Owing to the demoralization and increase of luxury which grew in Italy with such startling rapidity during the early years of the sixteenth century, the wealth and artistic skill which in the previous centuries had been mainly devoted to religious objects were diverted into a different channel, and became for the most part absorbed in the production of magnificent pieces of plate—vases, ewers, dishes, and the like—of large size, and decorated in the most lavish way with the fanciful and over-luxuriant forms of ornament introduced by the already declining taste of the Renaissance. This demand created a new school of metal works. During the seventeenth and even the eighteenth centuries fine pieces of plate were produced in Italy, many of them still retaining some of the grace and refinement of the earlier Renaissance.

*Germany.*—From very early times Germany was specially famed for its works in the precious metals, mostly, as in other countries, for ecclesiastical use. In the fifteenth century a large quantity of secular plate was produced, of very beautiful design and the most skillful workmanship.

During the first half of the sixteenth century Augsburg and Nuremberg, long celebrated for their silver work, developed a school of artists in plate whose productions are of the most unrivaled beauty.

*Spain.*—Throughout the middle ages Spain was remarkable for its large and magnificent works in the precious metals. It is not till the sixteenth century that a really Spanish school of art was developed; and the

discovery of America with its rich stores of gold and silver gave an enormous impetus to this class of work. The "custodia," or tabernacle for the host, in many of the Spanish cathedrals, is a large and massive object, decorated in a very gorgeous though somewhat debased style. In spite of the plundering of the French, even now no country is so rich in ecclesiastical plate as Spain.

*England.*—The Celtic races of both England and Ireland appear to have possessed great wealth in gold and silver, but especially the former. It seems, however, to have been mostly used in the manufacture of personal ornaments, such as torques, fibulæ, and the like. With regard to English secular plate, though but few early examples still exist, we know from various records, such as wills and inventories, that the fourteenth century was one in which every rich lord or burgher prided himself on his fine and massive collection of silver vessels; on festive occasions this was displayed, not only on the dinner-table, but also on sideboards, arranged with tiers of steps, one above the other, so as to show off to advantage the weighty silver vases, flagons, and dishes with which it was loaded. The central object on every rich man's table was the "nef"—a large silver casket, usually (as the name suggests) in the form of a ship, and arranged to contain the host's napkin, goblet, spoon, and knife, with an assortment of spices and salt. Great sums were often spent on this large and elaborate piece of plate, *e.g.*, one made for the duke of Anjou in the fourteenth century weighed 348 marks of gold. The English silversmiths of this period were highly skilled in their art, and produced objects of great beauty in both design and workmanship. One of the finest specimens of late fourteenth century plate which still exists is a silver cup belonging to the mayor and corporation of King's Lynn. It is graceful and chalice-like in form, skillfully chased, and decorated in a very rich and elaborate way with colored translucent enamels of ladies and youths, several with hawks on their wrists. Silver salt-cellars were among the most elaborate pieces of plate produced during the fifteenth century. Several colleges at Oxford and Cambridge still possess fine specimens of these; the favorite shape was a kind of hour-glass form richly ornamented with spiral fluting or bosses.

But few existing specimens of English plate are older than the beginning of the fifteenth century. Among the few that remain the principal are two or three chalices—such as the two large gold ones found in the coffin of an archbishop of York, now used for holy communion in the cathedral, and a fine silver chalice from the church of Berwick St. James, Wilts, now in the British Museum. Both this and the York chalices are devoid of ornament, but, judging from their shape, appear to be of the twelfth or thirteenth century.

PLATE, THE RIVER, or RIO DE LA PLATA ("River of Silver"), in South America, was at first known as Rio de Solis, after Juan Diaz de Solis, who discovered it in 1515, and lost his life on its banks. The present name, a double misnomer, was bestowed by Sebastian Cabot, who, ignorant that he was on the wrong side of the continent, thought he had reached a country of mineral wealth—a mistake (perpetuated also in the designation Argentine Republic) which may be said to have received a kind of poetic justification in the fact that the distant mines of Potosí lie within the drainage area of the La Plata system. Like Rio Grande do Sul and Rio de Janeiro on the Brazilian coast, this Rio is not a river, but a vast estuary into which rivers discharge. At its narrowest it is 23 miles across, opposite Buenos Ayres 34 miles, and opposite Montevideo 63 miles. By some writers the conventional limit be-

tween estuary and ocean is drawn from Montevideo, where the water is still fresh enough to be drunk; but others go farther out and take the line 150 miles across from Maldonado to Cabo San Antonio. In the former case the length of the estuary is 125 miles. At one time it must evidently have extended 200 miles farther inland to Diamante, at the bend of the Paraná; and nature is steadily and rapidly at work prolonging the rivers proper at the expense of the estuary. At low water the average depth may be taken at 18 feet, and shoals and sandbanks are abundant, especially in the upper end. Nearly the whole expanse between Buenos Ayres and Martin Garcia Island is between 3 and 6 feet deep, and a great portion is even shallower. In the shallower portions the bottom consists of a very fine hard-grained sand, in the deeper portions of a sticky ooze. The tidal movement is so disguised by the more obvious effects of wind that Mr. Révy found people who had lived all their lives on the banks ready to deny its existence. But at Buenos Ayres the normal neap-tide is five feet three inches above ordinary low water, and the spring tides vary from six to more than ten feet. The region being one of "storms and extraordinary electric disturbance," with the pampero at one time blowing hard from the land and at another a sea-wind driving the ocean before it, the ordinary levels and currents are often violently disturbed. The general slope of the surface may even be reversed, and the main current of estuary and river run up-stream for 100 miles or more. It has been estimated that the volume of water poured into the Rio de la Plata exceeds the aggregate discharge of all the rivers of Europe put together. Nor need this be matter of surprise when the enormous extent and the character of the drainage area are taken into account.

The three great rivers of the La Plata system are the Paraná, its equal affluent the Paraguay, and the Uruguay—the second being the most important as a waterway, and the first the most interesting from its physical features.

PLATEAU, JOSEPH ANTOINE FERDINAND, was born at Brussels in 1801, and died in 1883 at Ghent, where he had been professor of physics from 1835.

PLATED WARE. The plating or coating of one metal or alloy with another is extensively practiced in metal working. In some cases the coating metal is a valuable protector from oxidation, etc., of the underlying metal; in other cases the properties and advantages of two metals—such as strength and luster—are combined in one object; and more frequently a cheap and inferior body by a superficial coating gets the appearance of a more valuable and important metal. The art of plating was originally applied to the production of imitation silver plate, whence the term "plating." The original method of silver plating consisted in attaching, by a kind of autogenous soldering, thin plates of silver to the opposite surfaces of a prepared ingot of copper alloy or of German silver. The silver plates were firmly wired to the ingot and submitted to a soldering temperature in a plating furnace, in which the surfaces became firmly united. Subsequently the ingot was rolled down to a sheet in which the relative thickness of the metals was maintained, and from such sheets "silver plated" articles were fashioned. This method of plating may be regarded as now extinct, being superseded by electro-plating, or plating by electricity. Recently, however, cooking vessels, etc., of iron, plated in an analogous manner with nickel have come into use (see NICKEL). The plating or casing of iron with brass is extensively practiced in the manufacture of stair-rods, curtain and picture rods, and "cased" tubing for upholstery purposes generally; and in the manufac-

ture of pipes for conveying water the body of lead is frequently lined with a coating of pure tin. The gilding of metals is a process analogous to plating, as are also the galvanizing of iron and the manufacture of tin and terne plates. For these see IRON.

PLATEN-HALLERMUND, AUGUST, GRAF VON, German poet, was born at Ansbach on October 24, 1796, and died at Syracuse on December 5, 1835.

PLATINUM AND THE PLATINUM METALS. The metals platinum (Pt), palladium (Pd), rhodium (Rh), iridium (Ir), ruthenium (Ru), and osmium (Os) are united into a family by a striking similarity in chemical characters and by their association in natural occurrence. A rather rare ore, called platinum ore or polyxene, is almost the only native material which is available for their extraction; it contains them all in the regular form. *Traces* of platinum are found in almost all native gold.

Platinum, though a noble metal chemically, has too modest an appearance to lend itself much to the jeweler's purposes. The Russian Government used, for a while, to strike platinum coins, but soon came to give up the practice on account of the immense fluctuations in the commercial value of the metal. Almost all the platinum produced nowadays is made into chemical utensils. Platinum, in fact, is the metal of the chemist. In industrial chemistry platinum is used chiefly for the construction of those stills for the concentration of oil of vitriol which, although a single one costs a fortune, are cheaper in the long run than glass retorts.

PLATO, the Athenian philosopher and father of idealism, was born 427 B.C., and lived to the age of eighty. His literary activity may be roughly said to have extended over the first half of the fourth century B.C. That throughout his early manhood he was the devoted friend of Socrates, that in middle life he taught those who resorted to him in the grove named Academus, near the Cephissus, and there founded the great philosophical school, that (with alleged interruptions) he continued to preside over the Academy until his death, are matters of established fact. It is said by Aristotle that he was at one time intimate with Cratylus the Heraclitean. Beyond this we have no authentic record of his outward life. That his name was at first Aristocles, and was changed to Plato because of the breadth of his shoulders or of his style or of his forehead, that he wrestled well, that he wrote poetry which he burnt on hearing Socrates, that he fought in three great battles, that he had a thin voice, that (as is told of other Greek philosophers) he traveled to Cyrene and conversed with priests in Egypt, are statements of Diogenes Laertius, which rest on more or less uncertain tradition. The express assertion—which this author attributes to Hermodorus—that after the death of Socrates Plato and other Socratics took refuge with Euclides in Megara, has a somewhat stronger claim to authenticity. But the fact cannot be regarded as certain, still less the elaborate inferences which have been drawn from it. The romantic legend of Plato's journeys to Sicily, and of his relations there with the younger Dionysius and the princely but unfortunate Dion, had attained some degree of consistency before the age of Cicero, and at an unknown but probably early time were worked up into the so-called *Epistles* of Plato, now all but universally discredited. Nor is there sufficient ground for supposing, as some have done, that an authentic tradition is perceptible behind the myth. For the details of the story the reader is referred to Grote, who believed in the genuineness of the *Epistles*. Men's thoughts had begun to be disturbed and eager when Socrates arose. The skeptical movement had confused men's notions

as to the value of ethical ideas. "If 'right' is one thing in Athens and another at Sparta, why strive to follow right rather than expediency? The laws put restraint on Nature, which is prior to them. Then why submit to law?" And the ingenuities of rhetoric had stirred much unmeaning disputation. Every case seemed capable of being argued in opposite ways. Even on the great question of the ultimate constitution of things, the conflicting theories of absolute immutability and eternal change appeared to be equally irrefragable and equally untenable.

The first result, and, as the Platonic Socrates declares, the only result he had obtained, was the consciousness of knowing nothing. But he who knows that he knows nothing is disposed to seek, and only those who seek will find. And the seeking mind attains, if not to knowledge, yet to a new standard of knowing. So long as results are contradictory, so long as negative instances are successfully applied, the searcher may make progress, but is still to seek. For the aim of inquiry is the universal.

Human life and experience the sphere of search; truth and good, regarded as identical, the end of it; universality the test of reality, conversation the method, rational thought the means—these are the chief notes of the dialectic of Socrates. Applying the native strength of his intelligence directly to the facts of life, he revealed their significance in countless ways, by unthought-of generalizations, by strange analogies, combining what men had not combined, distinguishing what they had not distinguished—but always with the single aim of rousing them to the search after eternal truth and good.

The spirit which led on toward this unseen goal was not less practical than speculative. Socrates desired not only that men might know, but that they might know and do. Utility is the watchword no less of the Socratic than of the Baconian induction. But Socrates never doubted that if men once know they will also do. His own conscious conviction of the unity of truth and good he believed to be unconsciously the basis of all men's actions. They erred, he thought, from not seeing the good, and not because they would not follow it if seen. This is expressed in the Socratic *dicta* "Vice is ignorance," "Virtue is knowledge." Men therefore must be brought to see the good and true, and that they may see it they must first be made aware that they do not see.

This lifelong work of Socrates, in which the germs of ethics, psychology, and logic were contained—after it had been sealed by the death in which he characteristically at once obeyed his countrymen and convinced them of error—was idealized, developed, dramatized—first embodied and then extended beyond its original scope—in the writings of Plato, which may be described as the literary outcome of the profound impression made by Socrates upon his greatest follower.

These writings (in pursuance of the importance given by Socrates to conversation) are all cast in the form of imaginary dialogue. But in those which are presumably the latest in order of composition this imaginative form interferes but little with the direct expression of the philosopher's own thoughts. The many-colored veil, at first inseparable from the features, is gradually worn thinner, and at last becomes almost imperceptible.

The Platonic dialogues are not merely the embodiment of the mind of Socrates and of the reflections of Plato. They are the portraiture of the highest intellectual life of Hellas in the time of Plato—a life but distantly related to military and political events, and scarcely interrupted by them. Athens appears as the center of the excitable Hellenic mind, profoundly

stirred by the arrival of great sophists, and keenly alive to the questions of Socrates, although in the pages of Plato, even more than in reality, he only "whispers with a few striplings in a corner;" for, in the Platonic grouping, the agora, which was the chief scene of action of the real Socrates, retires into the background, and he is principally seen consorting with his chosen companions, who are also friends of Plato, and with the acquaintances whom he makes through them. The scene is narrowed (for the Academy was remote from the bustle of resort, and Plato judged the Hellenic world securely from the vantage-ground of partial retirement)—but the figures are distinct and full of life. In reading the dialogues, we not only breathe the most refined intellectual atmosphere, but are also present witnesses of the urbanity, the freedom, the playfulness, the generous warmth of the "best society" in Athens. For Plato has a numerous repertory of *dramatis personæ*, who stand in various relations to his chief character—the impetuous Chærephon, Apollodorus the inseparable weak brother, old Crito the true-hearted, Phædo the beloved disciple, Simmias and Cebes who have been with Philolaus, the graceful and ingenuous Phædrus; the petulant Philebus; Theætetus of the philosophic nature, who is cut off in his prime, and the incorrigible Alcibiades; then Plato's own kinsmen—Glaucou the irrepressible in politics, in quarrel, and in love; Adimantus, solid and grave; Critias in his phase of amateur philosopher, and not as what he afterward became; Charmides, not in fiery manhood, but in his first bloom of diffident youth; and many others who appear as mere acquaintances, but have an interest of their own—the accomplished Agathon, the gay Aristophanes, Eryximachus the all-worthy physician; Meno, light of spirit; Callias, entertainer of sophists; Calicles the willful man of the world, Cephalus the aged father of Lysias, and Nicias the honored soldier. All these appear, not as some of them do on the page of history, in sanguinary contention or fierce rivalry, but as peaceful Athenians, in momentary contact with Socrates, whose electric touch now benumbs and now exhilarates, and sometimes goads to frenzy of love or anger. Still more distantly related to him, as it were standing in an outer circle, are the imposing forms of Gorgias and Protagoras, surrounded with the lesser lights of Hippias, Prodicus, and Polus. Thrasymachus, Euthydemus, Dionysodorus hang round like comic masks, adding piquancy to the design. The adversaries Anytus and Meletus are allowed to appear for a moment, but soon vanish. The older philosophers, though Socrates turned away from them, also make their entrance on the Platonic stage. Parmenides with his magnificent depth is made to converse with the imaginary Socrates, who is still quite young. A stranger from Elea plays an important part in some later dialogues, and Timæus the Pythagorean is introduced discoursing of the creation of the world. In these dialogues Socrates is mostly silent; in the *Philebus* he has lost himself in Plato; and in the twelve books of the *Laws*, where an unnamed Athenian is the chief speaker, even the Platonic Socrates finally disappears.

In evolving his philosophy from the Socratic basis, Plato works along three main lines—the ethical and political, the metaphysical or scientific, and the mystical. All three are often intimately blended, as in the close of *Rep.*, bk. vi., and even where one element is uppermost the others are not wholly suppressed.

Two great forces are persistent in Plato, the love of truth, and zeal for human improvement. In the period culminating with the *Republic*, these two motives, the speculative and the practical, are fused in one harmonious working. In the succeeding period, without ex-

cluding one another, they operate with alternate intensity. In the varied outcome of his long literary career, the metaphysical "doctrine of ideas" which has been associated with Plato's name underwent many important changes. But pervading all of these there is the same constant belief in the supremacy of reason and the identity of truth and good. From that abiding root spring forth a multitude of thoughts concerning the mind and human things—turning chiefly on the principles of psychology, education, and political reform—thoughts which although unverified, and often needing correction from experience, still constitute Plato the most fruitful of philosophical writers. While general ideas are powerful for good or ill, while abstractions are necessary to science, while mankind are apt to crave after perfection, and ideals, either in art or life, have an acknowledged value, so long the renown of Plato will continue. "All philosophic truth is Plato rightly divined; all philosophic error is Plato misunderstood"—is the verdict of one of the keenest of modern metaphysicians.

Plato's followers, however, have seldom kept the proportions of his teaching. The diverse elements of his doctrine have survived the spirit that formulated them. The Pythagorizing mysticism of the *Timæus* has been more prized than the subtle and clear thinking of the *Theætetus*. Logical inquiries have been hardened into a barren ontology. Semi-mythical statements have been construed literally, and mystic fancies perpetuated without the genuine thought which underlay them. A part (and not the essential part) of his philosophy has been treated as the whole. But the influence of Plato has extended far beyond the limits of the Platonic schools. The debt of Aristotle to his master has never yet been fully estimated. Zeno, Chrysippus, Epicurus borrowed from Plato more than they knew. The moral ideal of Plutarch and that of the Roman Stoics, which have both so deeply affected the modern world, could not have existed without him. Neopythagoreanism was really a crude Neoplatonism. And the Sceptics availed themselves of weapons either forged by Plato or borrowed by him from the Sophists. A wholly distinct line of infiltration is suggested by the mention of Philo and the Alexandrian schools, and of Clement and Origen, while Gnostic heresies and even Talmudic mysticism betray perversions of the same influence. The effect of Hellenic thought on Christian theology and on the life of Christendom is a subject for a volume, and has been pointed out in part by Prof. E. Zeller and others (comp. NEOPLATONISM). Yet when Plotinus in the third century (after hearing Ammonius), amid the revival of religious paganism, founded a new spiritualistic philosophy upon the study of Plato and Aristotle combined, this return to the fountain-head had all the effect of novelty. And for more than two centuries, from Plotinus to Proclus, the great effort to base life anew on the Platonic wisdom was continued. But it was rather the ghost than the spirit of Plato that was so "unsphered." Instead of striving to reform the world, the Neoplatonist sought after a retired and cloistered virtue. Instead of vitalizing science with fresh thought, he lost hold of all reality in the contemplation of infinite unity. He had some skill in dealing with abstractions, but laid a feeble hold upon the actual world.

"Hermes Trismegistus" and "Dionysius Areopagita" are names that mark the continuation of this influence into the Middle Ages. The pseudo-Dionysius was translated by Erigena in the ninth century.

Two more "Platonic" revivals have to be recorded—at Florence in the fifteenth and at Cambridge in the seventeenth century. Both were enthusiastic and both uncritical. The translation of the dialogues into Latin by Marsiglio Ficino was the most lasting effect of the

former movement, which was tinged with the unscientific ardor of the Renaissance. The preference still accorded to the *Timæus* is a fair indication of the tendency to bring *fumum ex fulgare* which probably marred the discussions of the Florentine Academy concerning the "chief good." The new humanism had also a sentimental cast, which was alien from Plato. Yet the effect of this spirit on art and literature was very great, and may be clearly traced not only in Italian but in English poetry.

The critical study of Plato begins from Schleiermacher, who did good work as an interpreter, and tried to arrange the dialogues in the order of composition. His attempt, which, like many efforts of constructive criticism, went far beyond possibility, was vitiated by the ground-fallacy of supposing that Plato had from the first a complete system in his mind which he partially and gradually revealed in writing. At a considerably later time Karl Friedrich Hermann, to whom all students of Plato are indebted, renewed the same endeavor on the far more plausible assumption that the dialogues faithfully reflect the growth of Plato's mind. But he also was too sanguine, and exaggerated the possibility of tracing a connection between the outward events of Plato's life and the progress of his thoughts. This great question of the order of the dialogues, which has been debated by numberless writers, is one which only admits of an approximate solution. Much confusion, however, has been obviated by the hypothesis (first hinted at by Ueberweg, and since supported by the present writer and others) that the *Sophistes* and *Politicus*, whose genuineness had been called in question by Socher, are really intermediate between the *Republic* and the *Laws*. The allocation of these dialogues, and consequently of the *Philebus*, not only on ground of metaphysical criticism, but also on philological and other evidence of a more tangible kind, supplies a point of view from which it becomes possible to trace with confidence the general outlines of Plato's literary and philosophical development. Reflecting at first in various aspects the impressions received from Socrates, he is gradually touched with an inspiration which becomes his own, and which seeks utterance in half-poetical forms. Then first the ethical and by and by the metaphysical interest becomes predominant. And for a while this last is all absorbing, as he confronts the central problems which his own thoughts have raised. But, again, the hard-won acquisitions of this dialectical movement must be fused anew with imagination and applied to life. And in a final effort to use his intellectual wealth for the subvention of human need the great spirit passed away.

PLATON, LEVSHIN, a celebrated Russian archbishop, was born at the village of Tchashnikovo, near Moscow, in 1737, and died in 1812.

PLATTNER, CARL FRIEDRICH, a famous scientific metallurgist, was born in Kleinwaltersdorf, near Freiberg in Saxony, on January 2, 1800, and died in the latter town, January 22, 1858.

PLATTSBURGH, a village and township of the United States, the shire-town of Clinton county, N. Y., and the port of entry of Champlain customs district, lies on the west side of Lake Champlain at the mouth of the Saranac. By rail it is 168 miles north of Albany and seventy-three south-southeast of Montreal (Canada). A branch line runs twenty miles southwest to Au Sable and forms a favorite route to the Adirondacks, and the Chateaugay Railroad runs thirty-four miles west by north to Lyon Mountain, where there are extensive iron mines. Plattsburgh contains county buildings and court-house, a high school, and a small public library. It has nail and wagon factories, flour-

mills, saw-mills, an iron furnace, machine shops, and a large sewing-machine manufactory. It is a garrison town of the United States army, with extensive barracks about a mile south of the village. Its population in 1890, was 7,500.

PLATTSMOUTH, capital of Cass county, Neb., one of the United States west of the Missouri River, is located on the Burlington and Missouri River Railroad at a point on the Missouri River below the mouth of the Platte, twenty-two miles south of Omaha. It is a thriving and promising city that has grown rapidly of late years, and is conspicuous for the costly improvements, including a steel railroad bridge, that have been projected and completed during the past decade. The city is provided with complete educational, commercial and transportation facilities, contains six churches, two national banks, county buildings, a fine high-school building, two newspaper offices, a large number of stores, and many private residences architecturally attractive. It also has manufactories of locomotives, coaches and freight cars, organs, engines, flour, terra-cotta, wagons, brooms, etc., is lighted by gas and electric lights, and in 1890 contained a population of 8,392.

PLATYHELMINTHES. See PLANARIANS and TAPEWORMS.

PLATYPUS. The Duck-billed Platypus (*Platypus anatinus*) was the name assigned to one of the most remarkable of known animals by Shaw.

The platypus is pretty generally distributed in situations suitable to its aquatic habits throughout the island of Tasmania and the southern and eastern portions of Australia. Slight variations in the coloring and size of different individuals have given rise to the idea that more than one species may exist; but all naturalists who have had the opportunity of investigating this question by the aid of a good series of specimens have come to the conclusion that there is but one; and no traces of any extinct allied forms have yet been discovered.

The length of the animal when full grown is from eighteen to twenty inches from the extremity of the beak to the end of the tail, the male being slightly larger than the female. The fur is short, dense, and rather soft to the touch, and composed of an extremely fine and close under-fur, and of longer hairs which project beyond this, each of which is very slender at the base, and expanded, flattened, and glossy toward the free end. The general color is deep brown, but paler on the under parts. The tail is short, broad, and depressed, and covered with coarse hairs, which in old animals generally become worn off from the under surface. The eyes are small and brown. There is no projecting pinna or ear-conch. The mouth, as is well known, bears a striking resemblance to the bill of a duck. It is covered with a naked skin, a strong fold of which projects outward around its base. The nostrils are situated near the extremity of the upper surface. There are no true teeth, but their purposes are served by horny prominences, two on each side of each jaw—those in the front narrow, longitudinal, sharp-edged ridges, and those behind broad, flattened, and molariform. The upper surface of the lateral edges of the mandible has also a number of parallel fine transverse ridges, like those on the bill of a duck. In the cheeks are tolerably capacious pouches, which appear to be used as receptacles for food.

The platypus is aquatic in its habits, passing most of its time in the water close to the margin of lakes and streams, swimming and diving with the greatest ease, and forming for the purpose of sleeping and breeding deep burrows in the banks, which generally have two orifices, one just above the water level, concealed among long grasses and leaves, and the other below the

surface. The passage at first runs obliquely upward in the bank, sometimes to a distance of as much as fifty feet, and expands at its termination into a cavity, the floor of which is lined with dried grass and leaves, and in which the eggs are laid and the young brought up. The food consists of aquatic insects, small crustaceans, and worms, which are caught under water, the sand and small stones at the bottom being turned over with their bills to find them. They appear at first to deposit what they have thus collected in their cheek pouches, and when these are filled they rise to the surface and quietly triturate their meal with the horny teeth before swallowing it. Swimming is effected chiefly by the action of the broad forepaws, the hind feet and tail taking little share in locomotion in the water. When asleep they roll themselves into a ball. In their native haunts they are extremely timid and wary, and very difficult to approach, being rarely seen out of their burrows in the daytime.

PLAUEN, a busy manufacturing town of Saxony, in the government district of Zwickau, is situated on the Elster, sixty miles to the south of Leipsic.

PLAUTUS, T. MACCIUS, was the greatest comic and dramatic genius of Rome, and still ranks among the great comic dramatists of the world. While the other creators of Roman literature, Nævius, Ennius, Lucilius, etc., are known to us only in fragments, we still possess twenty plays of Plautus. A few of them are incomplete, and in some cases they show traces of later interpolations, but they have reached us in the main as they were written by him in the end of the third and the beginning of the second century B.C. The few facts known of his life rest on the authority of Cicero, of Aulus Gellius, and of Jerome in his continuation of the Eusebian *Chronicle*. He was born in the earlier half of the third century B.C., and died at an advanced age in the year 184 B.C.

PLAYFAIR, JOHN, mathematician and physicist, was born at Benzie, Forfarshire, where his father was parish minister, on March 10, 1748, and died in 1819.

PLEADING, in law, denotes in civil procedure the statement in legal form of the grounds on which a party to an action claims the decision of the court in his favor, in criminal procedure the accusation of the prosecutor or the answer of the accused. The term "pleadings" is used for the collected whole of the statements of both parties, the term "pleading" for each separate part of the pleadings. A pleading may be the statement of either party; a "plea" is (except in Scots and ecclesiastical law) confined to the defense made by an accused person. To "plead" is to frame a pleading or plea.

All systems of law agree in making it necessary to bring the grounds of a claim or defense before the court in a more or less technical form. In Roman law the action passed through three stages (see ACTION), and the manner of pleading changed with the action. The development of the system of pleading in Roman and English law proceeded upon very similar lines. It is possible that the English system was directly based upon the Roman. Bracton (*temp.* Henry III.) uses many of the Roman technical terms. Pleading was oral as late as the reign of Henry VIII., but in the reign of Edward III. pleadings began to be drawn up in writing, perhaps at first more for the purpose of entry on the court records than of the instruction of the court. The French language was used up to 36 Edw. III. st. 1, c. 15, after which English was used for oral pleading, but Latin for enrollment. Latin was the language of written pleadings at common law until 4 Geo. II. c. 26.

In the United States two systems of pleading in civil procedure exist side by side. Up to 1848 the pleading did not materially differ from that in use in England at

the same date. But in 1848 the New York legislature made a radical change in the system, and the example of New York has been followed by more than twenty States. The New York Civil Code of 1848 established a uniform procedure called the civil action, applicable indifferently to common law and equity. The pleadings are called *complaint*, *answer* (which includes *counterclaim*), and *reply*. The *demurrer* also is still used. In some States which follow the new procedure the complaint bears the name of *petition*. In the inferior courts, such as courts of justices of the peace, the pleadings are more simple, and in many cases oral. In States which do not adopt the amended procedure, the pleading is much the same as it was in the days of Blackstone, and the old double jurisdiction of common law and equity still remains. Criminal pleading differs little from that in use in England. (See Bishop, *Laws of Criminal Procedure*.)

PLEBEIANS. See NOBILITY and ROME.

PLEDGE, or PAWN, in law, is "a bailment of personal property as a security for some debt on engagement." The term is also used to denote the property which constitutes the security. Pledge is the *pignus* of Roman law, from which most of the modern law on the subject is derived. It differs from hypothec and from the more usual kind of mortgage in that the pledge is in the possession of the pledgee; it also differs from mortgage in being confined to personal property. Pledges pawned for 10s. (\$2.50) or under, not redeemed in time become the property of the pawnbroker, pledges above that sum are redeemable until sale. The sale must be by public auction. The pawnbroker is entitled to charge as interest 25% where the loan is under 40s., (\$10), and 20% where the loan is above that amount. Special contracts may be made where the loan is above 40s. (\$10). Unlawful pawning of goods not the property of the pawner, and taking in pawn any article from a person apparently under the age of sixteen or intoxicated, or any linen or apparel or unfinished goods or materials intrusted to wash, make up, etc, are (*inter alia*) made offenses punishable by summary conviction. An annual license, costing £7, 10s. (\$37.50), must be taken out for every pawnbroker's shop.

The law of Scotland as to pledge generally agrees with that of England, as does also that of the United States. The main difference is that in Scotland and Louisiana a pledge cannot be sold unless with judicial authority. In some of the States the common law as it existed apart from the Factor's Acts is still followed; in others the factor has more or less restricted power to give a title by pledge. In some States pawnbroking is regulated by the local authorities, and not, as in most, by the general law of the State.

PLESIOSAURIANS. The remarkable extinct marine reptiles included in the group of the *Plesiosauria* (or *Sauropterygia*, as they are sometimes called) existed during the whole of the Mesozoic period, that is, from Triassic into Cretaceous times, when they appear to have died out. The best known of these reptiles, and that which gives its name to the group is the *Plesiosaurus*, a genus established by Conybeare in 1821, and including numerous species, some of which may have attained a length of as much as twenty feet. The nearly allied *Elasmosaurus* of North America, however, reached a much greater size, its remains indicating an animal about 45 feet in length. Several almost perfect skeletons of *Plesiosaurus* having at different times been found, the general proportions of the body are well known. Although the different species vary in regard to proportions, the small size of the head and extreme length of the neck are always striking points in the

skeleton of a *Plesiosaurus*, while the tail is proportionately short. The limbs, both fore and hind, are well developed and modified for swimming; the forms of the various bones making it clear that the digits of each limb were not separate, but inclosed in one covering of integument, as in the flippers of a whale or a turtle.

PLETHO. See GEMISTUS.

PLEURISY, or PLEURITIS, inflammation of the pleura or serous membrane investing the lungs and lining the interior of the thoracic cavity. It is a common form of chest complaint, and may be either acute or chronic, more frequently the former.

Pleurisy frequently arises from exposure to cold; hence it is more common in the colder weather; but besides this various other causes are connected with its occurrence. Thus it is often associated with other forms of disease within the chest, more particularly pneumonia, bronchitis, and phthisis, and also occasionally accompanies pericarditis. Again it is apt to occur as a secondary disease in certain morbid constitutional states, *e.g.*, the infectious fevers, rheumatism, gout, Bright's disease, diabetes, etc. Further, wounds or injuries of the thoracic walls are apt to set up pleurisy, and the rupture of a phthisical cavity in the lungs causing the escape of air and matter into the pleura has usually a similar effect.

The symptoms of pleurisy vary, being generally well marked, but sometimes obscure. In the case of dry pleurisy, which is on the whole the milder form, the chief symptom is a sharp pain in the side, felt especially on breathing. Fever may or may not be present. There is a slight dry cough; the breathing is quicker than natural and is shallow and of catching character. If much pain is present the body leans somewhat to the affected side, to relax the tension on the intercostal muscles and their covering, which are even tender to touch. On listening to the chest by the stethoscope the physician recognizes sooner or later "friction," a superficial rough rubbing sound, occurring only with the respiratory acts and ceasing when the breath is held. It is due to the coming together during respiration of the two pleural surfaces which are roughened by the exuded lymph. The patient may himself be aware of this rubbing sensation, and its vibration or fremitus may be felt by the hand laid upon the thoracic wall during breathing. This form of pleurisy may be limited or may extend over the greater part of one or both sides. It is a not infrequent complication of phthisis in all its stages. In general it disappears in a short time, and complete recovery takes place; or, on the other hand, extensive adhesions may form between the costal and pulmonary surfaces of the pleura, preventing uniform expansion of the lung in respiration and leading to emphysema. Although not of itself attended with danger, dry pleurisy is sometimes preliminary to more serious lung disease, and is always therefore to be regarded while it lasts with some degree of anxiety.

*Pleurisy with effusion* is usually more severe than dry pleurisy, and although it may in some cases develop insidiously, it is in general ushered in sharply by rigors and fever, like other acute inflammatory diseases. Pain is felt in the side or breast of a severe cutting character, referred usually to the neighborhood of the nipple, but it may be also at some distance from the affected part, such as through the middle of the body or in the abdominal or iliac regions. This transference of the pain occasionally misleads the medical examiner. The pain is greatest at the outset, and tends to abate as the effusion takes place. A dry cough is almost always present, which is particularly distressing, owing to the increased pain the effort excites. The breathing is painful and difficult, tending to become shorter and

shallower as the disease advances and the lung on the affected side becomes compressed. The patient at first lies most easily on the sound side, but as the effusion increases he finds his most comfortable position on his back or on the affected side. When there is very copious effusion, and, as is apt to happen, great congestion of the other lung, or disease affecting it, the patient's breathing may be so embarrassed that he cannot lie down.

The treatment of pleurisy need only be alluded to in general terms. It will necessarily depend as regards details upon the form and severity of the attack. One of the first symptoms calling for treatment is the pain. Opiates in the form of morphia or Dover's powder are useful along with the application to the chest of hot poultices or fomentations sprinkled with turpentine. In severe cases much relief to the pain and difficulty of breathing may be afforded by the application of a few leeches to the side. Cases of simple dry pleurisy usually soon yield to such treatment, aided if need be by the application of a fly-blister or of iodine to the chest. The fixing as far as possible of the one side of the thorax by means of cross straps of adhesive plaster according to the plan recommended by Doctor Roberts seems of use in many instances. In the case of pleurisy with effusion, in addition to these measures, including blistering, the internal use of saline cathartics and diuretics appears to be often of service in diminishing the amount of the fluid in the pleural cavity, as are also powerful diaphoretics such as pilocarpin. When these measures fail to reduce the effusion the question of the artificial removal of the fluid comes to be considered.

PLEURO-PNEUMONIA. See MURRAIN.

PLEVNA, or PLEVEN, the chief town of one of the provinces in the principality of Bulgaria, lies in the midst of a series of hills (whose crests rise above it for 200 to 600 feet) about 6,000 yards to the east of the river Vid (a tributary of the Danube), into which the streamlets by which it is traversed discharge. Its position at the meeting-place of roads from Widdin, Sofia, Shipka, Biela, Zimnitsa, and Nikopoli gives it a certain military importance, and in the Russian campaign of 1877 it became one of the great centers of operation. The Russians, who had been defeated in two minor attacks, on July 20th and 30th, were again repulsed with a loss of 18,000 men in an assault (September 7-13) in which they employed 75,000 infantry and 60,000 cavalry. They formally invested the town on October 24th and obliged Osman Pasha to surrender on December 10th. In 142 days the assailants had lost 40,000 men and the defenders 30,000.

PLEVEL, IGNAZ JOSEPH, though now almost forgotten, was once one of the most popular composers in Europe. He was born at Rupperthal, near Vienna, June 1, 1757. He died at Paris, November 14, 1831.

PLINY, THE NATURALIST. Caius Plinius Secundus, commonly distinguished as the elder Pliny, the author of the *Natural History*, is believed to have been born (23 A.D.) at Novum Comum (Como). Like his nephew, the elder Pliny had seen military service, having joined the campaign in Germany under L. Pomponius Secundus; like him, also, he had been a pleader in the law-courts, and a diligent student of Greek and Roman literature. Much of his literary work was done, he tells us himself, in the hours stolen from sleep. Of his many works the *Naturalis Historia* in thirty-seven books has alone been preserved, and in a nearly complete state. This voluminous treatise professes to be an encyclopædia of Roman knowledge, mainly based on the researches and speculations of the Greeks. What A. von Humboldt accomplished in our own times, in



his great work *Cosmos*, Pliny had essayed to carry out on similar principles—but, of course, without the scientific knowledge, and also without the comprehensive view of the universe which is the inheritance of the present age. Pliny, we must admit, was an industrious compiler, but he was not, like Aristotle, a man of original research.

In his first book, which contains a summary of the whole work, he names the authors, both Greek and Latin, from whom the matter of each book was derived. The list indeed is a surprising one, and of comparatively few have we any remains. His theology is "agnostic" or Epicurean; if there is any God, he says, it is vain to inquire His form and shape; He is entirely a Being of feeling and sentiment and intelligence, not of tangible existence. He believes in the "religion of humanity," according to a rather recent definition of the idea. God is what Nature is; God cannot do what Nature cannot do; He cannot kill himself, nor make mortals immortal, nor raise the dead to life, nor cause one who has lived never to have lived at all, or make twice ten anything else than twenty.

With all its faults, inevitable to the infant state of science, Pliny's work is an astounding monument of industry. It is believed to have been published about two years before his death. He wrote, besides several other treatises, a history of the wars from the first in Germany, in twenty books, and a continuation of the history of Aufidius Bassus down to his own times, in thirty-one books—now all lost.

He is said to have been a great student, an early riser, abstemious and temperate in his meals. In his later days he appears to have grown somewhat unwieldy and asthmatic, for Pliny the younger, in describing his uncle's death by suffocation from the fumes in the eruption of Vesuvius, 79 A.D., says that his breathing "propter amplitudinem corporis gravior et sonatior erat" (because of the size of his body was heavy and loud). Pliny's friendship with Vespasian may be inferred from his custom of attending the morning levée; he seems to have first known him in the German wars in the time of Claudius.

Besides his published works, the elder Pliny left, as his nephew tells us, 160 note-books of extracts (electorum commentarios clx.), written in a very small hand on both sides of the page. He acted as procurator in Spain in 71, and was recalled to Rome by the death of his brother-in-law Caius Cæcilius, who by will appointed him guardian of the younger Pliny. At the time of his death, the elder Pliny had the command of the Roman fleet at Misenum. He fell a victim to his imprudent curiosity in advancing within the range of the thickly-falling ashes during the eruption of Vesuvius in 79 A.D.

**PLINY THE YOUNGER.** Caius Cæcilius Secundus, commonly called Pliny the Younger, was the nephew and heir of the elder Pliny, the naturalist. He was born 61 A.D. at Comum (Como) on the southern shore of Lake Larius in northern Italy, near to which, on the east side, stood the spacious and beautiful family villa. He took the name of Cæcilius from his father, who had married Plinia, the elder Pliny's sister. At ten years of age he was left to the care of Virginius Rufus, a distinguished man and thrice consul.

Pliny was a man of refined taste, highly accomplished, devoted to literature, kind and indulgent to his freedmen and his slaves, gentle and considerate in all his family relations, humane and forgiving to all who had offended him. By profession an advocate, and a pupil of the famous Quintilian (ii. 14), he was a frequent and very popular pleader at the courts of the centumviri held in the Julian basilica, as well as occasionally in the senate and in public prosecutions (vi. 20).

His fame in centumviral trials, which were chiefly

connected with will cases, is attested by Martial (x. 19, 17), whose epigram he quotes in lamenting the poet's death (iii. 21). But, though himself somewhat ambitious of praise as a pleader (for he seems to have regarded Cicero as his model in everything), he sternly reprobated the arts of bribery and flattery which were commonly adopted by patrons to secure the applause of their clients. Fond as he was of eloquence, he seems to have given up legal practice from some feeling of disgust at these abuses, and to have devoted himself to the duties of the state-offices. He was appointed augur and præfect of the treasury in the temple of Saturn, and rose in due course through the offices of quæstor, prætor, and tribune of the people, finally attaining to the consulship, 100 A.D. He died in 115, leaving interesting literary remains in the form of his *Letters*.

**PLOCK (PLOTSK)**, a government of Russian Poland, on the right bank of the Vistula, having the provinces of Western and Eastern Prussia on the north, and the Polish provinces of Lomza on the east, and Warsaw on the south. Its area is 4,200 square miles. Its flat surface, 350 to 500 feet above the sea-level, gently rises toward the north, where it merges in the Baltic coast-ridge of the Prussian lake district. Only a few hills reach 600 feet above the sea, while the broad valley of the Vistula has an elevation of but 130 to 150 feet.

*History.*—After the second dismemberment of Poland in 1793, what is now the government of Plock became part of Prussia. It fell under Russian dominion after the treaty of Vienna, and, in the division of that time into five provinces, extended over the western part of the present province of Lomza, which was created in 1864 from the Ostrolenka and Pultusk districts of Plock, together with parts of the province of Augustowo.

**PLOCK**, capital of the above province, situated on the right bank of the Vistula, sixty miles to the west-northwest of Warsaw.

**PLOTINUS.** See **NEOPLATONISM**.

**PLOVER**, French *Pluvier*, Old French *Plovier*, which doubtless has its origin in the Latin *pluvia*, rain (as witness the German equivalent *Regenpfeifer*, Rain-fifer); but the connection of ideas between the words therein involved, so that the former should have become a bird's name, is doubtful. Belon (1555) says that the name *Pluvier* is bestowed "pour ce qu'on le prend mieux en temps pluvieux qu'en nulle autre saison," (because they are more easily caught in times of rain than at any other season), which is not in accordance with modern observation, for in rainy weather plovers are wilder and harder to approach than in fine. The Gray Plover is a bird of almost circumpolar range, breeding in the far north of America, Asia, and Eastern Europe, frequenting in spring and autumn the coasts of the more temperate parts of each continent, and generally retiring further southward in winter, sometimes as far as Tasmania.

**PLOW.** See **AGRICULTURE**.

**PLÜCKER, JULIUS**, mathematician and physicist, was born at Elberfeld on June 16, 1801, and died in 1868. Of the very numerous honors bestowed on Plücker by the various scientific societies of Europe it may suffice to mention here the Copley medal, awarded to him by the Royal Society two years before his death.

**PLUM (PRUNUS).** Our cultivated plums are supposed to have originated from one or other of the species *P. domestica* or *P. insititia*. The young shoots of *P. domestica* are glabrous and the fruit oblong; in *P. insititia* the young shoots are pubescent, and the fruit more or less globose. A third species, the common sloe or black-thorn, *P. spinosa*, has stout spines; its flowers expand before the leaves; and its fruit is very rough to the

taste, in which particulars it differs from the two preceding. These distinctions, however, are not maintained with much constancy. *P. domestica* is a native of Anatolia and the Caucasus, and is considered to be only naturalized in Europe. *P. insititia*, on the other hand, is wild in southern Europe, in Armenia, and along the shores of the Caspian.

PLUMBAGO, a name frequently applied to graphite in allusion to its remote resemblance to lead, whence it is popularly called "black lead."

PLUNKET, WILLIAM CONYNGHAM PLUNKET, BARON, an eminent lawyer, orator, and statesman, was born in the county of Fermanagh, Ireland, in July, 1765. After the union of Great Britain and Ireland Plunket returned to the practice of his profession, and became at once a leader of the equity bar. In 1804, in Pitt's second administration, he became solicitor-general and then attorney-general for Ireland. In 1812, having amassed a considerable fortune, he reëntered parliament as member for Trinity College, and identified himself thoroughly with the Grenville or anti-Gallican Whigs.

In 1822 Plunket was once more attorney-general for Ireland, with Lord Wellesley as lord-lieutenant.

In 1827 Plunket was made master of the rolls in England; but, owing to the professional jealousy of the bar, who not unnaturally thought him an intruder, he was obliged to abandon this office. Soon afterward he became chief justice of the common pleas in Ireland, and was then created a peer of the United Kingdom. In 1830 he was appointed lord chancellor of Ireland, and held the office, with an interval of a few months until 1841, when he finally retired from public life. During this period he made some able speeches in favor of parliamentary reform; but they were scarcely equal to his earlier efforts; and his reputation as a judge, though far from low, was not so eminent as might have been expected. He died in 1854, in his ninetieth year.

PLUSH (French *Peluche*), a textile fabric having a cut nap or pile the same as fustian or velvet.

PLUTARCH, a Greek prose writer, born at Chæronea in Bœotia, and a contemporary of Tacitus and the Plinys. The precise dates of his birth and death are unknown; but it is certain that he flourished under the Roman emperors from Nero to Trajan inclusive, so that from 50 to 100 A.D. will probably include the best years of his life. There is some probability that he outlived Trajan, who died in 117.

The celebrity of Plutarch, or at least his popularity, is mainly founded on his forty-six *Parallel Lives*. He is thought to have written this work in his later years after his return to his native town Chæronea. His knowledge of Latin and of Roman history he must have partly derived from some years' residence in Rome and other parts of Italy.

Nearly all the lives are in pairs; but the series concludes with single biographies of Artaxerxes, Aratus (of Sicyon), Galba, and Otho. In the life of Aratus, not Sosius Senecio, but one Polycrates, is addressed.

It is not to be supposed that Plutarch was content to write merely amusing or popular biographies. On the contrary, the *Lives* are works of great learning and research, and they must for this very reason, as well as from their considerable length, have taken many years in their compilation.

The voluminous and varied writings of Plutarch exclusive of the *Lives* are known under the common term of *Opera Moralia*. These consist of above sixty essays, some of them long and many of them rather difficult, some too of very doubtful genuineness. Their literary value is greatly enhanced by the large numbers of citations from lost Greek poems, especially verses from the

dramatists, among whom Euripides holds by far the first place. They evince a mind of vast and varied resources, historical as well as philosophical—the mind of an inquirer and seeker after knowledge, rather than that of an exponent or an opponent of any particular philosophical system.

PLUTO, the god of the dead in Greek mythology. His oldest son was Hades, "the Unseen;" the name Pluto was given him as the bestower of the riches of the mine, and in ordinary language it ousted the dread name of Hades, which was, however, retained in poetry. He was the son of Cronus and Rhea, and brother of Zeus and Poseidon. Having deposed Cronus, the brothers cast lots for the kingdoms of the heaven, the sea, and the infernal regions, and Pluto obtained the infernal regions, which from their ruler were afterward known as Hades. The "house of Hades" was a dark and dreadful abode deep down in the earth. How literally the god was supposed to dwell underground is shown by the method of invoking him, which was by rapping on the ground to attract his attention.

PLUTUS, ("wealth"), the Greek god of riches, whom Demeter bore to Iasion "in the fat land of Crete."

PLYMOUTH, a municipal and parliamentary borough and seaport town of Devonshire, England, is picturesquely situated on Plymouth Sound in the southwest corner of the county, at the confluence of the Tamar and Plym, forty-four miles southwest of Exeter. With the borough of Devonport and the township of East Stonehouse it forms the aggregate town known as the "Three Towns." There is railway communication by means of the Great Western and South-Western lines, and by several branch lines connected with these systems. The defenses of the town, in addition to the citadel, an obsolete fortification built by Charles II., on the site of an older fort, consist of a most elaborate chain of forts of great strength mounted with guns of the heaviest caliber, and forming a complete line of defense round the whole circumference both landward and seaward. The streets are for the most part narrow and crooked, and the houses very irregular both in style of architecture and in height. Great improvements have, however, recently taken place. The more ancient part of the town near the water-side has been much altered, and a number of model dwellings have also lately been erected. In the principal thoroughfares there are numerous handsome shops and other imposing business establishments.

Plymouth not only holds a leading position in the country as a naval station, but is the center of the growing trade of Devonshire and Cornwall, and is also becoming a holiday center and health resort. To the south of the town is the Sound, protected by the magnificent breakwater, within the limits of which and the harbors connected with it the whole British navy might find a safe anchorage. The western harbor, known as the Hamoaze, at the mouth of the river Tamar, is devoted almost exclusively to the requirements of the royal navy, as along its banks are the dockyard, the Keyham factory, the arsenal, and other government establishments (see DEVONPORT and DOCKYARDS). The eastern harbor, Cattewater with Sutton Pool, now protected by a new breakwater at Mount Batten, is the anchorage ground for merchant shipping. Commodious dock accommodation is provided at the Great Western Docks, Millbay, between Plymouth and Stonehouse, opened in 1857, and comprehending a floating basin over thirteen acres in extent with a depth of twenty-two feet at spring tides, a tidal harbor of thirty-five acres, and a graving dock. The port has an extensive trade with America, the West Indies, Mauritius, Africa, and the Baltic ports, as well as an exten-

sive coasting trade. It is the starting point for many of the emigrant ships for Australia, New Zealand, and British America. The chief exports are minerals, including copper, lead, tin, granite, and marble. There is also some trade in pilchards and other fish. The imports are chiefly agricultural produce and timber. Plymouth has few manufactures, the principal being biscuits, black-lead, candles, manures, soap, starch, sugar, lead, and the celebrated Plymouth gin. The principal industries are connected with shipbuilding and the fisheries. Population (1891), 87,307.

PLYMOUTH, a township and village of the United States, the shire-town of Plymouth county, Mass., and a port of entry on Cape Cod Bay—the village lying at the terminus of a branch of the Old Colony Railroad, thirty-seven miles south-southeast of Boston. The main interest of Plymouth is historical, and centers in the fact that it was the first settlement of the Pilgrim Fathers of New England, who landed December 21 (N.S.), 1620, on the rock now covered by a handsome granite canopy in Walker street. Leyden street, so called in memory of the Dutch town where the exiles had stopped for a season, is the oldest street in New England. The houses and general appearance of Plymouth are, however, thoroughly modern. Pilgrim Hall (which is built of granite and measures seventy feet long by forty feet wide) was erected in 1824–25 by the Pilgrim Society constituted in 1820; it contains a public library and many relics of the fathers—including Miles Standish's sword and Governor Carver's chair. The corner stone of a national monument to the Pilgrims was laid August 1, 1859, on a high hill near the railroad station; 1,500 tons of granite were used for the foundation; and a pedestal forty-five feet high is surrounded by statues twenty feet high of *Morality*, *Law*, *Education* and *Freedom*, and bears a colossal statue of *Faith*, thirty-six feet high, holding a Bible in her right hand (the largest granite statue in the world). Burying Hill was the site of the embattled church erected in 1622, and contains many ancient tombstones and the foundations of the watchtower (1643) now covered with sod. Cole's Hill is the spot where half of the *Mayflower* Pilgrims found their rest during the first winter. Five of their graves were discovered in 1855 while pipes for the town water-works were being laid, and two more (now marked with a granite slab) in 1883. The bones of the first five are deposited in a compartment of the canopy over the *Forefathers' Rock*. A town hall (1749), the county court-house, and the house of correction are the main public buildings of Plymouth. The population of the township was 4,758 in 1830, 6,024 in 1850, 6,238 in 1870, 7,093 in 1880, and 7,292 in 1890. Manufactures of sail-duck, cotton-cloth, tacks, nails, plate-iron, rolled zinc and copper rivets, hammers, etc., are carried on; the cordage factories are among the largest and most complete works of the kind in the world.

PLYMOUTH, a borough of the United States, in Luzerne county, Penn., on the Bloomsburg division of the Delaware, Lackawanna and Western Railroad, eight miles from Wyoming, is a flourishing coal-mining town, which increased its population from 2,648 in 1870 to 9,344 in 1890. At Plymouth Junction, two miles to the northeast, a branch line to Wilkesbarre connects with the Central Railroad.

PLYMOUTH BRETHERN (BRETHERN, or CHRISTIAN BRETHERN), are a sect of Christians who received the name in 1830 when the Rev. J. N. Darby induced many of the inhabitants of Plymouth to associate themselves with him for the promulgation of opinions which they held in common. Although small Christian communities existed in Ireland and elsewhere calling them-

selves *Brethren* and holding similar views, the accession to the ranks of Mr. Darby so increased their numbers and influence that he is usually reckoned the founder of Plymouthism. Darby (born in November, 1800, in London; graduated at Trinity College, Dublin, in 1819; died April 29, 1882 at Bournemouth) was a curate in the Episcopalian Church of Ireland until 1827, when he felt himself constrained to leave the Established Church; betaking himself to Dublin, he became associated with several devout people who refused all ecclesiastical fellowship, met steadily for public worship, and called themselves the Brethren.

The theological views of the Brethren do not differ greatly from those held by evangelical Protestants (for a list of divergences, see Reid, *Plymouth Brethrenism Unveiled and Refuted*); they make the baptism of infants an open question and celebrate the Lord's Supper weekly. Their distinctive doctrines are ecclesiastical. They hold that all official ministry, anything like a clergy, whether on Episcopalian, Presbyterian, or Congregational theories, is a denial of the spiritual priesthood of all believers, and a striving against the Holy Spirit. Hence it is a point of conscience to have no communion with any church which possesses a regular ministry.

PNEUMATIC DISPATCH. The transport of written dispatches through long narrow tubes by the agency of air-pressure was introduced in 1853, by Mr. Latimer Clark, between the Central and Stock Exchange stations of the Electric and International Telegraph Company in London. The stations were connected by a tube  $1\frac{1}{2}$  inches in diameter and 220 yards long. Carriers containing batches of telegrams, and fitting piston-wise in the tube, were sucked through it (in one direction only) by the production of a partial vacuum at one end. In 1858 Mr. C. F. Varley improved the system by using compressed air to force the carriers in one direction, a partial vacuum being still used to draw them in the other direction. This improvement enables single radiating lines of pipe to be used both for sending and for receiving telegrams between a central station supplied with pumping machinery and outlying stations not so supplied. In the hands of Messrs. Culley and Sabine this radial system of pneumatic dispatch has been brought to great perfection in connection with the telegraphic department of the British post-office. Another method of working, extensively used in Paris and other Continental cities, is the circuit system, in which stations are grouped on circular or loop lines, round which carriers travel in one direction only. Various forms of the system are used in America in the principal cities. In one form of circuit system—that of Messrs. Siemens—a continuous current of air is kept up in the tube, and rocking switches are provided by which carriers can be quickly introduced or removed at any one of the stations on the line without interfering with the movement of other carriers in other parts of the circuit. More usually, however, the circuit system is worked by dispatching carriers, or trains of carriers, at relatively long intervals, the pressure or vacuum which gives motive power being applied only while such trains are on the line. On long circuits means are provided at several stations for putting on pressure or vacuum, so that the action may be limited to that section of the line on which the carriers are traveling at any time.

PNEUMATICS is that department of hydrodynamics which treats of the properties of gases as distinct from liquids. Under HYDROMECHANICS will be found a general discussion of the subject as a branch of mathematical physics.

The gaseous fluid with which we have chiefly to do is our atmosphere. Though practically invisible, it ap-

peals in its properties to other of our senses, so that the evidences of its presence are manifold. Thus we feel it in its motion as wind, and observe the dynamical effects of this motion in the quiver of the leaf or the momentum of the frigate under weigh. It offers resistance to the passage of bodies through it, destroying their motion and transforming their energy—as is betrayed to our hearing in the whiz of the rifle bullet, to our sight in the flash of the meteor. In its general physical properties the air has much in common with other gases. It is advisable therefore first to establish these general properties, and then consider the characteristic features of the several gases.

Matter is conveniently studied under the two great divisions of solids and fluids. The practically obvious distinction between these may be stated in dynamical language thus:—solids can sustain a longitudinal pressure without being supported by a lateral pressure; fluids cannot.

The mutual action between any two portions of matter is called the stress between them. This stress has two aspects, according as its effect or tendency is considered with reference to the one or the other body. Thus between the earth and moon there is a stress which is an attraction. The one aspect is the force which attracts the moon to the earth; the other is the force which attracts the earth to the moon.

The stress which exists between the contiguous portions of a fluid is of the nature of a pressure. The ideal or perfect fluid is a substance in which this stress between contiguous portions is always perpendicular to the common interface. In other words there is no stress tangential to the interface at any point.

The pressures at two contiguous points in a fluid may either differ or not. If they differ, the change of pressure must be balanced by some extraneous force acting on the fluid in the direction in which the pressure increases. Any direction in which no such force acts must be a direction in which there is no change of pressure; otherwise equilibrium will be destroyed. Suppose now the resultant force at every point in a fluid at rest to be given. In directions at right angles to the force at any given point the pressure will not vary. Hence we can pass to an infinite number of contiguous points at which the pressure is the same as at the given points. By making each of these in turn the starting-point, we can pass on to another set of points, and so gradually trace out within the fluid a surface at every point of which the pressure is the same. Such a surface is called a surface of equal pressure, or briefly a level surface; and we can see from the mode of its construction that it is at every point of it perpendicular to the resultant force at that point.

It is evident that, for a fluid situated as our atmosphere is, the pressure must diminish as we ascend. The equipotential surfaces and consequently the surfaces of equal pressure and of equal density will be approximately spheres concentric with the earth. At any point there will be a definite atmospheric pressure, which is equal numerically to the weight of the superincumbent vertical column of air of unit cross section. The effect of this pressure, as exemplified in the action of the common suction-pump, seems to have been first truly recognized by Galileo, who showed that the maximum depth from which water can be pumped is equal to the height of the water column which would exert at its base a pressure equal to the atmospheric pressure. As an experimental verification, he suggested filling with water a long pipe closed at the upper end, and immersing it with its lower and open end in a reservoir of the same liquid. The liquid surface in the pipe would, if the pipe were long enough, stand at a definite height, which

would be the same for all longer lengths of pipe. The practical difficulty of constructing a long enough tube (33 feet at least) prevented the experiment being really made till many years later.

Torricelli, however, in 1642, by substituting mercury for water, produced the experiment on a manageable scale. See BAROMETER.

The transition from the gaseous to the liquid state is conveniently studied by the help of isothermal lines, which may be generally defined as curves showing the relation between two mutually dependent variables for given constant temperatures. Such variables are the pressure and volume of a mass of gas. Let the numbers representing the volumes be measured from a chosen origin along a horizontal axis, and the numbers representing the pressures similarly along a vertical axis passing through the same origin. If we consider a mass of gas at a given temperature, for any volume that can be named there will be a definite pressure corresponding, and *vice versa*. Hence the point whose coördinates are the corresponding volume and pressure is completely determined if either coördinate is given. The temperature always being kept constant, let now the volume change continuously. The pressure will also alter according to a definite law; and the point whose coördinates are at any instant the corresponding volume and pressure will trace out a curve. This curve is an isothermal curve, or simply an *isotherm*. The isotherm would be a rectangular hyperbola, whose asymptotes are the coördinate axes. For any gas not near its point of liquefaction the isotherm will not deviate greatly from the hyperbolic form.

So long as the substance is in the gaseous form, the isotherm remains approximately hyperbolic; but at the pressure at which liquefaction takes place a marked change occurs in the form of the curve.

The necessity for a very low temperature long prevented the obtaining in a liquid form of the standard gases—hydrogen, oxygen, nitrogen, etc.—which were accordingly distinguished by the name *permanent gases*. Faraday proved that these could not be liquefied at a temperature of  $-110^{\circ}$  C., even when subjected to a pressure of 27 atmospheres. Naterer likewise failed to reduce these gases to the liquid state, even at a pressure of 3,000 atmospheres. His means for reducing the temperature were not satisfactory. In 1877 Cailletet and Pictet, working independently, first successfully effected their approximate liquefaction.

In many experiments on the properties of gases it is necessary to have an efficient and rapid means for altering the density. Instruments for this purpose are called air-pumps, and their function may be either to rarefy or condense the air—usually the former.

Otto Von Guericke of Magdeburg constructed the first air-pump about the year 1652. It was simply a spherical glass vessel opening below by means of a stop-cock and narrow nozzle into the cylinder of an “exhausting syringe,” which inclined upward from the extremity of the nozzle, while at the same time the former was forced open by the pressure of the denser air in the vessel and nozzle. Thus, at every complete stroke of the piston, the air in the vessel or receiver was diminished by that fraction of itself which is expressed by the ratio of the volume of the available cylindrical space above the outward opening valve to the whole volume of receiver, nozzle, and cylinder.

The important characteristics of an efficient air-pump are as follows. The piston must work smoothly and easily. The valves must act precisely, and be when closed absolutely air-tight. The plate on which the receivers rest must be smooth and plane, so that the ground edges of the receivers may be in close contact

all round. This perfect fitting is beyond the powers of the best workmanship, so that it is necessary to press between the receiver and plate a thin layer of lard, which renders the junction air-tight. Somewhere in the duct leading from the receiver to the piston cylinders, a stop-cock must be fixed, so that it may be possible to shut off the receiver completely from these. Then a second stop-cock is required as a ready means for admitting air to the receiver, whenever the need should arise. A combination three-way stop-cock is a very usual form. And, finally, the apparatus should be provided with a pressure gauge—a mercury manometer communicating by means of a duct with the main duct and receiver.

The cooling of a gas by its own expansion may be observed in one of its effects during exhaustion in an ordinary receiver. Frequently a cloud of minute drops of water—a veritable fog—forms in the exhausted air. The reason simply is that the air has become cooled below its dew-point, or the temperature corresponding to the pressure of water vapor present.

PNEUMONIA, or inflammation of the substance of the lungs, manifests itself in several forms which differ from each other in their nature, causes, and results—viz.: (1) Acute Croupous or Lobar Pneumonia, the most common form of the disease, in which the inflammation affects a limited area, usually a lobe or lobes of the lung, and runs a rapid course; (2) Catarrhal Pneumonia, Broncho-Pneumonia, or Lobular Pneumonia, which occurs as a result of antecedent bronchitis, and is more diffuse in its distribution than the former; (3) Interstitial Pneumonia or Cirrhosis of the lung, a more chronic form of inflammation, which affects chiefly the framework or fibrous stroma of the lung and is closely allied to phthisis.

*Acute Croupous or Lobar Pneumonia.*—This is the disease commonly known as inflammation of the lungs.

The symptoms of acute pneumonia are generally well marked from the beginning. The attack is usually ushered in by a rigor (or in children a convulsion), together with vomiting and the speedy development of the febrile condition, the temperature rising to a considerable degree— $101^{\circ}$  to  $104^{\circ}$  or more. The pulse is quickened and there is a marked disturbance in the respiration, which is rapid, shallow, and difficult, the rate being usually accelerated to some two or three times its normal amount. The lips are livid, and the face has a dusky flush. Pain in the side is felt, especially should any amount of pleurisy be present, as is often the case. Cough is an early symptom. It is at first frequent and hacking, and is accompanied with a little tough colorless expectoration, which soon, however, becomes more copious and of a rusty brown color, either tenacious or frothy and liquid. Microscopically this consists mainly of epithelium, casts of the air cells, and fine bronchi, together with granular matter and blood and pus corpuscles.

The treatment of acute pneumonia, which at one time was conducted on the antiphlogistic or lowering principle, has of late years undergone a marked change; and it is now generally held that in ordinary cases very little active interference is called for, the disease tending to run its course very much as a specific fever. The employment of blood-letting once so general is now only in rare instances resorted to; but, just as in pleurisy, pain and difficulty of breathing may sometimes be relieved by the application of a few leeches to the affected side. In severe cases the cautious employment of aconite or antimony at the outset appears useful in diminishing the force of the inflammatory action. Warm applications in the form of poultices to the chest give comfort in many cases. Cough is relieved by ex-

pectorants, of which those containing carbonate of ammonia are specially useful. Any tendency to excessive fever may often be held in check by quinine. The patient should be fed with milk, soups, and other light forms of nourishment. In the latter period of the disease stimulants may be called for, but most reliance is to be placed on nutritious aliment. After the acute symptoms disappear counter irritation by iodine or a blister will often prove of service in promoting the absorption of the inflammatory products. After recovery is complete the health should for some time be watched with care.

When pneumonia is complicated with any other ailment or itself complicates some preëxisting malady, it must be dealt with on principles applicable to these conditions as they may affect the individual case.

The symptoms characterizing the onset of catarrhal pneumonia in its more acute form are the occurrence during an attack of bronchitis of a sudden and marked elevation of temperature, together with a quickened pulse and increased difficulty in breathing. The cough becomes short and painful, and there is little or no expectoration. The physical signs are not distinct, being mixed up with those of the antecedent bronchitis; but, should the pneumonia be extensive, there may be an impaired percussion note with a tubular breathing and some bronchophony.

Acute catarrhal pneumonia must be regarded as a condition of serious import. It is apt to run rapidly to a fatal termination, but on the other hand a favorable result is not infrequent if it is recognized in time to admit of efficient treatment. In the more chronic form it tends to assume the characteristics of chronic phthisis (see PHTHISIS). The treatment is essentially that for the more severe forms of bronchitis (see BRONCHITIS), where in addition to expectorants, together with ammoniacal, ethereal, and alcoholic stimulants, the maintenance of the strength by good nourishment and tonics is clearly indicated. The breathing may often be relieved by light warm applications to the chest and back. Convalescence is often prolonged, as special care will always be required in view of the tendency of the disease to develop into phthisis.

The symptoms of chronic interstitial pneumonia are very similar to those of chronic phthisis (see PHTHISIS), especially increasing difficulty of breathing, particularly on exertion, cough either dry or with expectoration, sometimes copious and fetid. In the case of coalminers the sputum is black from containing carbonaceous matter.

The physical signs are deficient expansion of the affected side—the disease being mostly confined to one lung—increasing dullness on percussion, tubular breathing, and moist sounds. As the disease progresses retraction of the side becomes manifest, and the heart and liver may be displaced. Ultimately the condition as regards both physical signs and symptoms takes the characteristics of the later stages of phthisis with colliquative symptoms, increasing emaciation, and death. Occasionally dropsy is present from the heart becoming affected in the course of the disease. The malady is usually of long duration, many cases remaining for years in a stationary condition and even undergoing temporary improvement in mild weather, but the tendency is on the whole downward.

The treatment is conducted on similar principles to those applicable in the case of phthisis. Should the malady be connected with a particular occupation, the disease might be averted or at least greatly modified by early withdrawal from such source of irritation.

PNOM-PENH, the capital of CAMBODIA.

PO, the largest river of Italy, traverses the whole length of the great plain between the Alps and the

Apennines, which was in the Miocene period an arm of the sea connecting the Adriatic with the Mediterranean by what is now the Col d'Altare or Col di Cadibona and has gradually been filled by detritus from the surrounding highlands. That its course lies much nearer the Apennines than the Alps is evidently due to the fact that the tributaries from the loftier range on the north, whether in the form of glacier or stream, have all along been much more powerful than the tributaries from the south. The total length of the river from its conventional source to the mouth of the principal channel is 417½ miles, and the area of its basin, which includes portions of Switzerland and Austria, is estimated at 26,798 square miles.

POCHARD, POCKARD, or POKER, names properly belonging to the male of a species of Duck (the female of which is known as the Dunbird) the *Anas ferina* of Linnæus, and *Fuligula* or *Æthya ferina* of later ornithologists—but names very often applied by writers in a general way to most of the group or Subfamily *Fuligulinae* commonly called Diving or Sea-Ducks.

POCOCK, EDWARD, one of the most eminent of English Oriental and Biblical scholars, was born in 1604, and died in 1691.

POCOCKE, RICHARD, distantly related to the preceding, was the son of Richard Pockocke, head master of the free school at Southampton, where he was born in the year 1704. He died in 1765.

PODIEBRAD, GEORGE OF, king of Bohemia, was the son of Herant of Podiebrad, a Bohemian nobleman, and was born April 6, 1420. On the death of Ladislaus in 1457 he was chosen king of Bohemia (March, 1458.) George died March 22, 1471, and was succeeded by Ladislaus, eldest son of Casimir IV.

PODOLIA, a government of southwestern Russia, having Volhynia on the north, Kieff and Kherson on the east and south, Bessarabia on the southwest, and Galicia (Austria) on the west, from which last it is separated by the Zbrutch, or Rodvotcha, a tributary to the Dniester. It has an area of 16,223 square miles, extending for 200 miles from northwest to southeast on the left bank of the Dniester.

PODOLSK, a district-town of Russia, in the government of Moscow, is situated twenty-three miles to the south of the capital, at the junction of the two main roads going from Moscow to the Crimea and to Warsaw, and within a mile from the Podolsk railway station.

PODOPHYLLIN, a popular remedy which is much used by those who are averse to the employment of calomel and other mercurial preparations, and hence has been called vegetable mercury. The drug, as used in medicine, is obtained from the rhizome of the American mandrake or May apple. *Podophyllum peltatum*, L., an herbaceous perennial belonging to the natural order *Berberidaceæ*, indigenous in woods in Canada and the United States. In small doses it acts as a slow and gentle laxative, especially if combined with henbane and belladonna, but in large doses it is an irritant hydragogue cathartic, the action of which persists for some time. The usual dose as a laxative and mild hepatic stimulant is about ⅙ of a grain, but the samples met with in commerce vary considerably in strength, and act with varying effect upon different individuals. Specimens having a greenish tint should be avoided, since they probably contain podophyllo-querctin, and tend to cause severe griping. In large doses it appears to lose its stimulant action on the liver. Podophyllin is official in the pharmacopœias of Great Britain, India, France, Russia, and the United States.

POE, EDGAR ALLAN, is the most interesting figure in American literature, and his life furnishes the most extraordinary instance on record of systematic misrep-

resentation on the part of a biographer. It was not quite correct to describe Poe as the son of strolling players, but his father, a man of good family, had married an actress and taken to the stage as a profession. Their son was born in Baltimore, February 19, 1809; and father and mother died in 1811 when he was a child. The orphan was adopted by his godfather, Mr. Allan, a wealthy merchant, and from his eighth till his thirteenth year (1816-1821) was placed at school in England. Thence he was transferred to an academy at Richmond, Va., and thence at the age of seventeen to the university of Virginia at Charlottesville. Mr. Allan was childless, and apparently treated his adopted son as his own child. Why Poe left the university after one session is not clearly explained, but it has been ascertained that he was not expelled, but on the contrary was honorably distinguished as a student, although it is admitted that he had contracted debts and had "an ungovernable passion for card-playing." These debts may have been sufficient cause for a quarrel with Mr. Allan. Poe disappeared for two years, setting out for Europe to join the Greeks in their fight for independence. Reappearing at Richmond in 1829, he stayed at home for a year, and then was entered as a military cadet at West Point. But all his ambitions by this time were toward literature; he neglected his duties, disobeyed orders, and was dismissed from the service of the United States. What he did for two years after is not ascertained, but in 1833 he reappeared as the successful competitor for a prize offered by a Baltimore newspaper for a prose story. From that time he subsisted by literature. Mr. Allan had married again, and died soon afterward, leaving an heir by his second wife, and "not a mill" to Poe.

During the fifteen years of his literary life Poe was connected with various newspapers and magazines in Richmond, New York, and Philadelphia, and there is unanimous testimony that, so far from being an irregular contributor, he was a model of punctuality and thoroughness, and took a pride in these homely virtues. His connection was not in any one case "severed by his irregularities." He wrote first for the *Southern Literary Messenger* in Richmond, and edited it for some time; then, in 1837, he removed to New York, and wrote criticisms and did editorial work for the *New York Quarterly Review*; then, after a year, with a prospect of more lucrative employment, he removed to Philadelphia, and for four years was the mainstay of *Graham's Magazine*. His literary work was poorly paid for, though some of his most powerful tales—*Hans Pfaal*, *Arthur Gordon Pym*, *Ligeia*, *The House of Usher*, *The Murders in the Rue Morgue*, *Marie Roget*, *The Descent into the Maelström*—were among Poe's contributions to these periodicals. His short stories were an easy prey for the newspaper pirate, and when thousands were reading them the author received nothing but the few dollars paid him by the publication in which they first appeared. *The Raven* was first published in 1845, and in a few months was being read and recited and parodied wherever the English language was spoken; but the half-starved poet, who had to live by his genius, received only ten dollars for the production. And, fertile and active as his imagination was, these short works of his, which served for the passing sensation of the newspaper reader, were far from being extempore effusions. His *Philosophy of Composition* is sometimes, indeed generally, regarded as half-serious, half a jest, in the author's peculiar way of mystification.

His wife died in 1847, and he followed her in 1849, dying under painful circumstances at Baltimore. For a critical estimate of Poe's writings the reader may be referred to Professor Nichol's *American Literature*.

There are few English writers of this century whose fame is likely to be more enduring. The feelings to which he appeals are simple but universal, and he appeals to them with a force that has never been surpassed.

POERIO, CARLO, Italian statesman, born in 1803, was descended from an old Calabrian family and was a son of Giuseppe Poerio, a distinguished lawyer of Naples. He died at Florence, April 28, 1867.

POETRY. In modern criticism the word poetry is used sometimes to denote any expression (artistic or other) of imaginative feeling, sometimes to designate one of the fine arts.

As an expression of imaginative feeling, as the movement of an energy, as one of those great primal human forces which go to the development of the race, poetry in the wide sense has played as important a part as science. In some literatures (such as that of England) poetic energy and in others (such as that of Rome) poetic art is the dominant quality. It is the same with individual writers. In classical literature Pindar may perhaps be taken as a type of the poets of energy; Virgil of the poets of art. In English poetical literature Elizabeth Barrett Browning typifies, perhaps, the poets of energy; while Keats (notwithstanding all his unquestionable inspiration) is mostly taken as a type of the poets of art. In French literature Hugo, notwithstanding all his mastery over poetic methods, represents the poets of energy.

In some writers, and these the very greatest—in Homer, Æschylus, Sophocles, Dante, Shakespeare, Milton, and perhaps Goethe—poetic energy and poetic art are seen in something like equipoise. It is of poetry as an art, however, that we have mainly to speak here; and all we have to say upon poetry as an energy is that the critic who, like Aristotle, takes this wide view of poetry—the critic who, like him, recognizes the importance of poetry in its relations to man's other expressions of spiritual force, claims a place in point of true critical sagacity above that of a critic who, like Plato, fails to recognize that importance. And assuredly no philosophy of history can be other than inadequate should it ignore the fact that poetry has had as much effect upon human destiny as that other great human energy by aid of which, from the discovery of the use of fire to that of the electric light, the useful arts have been developed.

1. *What is Poetry?*—Definitions are for the most part alike unsatisfactory and treacherous; but definitions of poetry are proverbially so.

Yet some definition, for the purpose of this essay, must be here attempted; and, using the phrase "absolute poetry" as the musical critics use the phrase "absolute music," we may, perhaps, without too great presumption submit the following:

*Absolute poetry is the concrete and artistic expression of the human mind in emotional and rhythmical language.*

2. *What position does Poetry take up in Relation to the other Arts?*—Notwithstanding the labors of Lessing and his followers, the position accorded by criticism to poetry in relation to the other arts was never so uncertain and anomalous as at the present moment. On the one hand there is a class of critics who, judging from their perpetual comparison of poems to pictures, claim her as a sort of handmaid of painting and sculpture. On the other hand the disciples of Wagner, while professing to do homage to poetry, claim her as the handmaid of music. To find her proper place is therefore the most important task the critic can undertake at this time, though it is one far beyond the scope of a paper so brief as this. With regard to the relations of poetry to painting and sculpture, however, it seems

necessary to glance for a moment at the saying of Simonides, as recorded by Plutarch, that poetry is a speaking picture and that painting is a mute poetry. It appears to have had upon modern criticism as much influence since the publication of Lessing's *Laocoon* as it had before. Perhaps it is in some measure answerable for the modern vice of excessive word-painting. Beyond this one saying, there is little or nothing in Greek literature to show that the Greeks recognized between poetry and the plastic and pictorial arts an affinity closer than that which exists between poetry and music and dancing. Understanding artistic methods more profoundly than the moderns, and far too profoundly to suppose that there is any special and peculiar affinity between an art whose medium of expression is marble and an art whose medium of expression is a growth of oral symbols, the Greeks seem to have studied poetry not so much in its relation to painting and sculpture as in its relation to music and dancing.

The true place of poetry lies between music on the one hand and prose, or loosened speech, on the other.

And now how stands poetry with regard to the plastic arts?

As compared with sculpture and painting the great infirmity of poetry, as an "imitation" of nature, is of course that the medium is always and of necessity words—even when no words could, in the dramatic situation, have been spoken. What human sounds could render the agony of Niobe, or the agony of Laocoon, as we see them in the sculptor's rendering? Not articulate speech at all; not words but wails. It is the same with hate; it is the same with love. We are not speaking merely of the unpacking of the heart in which the angry warriors of the *Iliad* indulge. Even such subtle writing as that of Æschylus and Sophocles falls below the work of the painter. Hate, though voluble perhaps, as Clytæmnestra's when hate is at that red-heat glow which the poet can render, changes in a moment whenever that redness has been fanned to hatred's own last complexion—whiteness as of iron at the melting-point—when the heart has grown far too big to be "unpacked" at all, and even the bitter epigrams of hate's own rhetoric, though brief as the terrier's snap before he fleshes his teeth, or as the short snarl of the tigress as she springs before her cubs in danger, are all too slow and sluggish for a soul to which language at its tensest has become idle play. But this is just what cannot be rendered by an art whose medium consists solely of words.

It is giving voice, not to emotion at its tensest, but to the variations of emotion, it is in expressing the countless shifting movements of the soul from passion to passion, that poetry shows in spite of all her infirmities her superiority to the plastic arts.

The faculty of developing a poetical narrative from a philosophic thought is Oriental, and on the whole foreign to the genius of the Western mind. Neither in Western drama nor in Western epic do we find, save in such rare cases as that of Vondel, anything like that power of developing a story from an idea which not only Jami but all the parable poets of Persia show.

In recent English poetry, the motive of Shelley's dramatic poem *Prometheus Unbound* is a notable illustration of what is here contended. Starting with the full intent of developing a drama from a motive—starting with a universalism, a belief that good shall be the final goal of ill—Shelley cannot finish his first 300 lines without shifting (in the curse of "Prometheus") into a Manichæism as pure as that of Manes himself:—

"Heap on thy soul, by virtue of this curse,  
Ill deeds, then be thou damned, beholding good;  
Both infinite as is the universe."

According to the central thought of the poem human nature, through the heroic protest and struggle of the human mind typified by Prometheus, can at last dethrone that supernatural terror and tyranny (Jupiter) which the human mind had itself installed. But, after its dethronement (when human nature becomes infinitely perfectible), how can the supernatural tyranny exist apart from the human mind that imagined it? How can it be as "infinite as the universe?"

POGGENDORFF, JOHANN CHRISTIAN, physicist, an editor for more than half a century of the well-known scientific journal called after him *Poggendorff's Annalen*, was born in Hamburg on December 29, 1796. He had an extraordinary memory, well-stored with scientific knowledge, both modern and historical, which served him in good stead in the critical part of his editorial duty. He had a cool and impartial judgment, with a strong preference for facts as against theory of the speculative kind at least, and was able to throw himself into the spirit of modern experimental science, represented in the early part of his editorial career by such great names as Berzelius, Faraday, Brewster, Fresnel, Regnault. He also possessed in more than German measure the German virtue of orderliness in the arrangement of knowledge and in the conduct of business. To this he added an engaging geniality of manner and much tact in dealing with men; so marked in fact was this part of his character that, notwithstanding his somewhat trying position, he never during his long life was involved in anything that could be fairly called a literary quarrel. Its editor soon made *Poggendorff's Annalen* the foremost scientific journal in Europe.

Poggendorff's literary and scientific reputation speedily brought him honorable recognition. In 1830 he was made royal professor and in 1834 Hon. Ph.D. and extraordinary professor in the university of Berlin, and in 1839 member of the Berlin Academy of Sciences. He ultimately became a member of many foreign societies, and received more than the usual share of the orders bestowed by continental nations for scientific merit. During his lifetime many offers of ordinary professorships were made to him, but he declined them all, devoting himself to his duties as editor of the *Annalen*, and to the pursuit of his scientific researches. He died at Berlin on January 24, 1877.

POGGIO, Gian Francesco Poggio Bracciolini, eminent in the annals of the revival of learning, was born in 1380 at Terranova, a village in the territory of Florence. His distinguished abilities and his dexterity as a copyist of MSS. brought him into early notice with the chief scholars of Florence.

POGY, a popular name for the fish *Clupea menhaden*, almost universally in use in the State of Maine and Massachusetts (see MENHADEN).

POINSOT, LOUIS, mathematician, was born at Paris, January 3, 1777. In 1794 he became a scholar at the Polytechnic School, which he left in 1796 to act as a civil engineer. He died at Paris, December 5, 1859. Poinsot's earliest work was his *Élémens de Statique*, in which he introduces the idea of statical couples and investigates their properties. He contributed a number of papers on pure and applied mathematics to *Liouville's Journal* and to the *Journal* of the Polytechnic School.

POINT DE GALLE. See GALLE.

POINTE À PITRE, the principal port of the island of Guadeloupe.

POISONS. An exact definition of the word "Poison" is by no means easy. There is no legal definition of what constitutes a poison, and the definitions usually proposed are apt to include either too much or too little. Generally, a poison may be defined to be a substance having an inherent deleterious property, rendering it

capable of destroying life by whatever avenue it is taken into the system; or it is a substance which when introduced into the system, or applied externally, injures health or destroys life irrespective of mechanical means or direct thermal changes. In popular language, a poison is a substance capable of destroying life when taken in small quantity; but a substance which destroys life by mechanical means as, *e.g.*, powdered glass, is not strictly speaking a poison.

The subject of toxicology forms one of the most important branches of MEDICAL JURISPRUDENCE, (*q.v.*) The medical jurist should be familiar with the nature and actions of poisons, the symptoms which they produce, the circumstances which modify their working, the pathological results of their action, and the methods of combating these.

*Action of Poisons.*—Poisons may exert a twofold action. This may be either local, or remote, or both local and remote. The local action of a poison is usually one of corrosion, inflammation, or a direct effect upon the sensory or motor nerves. The remote actions of poisons are usually of a specific character, though some writers group the remote effects of poisons under two heads, and speak of the common and the specific remote effects of a poison. The local action of a poison of the corrosive class is usually so well marked and obvious that the fact of the administration of a poison of this class is generally unmistakable. The same may be said, in a less degree, of the irritant poisons, especially the mineral irritants; but here the symptoms sometimes so closely simulate those of natural disease as to render the recognition of the administration of poison a matter of difficulty. Hence an accurate acquaintance with the remote specific effects of the various poisons is indispensable to the medical jurist. The class of poisons which has been administered or taken will thus be suggested to his mind by the observation of the symptoms; and not infrequently the specific poison taken will be suspected. It is almost universally admitted that absorption of a poison is necessary for the production of its specific remote effects, and the old notion that a poison may kill, by its action through the nervous system, without absorption, is abandoned.

*Modifying Circumstances.*—The ordinary action of a poison may be greatly modified by the largeness of the dose, by the state of aggregation, admixture, or of chemical combination of the poison, by the part or membrane to which it is applied, and by the condition of the patient. Thus, for example, opium may be a medicine or a poison according to the dose in which it is given; and a dose of the drug which may be beneficial to an adult in certain states of the system may be fatal to a child, or to an adult when suffering from some forms of disease. All barium salts, again, are poisonous, except the quite insoluble sulphate. The simple cyanides, and many double cyanides, are highly poisonous; but yellow prussiate of potash, which is a double cyanide of iron and potassium, is almost without action upon the system. The part or tissue to which a poison is applied greatly affects the activity of a poison, owing to the varying rapidity with which absorption takes place through the cutaneous, mucous and serous surfaces, and by the other tissues of the body. Curare, an arrow poison, may be swallowed in considerable quantity without appreciable result, while a minute quantity of the same substance introduced into a wound is speedily fatal. Idiosyncrasy has an important bearing in toxicology. Pork, mutton, certain kinds of fish, more especially shell fish so-called, and mushrooms have each produced all the symptoms of violent irritant poisoning, while other persons who have partaken of



the same food at the same time have experienced no ill effects. Some persons are stated, on good authority, to be capable of taking with impunity such poisons as opium, corrosive sublimate, or arsenic, in enormous doses—and this irrespective of habit, which is known to have such an influence in modifying the effects of some poisons, notably the narcotics. A tolerance of poisons is sometimes engendered by disease, so that a poison may fail to produce its customary effect. Thus, opium is tolerated in large quantities in tetanus and in delirium tremens, and mercurial compounds may in some febrile affections fail to produce the usual constitutional effects of the metal. On the other hand, diseases which impede the elimination of a poison may intensify its effects.

The *evidence* that a poison has been administered is based upon the symptoms produced, on the appearances met with in the body after death, on the analysis of articles of food and drink, of excreta and ejecta, and of the organs of the body after death, and on physiological experiments made with substances extracted from the same articles. These physiological experiments are usually made upon animals, but in some cases, as for instance when aconite has to be searched for, the physiological experiments must be made also upon the human subject. The evidence obtained from one or more of these sources, as compared with the properties or effects of various known poisons, will enable the medical jurist to form an opinion as to the administration or non-administration of a poison.

The *symptoms* exhibited by the patient during life rarely fail to afford some clue to the poison taken. Persons may, however, be found dead of whose history nothing can be learned. Here post-mortem appearances, chemical analysis, and, it may be, physiological experiments are all-important for the elucidation of the nature of the case.

Poisoning may be *acute* or *chronic*. The general conditions which should arouse a suspicion of acute poisoning are the sudden onset of serious and increasingly alarming symptoms in a person previously in good health, especially if there be pain in the region of the stomach, or, where there is complete prostration of the vital powers, a cadaveric aspect, and speedy death. In all such cases the aid of the analytical chemist must be called in either to confirm well-founded or rebut ill-founded suspicions.

The *mode of treatment* to be adopted in the case of poisoned persons varies greatly according to the nature of the poison. The first indication, when the poison has been swallowed, is to evacuate the stomach; and this may usually be done by means of the stomach-pump when the poison is not of the corrosive class; or the stomach may be gently washed out by means of a funnel and flexible siphon-tube. In many cases emetics are valuable. Antidotes and counter-poisons may then be given. The former are such substances as chalk to neutralize the mineral acids and oxalic acid; the latter have a physiological counteraction, and are such as atropine, which is a counter-poison to morphia. These may usually be administered most effectively by hypodermic injection. The stomach may to a certain degree be protected from the injurious effects of irritants by the administration of mucilaginous drinks; alkaloids may be rendered sparingly soluble by means of astringent substances containing tannin; and pain may be relieved by means of opium, unless contra-indicated by the nature of the poison. The effects of the convulsant poisons, such as strychnine, may be combated by means of the inhalation of chloroform.

The *classification* of poisons is a matter of difficulty. Various attempts have been made to classify them scien-

tifically, but with no signal success; and perhaps the best system is that which groups the various poisons according to the more obvious symptoms which they produce. Our knowledge of the more intimate action of poisons is still too imperfect to admit of any useful classification according to the manner in which they specifically affect the vital organs. Poisons may in the manner indicated be classified as (1) *Corrosives*, (2) *Irritants*, (3) *Neurotics*, and (4) *Gaseous Poisons*. The subject of poisonous food has already been treated under the heading MEDICAL JURISPRUDENCE.

POISSON, SIMÉON DENIS, a celebrated French mathematician, was born at Pithiviers in the department of Loiret, on June 21, 1781, and died in 1840.

As a teacher of mathematics Poisson is said to have been more than ordinarily successful, as might have been expected from his early promise as a répétiteur at the Polytechnic School. As a scientific worker his activity has rarely if ever been equaled. Notwithstanding his many official duties, he found time to publish more than 300 works, several of them extensive treatises, and many of them memoirs dealing with the most abstruse branches of pure and applied mathematics. There are two remarks of his, or perhaps two versions of the same remark, that explain how he accomplished so much: one, "La vie n'est bonne qu'à deux choses—à faire des mathématiques et à les professer;" (Life has but two good things—to study mathematics and be a professor); the other, "La vie c'est le travail." (Life is toil.)

POITIERS, a town of France, formerly the capital of Poitou, and now the chief town of the department of Vienne, lies 206 miles southwest of Paris on the railway to Bordeaux, at the junction of the Boivre with the Clain (a tributary of the Loire by the Vienne), and occupies the slopes and summit of a plateau which rises 130 feet above the level of the streams by which it is surrounded on three sides. King John having been defeated and made prisoner in the disastrous battle of Poitiers (fought four miles east of the town on the hillside of Nouaille, September 19, 1356), Poitou was recognized as an English possession by the treaty of Brétigny (1360). Nine years later it was recovered by Duguesclin.

POITOU, one of the old provinces of France, which also formed one of the great military governments of the kingdom, was bounded north by Brittany, Anjou, and Touraine; south by Angoumois and Aunis; east by Touraine, Berri, and Marche; and west by the ocean. It was divided into Lower Poitou, which corresponded to the modern department of La Vendée, and Upper Poitou, now split into the departments of Deux-Sèvres and Vienne.

POKER, a game at cards—probably a development of *il frusso* (played in Italy in the fifteenth century). A similar but less simple game, called *primiera*, was also played in Italy in the sixteenth century, whence under the name of *primero* it traveled to Spain. *La prime* is mentioned by Rabelais (sixteenth century;) and later the game of prime elaborated was played in France under the name of *l'ambigu* or *le meslé*. Prime was also played in England in the sixteenth century; and later a bastard kind of prime, called post and pair, was much played in the west of England. Gleek had some points of resemblance to these games. The more modern game of brag is only post and pair with variations. Poker (originally played in America) may be described as developed brag, though in some respects it "throws back" to the parent games post and pair, *l'ambigu*, and *primero*.

*Draw Poker* is played with a pack of fifty-two cards, and by any number of persons from two to six.

Before the dealer begins to deal the cards, the player

next to his left, who is called the *ante-man*, or *age*, must deposit in the pool an *ante* not exceeding one-half the limit previously agreed upon; this is called a blind.

The deal is performed by giving five cards to each player, one at a time, beginning with the player to the left of the dealer.

After the cards have been dealt the players look at their hands, and each player, in rotation, beginning with the player to the left of the *age*, determines whether he will *go in* or not. Any player who decides to go in, that is, to play for the pool, must put into the pool double the amount of the ante, except the player holding the *age*, who contributes the same amount as his original ante. This makes the blind good, and all the players interested in that hand will have contributed alike.

Those who decline to play throw their cards, face downward; upon the table in front of the next dealer.

Any player, when it is his turn, and after making the ante good, may *raise*, *i. e.*, increase the ante any amount within the limit of the game.

Another feature that may be introduced when betting upon the *original hand*, is the *straddle*. The straddle is nothing more than a double blind.

When all are in who intend to play, each player has the right to draw any number of cards he chooses, from one to five, or he can retain his cards as originally dealt to him. If a player draws cards, he must discard a like number from his hand previous to drawing, and the rejected cards must be placed face downward upon the table near the next dealer.

When all the hands are filled, the player to the left of the *age* has the first say, and he must either bet or retire from the game, forfeiting what he has already staked. The same with all the other players, in rotation, up to the *age*. When a player makes a bet, the next player must either *see him*, *i. e.*, put in the pool an equal amount, or *go better*, *i. e.*, make the previous bet good, and raise it any amount not exceeding the limit; or he must pass out.

If all the players pass up to the *age*, the latter takes the pool, and the deal ends.

The value of the hands is as follows, given in the regular order: One pair, two pair, triplets, a straight (straights are not always played; it should therefore be determined whether they are to be admitted at the commencement of the game. If, however, it has been agreed before commencing to play that straights are to be counted in the game, a straight flush outranks four cards of the same denomination, four aces, for instance), a flush, a full, fours (when straights are not played, fours beat a straight flush), a straight flush. When none of the foregoing hands are shown, the highest card wins; if these tie, the next highest in those two hands, and so on. If upon a *call* of a show of hands, it occurs that two or more parties interested in the call hold hands identical in value, and those hands are the best out, the parties thus tied must divide the pool, share and share alike.

*Whisky Poker* is a neat variation of draw poker, and is a most amusing game. Each player contributes one chip to make a pool, and the same rule governs as at "draw," except that the strongest hand you can get is a straight flush.

Five cards are dealt to each player, one at a time, and an extra hand is dealt on the table, which is called the "*widow*."

The eldest hand then examines his cards, and if, in his judgment, his hand is sufficiently strong, he passes.

The next player then has the privilege of the widow, and, for the purpose of illustration, we will suppose he takes it; he then lays his discarded hand (that which

he relinquishes for the widow) face up in the center of the table, and the next player on the left selects from it that card which suits him best in filling his hand, and so on all around the board, each player discarding one card and picking up another, until some one is satisfied, which he signifies by knocking upon the table.

When this occurs, all the players around to the satisfied party have the privilege of one more draw, when the hands are shown, and the strongest wins.

If any player knocks before the widow is taken, the widow is then turned face up, and each player from him who knocks has but one draw.

Should no one take the widow, but all pass to the dealer, he then turns the widow, and all parties have the right to draw until some one is satisfied.

*Straight Poker*, or *Bluff*, as it is sometimes called, is played with a pack of fifty-two cards. The game is governed by the same rules as draw poker, and differs from the latter game in the following particulars only:

I. The winner of the pool has the deal.

II. Each player antes before the cards are cut for the deal.

III. Any player may pass with the privilege of coming in again, provided no player *preceding* him has made a bet.

IV. No player is permitted to discard, or draw any cards.

V. When all the players pass, the eldest hand deals, and each player deposits another ante in the pool, thus making what is termed a "double-header." When a misdeal occurs, the rule is the same.

To avoid confusion, and prevent misunderstanding, instead of each player depositing an ante before the cards are cut, it is usual for one of the players (at the commencement of the game, the dealer) to put up a sum equal to an ante from each, thus: if four are playing and the ante is one chip, the dealer puts up four chips, and passes the *buck*, *i. e.*, a knife or key, to the next player at his left. When the next deal occurs, the player having the buck puts up four chips, and passes the *buck* to his next neighbor, who in turn does the same, and so it goes round as long as the game continues. Straight poker is but seldom played, having been superseded by the draw game.

*Stud Poker* is the name of a game which, in all essential particulars, is like the other poker games, and is subject to the same laws and mode of betting, passing, etc. It is played in this manner:

Five cards are dealt, one at a time—the first dealt as usual, face down, all the others face up, the highest pair, or best hand winning, as at "draw." To illustrate, suppose the dealer's four cards as exposed, are a king, four, seven, and a five, and his opponent's a queen, ten, six, and nine—the dealer's hand in sight is the better hand, and the call being made and the unknown cards turned over, the non-dealer shows an ace, and his opponent an eight; of course, the dealer loses.

POKROVSKAYA SLOLODA, or POKROVSK, also KASAKSTADT, a village of the district of Novo-uzen, in the government of Samara, Russia, on the left bank of the Volga, almost opposite Saratoff.

POLA, the principal naval harbor and arsenal of the Austrian-Hungarian monarchy, is picturesquely situated at the south extremity of the peninsula of Istria, fifty-five miles to the south of Trieste.

The foundation of Pola is usually carried back to the mythic period, and ascribed to the Colchian pursuers of Jason and the Argonauts. In all probability it was a Thracian colony, but its verifiable history begins with its capture by the Romans 178 B. C. It was destroyed by Augustus on account of its espousal of the cause of

Pompey, but was rebuilt on the intercession of his daughter Julia, and received (according to Pliny) the name of Pietas Julia. It seems to have attained its greatest prosperity about the time of the emperor Septimius Severus (193-211 A.D.), when it was an important war harbor and contained 35,000 to 50,000 inhabitants.

POLAND (the Polish *Polska*, German *Polen*, French *Pologne*) was till toward the end of the eighteenth century a large and powerful kingdom, extending, with Lithuania, which was incorporated with it, over the basins of the Warta, Vistula, Dwina, Dnieper, and upper Dniester, and having under its dominion, besides the Poles proper and the Baltic slavs, the Lithuanians, the White Russians, and the Little Russians or Ruthenians.

If Schafarik is correct in seeing the name of the Poles in the *Bulanes* of the geographer Ptolemy, we shall have this Slavonic people mentioned as early as the second century after Christ.

All that we are told of the early Slavs shows them to have been a quiet agricultural people. We find them at first living in village communities with a tribal government. Nestor says, "The Poliani lived in separate groups, and each governed his family." Gradually a class of serfs sprung up, whose origin cannot be clearly traced. Röpell in his history supposes that they were the descendants of rival tribes who had been conquered. At all events we soon find the following divisions of society among the Poles:— (1) the nobility who throughout Polish history constitute the nation properly so-called; (2) a superior class of peasants who were personally free, but bound to perform certain services (these are always called Polish *kmienci*); and (3) the peasants strictly so called, who were the property of their masters and had no rights. We shall see how there was gradually formed in Poland a proud military aristocracy, which circumscribed the power of the king by the *pacta conventa*, so that he became a mere puppet in their hands. The nobles had absolute power over the serfs, as each separate palatinate had its tribunals. In course of time the *kmienci* became mere bondsmen. The miserable condition of the latter is seen in such books as Connor's *Letters on Poland*, published at the conclusion of the seventeenth century. Connor, who was physician to John Sobieski, had good opportunities for forming an opinion. Thus the trade of the country fell wholly into the hands of foreigners and Jews.

With the reign of Mieczyslaw I. (962-992) we begin to have something firmer in our grasp. He became a suitor for the hand of Dabrowha, the daughter of the king of Bohemia. Being a Christian she refused to give her hand to a pagan, and Mieczyslaw consented to be baptized in 965. He died in 992 universally regretted, as we are told, and was succeeded by his son Boleslaw, surnamed the Great. During his reign Otho III. of Germany paid him a visit, and the Polish prince received him with such magnificence that the emperor elevated his duchy into a kingdom, probably intending that it should always remain a fief of the empire.

Toward the end of his life Boleslaw sought to aggrandize himself at the expense of Russia. He was succeeded by Mieczyslaw, his son, who abandoned himself to pleasure, and left the kingdom in a disordered state. He is said to have first divided Poland into palatinates, a term which will be explained shortly. On his death an interregnum ensued. To heal the universal wounds it was resolved to send for Kazimiérz (Casimir), the son of Mieczyslaw. Kazimiérz was succeeded by a second Boleslaw (1058-1101), of whom many curious stories are told. After the disappearance of Boleslaw, who had taken his son with him and fled, the State remained

nearly a year without a sovereign. Finally, being afraid of a Russian or Hungarian invasion, the Poles called to the throne Wladyslaw (Ladislaus), the brother of Boleslaw. The power of Poland was diminished in his reign, as many provinces were occupied by the Russians. He was succeeded by his son, Boleslaw III., to whom the Poles have affixed the surname Krzywousty, or the Wry-mouthed. On his death Boleslaw was succeeded by his brother Mieczyslaw, who was so unpopular that he was expelled from the country in 1177. The crown, therefore, according to the prophecy, devolved upon Kazimiérz, the youngest son of Boleslaw Krzywousty. During his reign many judicious laws were passed in Poland; among other improvements he abolished the evil custom of purveyance. In the reign of Boleslaw V. (1227-79) the Mongols made an incursion into Poland, but were subsequently diverted into Hungary, having gained a victory at Lignica (Liegnitz) in Silesia in 1241.

An unfortunate and uninteresting prince, Leszek the Black, succeeded, but the dignity of the house of Piast was fully restored when Przemyslaw, without condescending to solicit the title of sovereign from the hands of the pope, received the crown from his nobles and clergy at Gniezno (Gnesen). Thus did Poland again become a kingdom. This unfortunate prince, however, was afterward murdered by the margrave of Brandenburg at Rogozno (1295). The reign of Waclaw (Wenceslaus) (1300-5) was not of great importance. He united the crowns of Poland and Bohemia, but soon became unpopular on account of his preference of his Bohemian subjects. With him expired the race of the holy peasant Premysl, which had ruled Bohemia according to the ancient chronicles for nearly 600 years. The relations of the latter country to the German empire were now to become much closer. Wladyslaw Lokietek, who succeeded Waclaw, was constantly engaged in wars with the Teutonic knights.

Wladyslaw was succeeded by his son Kazimiérz (Casimir) III., justly surnamed the Great, whose reign was a golden period for Poland. Casimir was succeeded, as had been arranged, by Louis of Hungary, who held the crown for twelve years only, and of that period spent but a short time in the country. Louis showed too great a fondness for his own subjects; he had also the misfortune to be unacquainted with the Polish language. After his death his second daughter Jadwiga was elected queen, but she was to accept as husband any prince whom the diet might propose to her. As a matter of state policy she was induced to marry Jagiello, the prince of Lithuania, a man of savage manners; but Lithuania was thus annexed to Poland, with which it remained joined ever afterward—a more complete federation having taken place at Lublin in the year 1569. In 1386 they were married, and from that year we may date the commencement of the dynasty of the Jagiellos in Poland, which lasted for nearly two centuries, terminating in 1572—indeed, we may say nearly a century longer, omitting the short and brilliant period of Batory (1576-1586), for Sigismund III. was the son of Catherine daughter of Sigismund II., and Wladyslaw IV. and John Casimir were his sons; after the death of the latter the throne became entirely elective. The new sovereign was baptized by the name of Wladyslaw.

The consolidation of Lithuania with Poland was destined to be a much more tedious and protracted matter than its somewhat violent union. Great as may have been the grief of Wladyslaw at the death of Jadwiga, it did not prevent him from contracting three subsequent marriages—the third wife being Sophia, a princess of Kieff.

The younger Wladyslaw was able soon after his accession to add (by election) both Bohemia and Hungary to his dominions. At first Wladyslaw was everywhere successful, and had instilled such terror into the Turks that Amurath proposed a truce for ten years and offered to cede all his conquests except Bulgaria. The conditions, having been accepted, were ratified by mutual pledges; unfortunately Wladyslaw was induced by Cardinal Cesarini to recommence the war and violate his oaths. The sultan on hearing of this perjury at once prepared for battle at the head of a formidable army. The encounter took place at Varna, in the present principality of Bulgaria. After performing prodigies of valor, Wladyslaw was defeated and slain.

After a brief interregnum Kazimiérz, brother of the deceased king, was chosen to succeed him; he had previously been grand-duke of Lithuania. In this reign the Poles carried on successful wars with the Teutonic knights, which resulted in peace, by which western Prussia, including Pomerania and the cities Dantzic, Thorn, and others, were to belong to Kazimiérz, while eastern Prussia was left to the knights, who were, however, to hold it as a fief of the crown, and each subsequent grand master was to be the vassal of the Polish king and senate.

Kazimiérz was succeeded by his son John I., surnamed Albert, a feeble prince, most of whose wars were unsuccessful. John Albert was succeeded by his brother Alexander, an utterly insignificant king; in his reign, however, we trace the first germ of the detestable *liberum veto*, which ruined Poland. The feeble Alexander was succeeded by his brother Sigismund (in Polish, Zygmunt), another son of Kazimiérz. Sigismund was engaged in constant wars with Basil, the czar of Russia.

In this reign the order of Teutonic Knights embraced the doctrines of Luther; their dominions were already a fief of the Polish kingdom. Gradually this small principality was to absorb the Slavonic elements which surrounded it, and to rise triumphant over the ruins of Poland. The doctrines of the Reformation were now becoming widely spread over Europe, and the element of religious animosity was largely infused into this land of perpetual anarchy and tumults. Sigismund, however, was a man of remarkable ability, and under his rule the country flourished. He survived to the age of eighty-two, and his memory is still cherished with affection by the Poles. His broad heavy physiognomy may be seen accurately represented in the old editions of Kromer, who dwells much upon his merits.

He was succeeded by his son Sigismund II. (1548-72), otherwise called Sigismund Augustus, but this prince was not elected till a very stormy debate had ensued as to whether he should repudiate his wife or not. He had married, as a widower (his first wife having been Elizabeth, daughter of Ferdinand of Austria), a fair widow of the house of Radziwill one of the most illustrious of the families of Lithuania. The nobles, however, who already treated their sovereign as a chief magistrate and nothing more, and had begun to control all his movements, required at the diet of Piotrkow that the marriage should be annulled, merely on the grounds that the country would gain more by his alliance with the daughter of a foreign potentate. But Sigismund, by sowing discord in the ranks of his opponents—proposing among other things to destroy pluralities in church and state—contrived to carry his point. His wife was crowned in 1550, but died within six months after, not without suspicions of having been poisoned by her mother-in-law. In this reign, Warsaw was fixed upon as the seat of the government, since, being part of Masovia, it was, strictly speaking, neither Polish

nor Lithuanian. It afterward became the regular capital of the country. An interregnum now occurred on the failure of the line of the Jagiellos, and the throne was publicly offered for competition. Four candidates appeared—Ernest, archduke of Austria; Henry of Valois, duke of Anjou, brother of the French king; a Swedish prince; and finally Ivan the Terrible of Russia. The contest, however, really lay between the first two. The political importance of France and the astute diplomacy of Montluc, the ambassador from that country, caused the decision to be given in favor of the French candidate.

By the death of his brother Charles IX. he became heir to the French crown. Henry at once secretly fled to France, but was pursued and overtaken, and refused to return. The Poles, however, were well rid of one of the most corrupt sovereigns of a corrupt house. In 1589 the knife of the Dominican friar terminated his life, and with it the line of the Valois.

The Poles, piqued at the contempt with which their crown had been treated, assembled at Stezycy and resolved to declare the throne vacant if the king did not return by May 12, 1575. During the interregnum the Mongols made incursions into Podolia and Volhynia, and grievously devastated those countries. The appointed period having elapsed, Stephen Batory, prince of Transylvania, was elected, having previously stipulated to marry the princess Anne, sister of Sigismund Augustus. There were some difficulties, however, before he succeeded in obtaining the royal authority. The primate Ucharski nominated the emperor Maximilian king. This caused considerable opposition, and the city of Dantzic did not recognize the new sovereign till compelled. To conciliate the nobility Batory was obliged to consent to some serious diminutions of the royal prerogative. This king was a great soldier, successful against both Prussians and Russians, the latter of whom he compelled, in 1582, to evacuate Livonia, which was thus again annexed to Poland. He also did much to encourage letters.

On the death of Batory in 1586, after many quarrels among the leading families, the throne was again brought into the market. The candidates were, among others, the archduke Maximilian of Austria; Feodore Ivanovitch, the feeble Russian czar; and Sigismund, a Swedish prince, son of Catherine, sister of Sigismund Augustus. The last of the three was finally elected, although not without considerable opposition from Maximilian, who was only driven from his candidature by main force. The reign of Sigismund III. was on many grounds a disastrous one for Poland, and it was a very long one.

He was succeeded by his son Wladyslaw IV., who was elected by the diet. During his reign the usual wars took place with the ancient enemies of the republic—the Swedes, Russians, and Turks. He died at Merez in Lithuania, between Grodno and Vilna, May 20, 1648, and was succeeded by his brother John Casimir, the other candidates being the czar Alexis, father of Peter the Great, and Ragotzi, prince of Transylvania. One of the first acts of the new king was to endeavor to negotiate with Bogdan, but the negotiations were brought to an abrupt termination by the treachery of Wisniowiecki, the Polish general, who fell upon the unsuspecting Cossacks while they were deliberating about the terms of the convention. After this massacre Bogdan raised another army, but was completely defeated by John Casimir at Beresteczko in 1651. The kingdom, however, was thrown into the greatest confusion by the disputes of the nobles, and all vigorous action was paralyzed. The blood-stained annals of these wars are full of horrors; the population

in many districts was entirely extirpated; everywhere murder and plunder were rampant; and tortures too horrible to mention were inflicted upon the unhappy prisoners.

Worn out with age, and disgusted with his repeated failures, the king abdicated in 1668. In due time three candidates for the vacant throne made their appearance—the prince of Condé, the prince of Neuburg, supported by Louis XIV., and Charles of Lorraine, who was put forward by Austria. The first of these could rely upon the coöperation of the great Sobieski, who at this time begins to figure in history, but eventually none of the three was chosen. The election fell upon a native Pole—Prince Michael Korybut Wisniowiecki, of a noble family indeed, but so impoverished that he may be said to have had regal honors thrust upon him against his will, and we are even told that he was offered the crown half in derision. Michael soon became a mere puppet in the hands of his turbulent subjects. His reign, however, was rendered illustrious by the great successes of Sobieski against the Turks, although the Poles suffered the loss of the important town of Kamenets, and Michael, powerless to make head against them, concluded the treaty of Buczacz, by which he even stipulated to pay them tribute. By the great victory of Khotin in 1673, Sobieski did much to repair these losses and was about to follow up his glorious campaign when he heard of the death of Wisniowiecki at Lemberg in Galicia; so sudden was the end of Michael that some have even supposed that he was poisoned,—“by a Frenchman,” says Connor. The diet met at Warsaw; there were several candidates; and among others Charles of Lorraine and Philip of Neuburg again put forward their claims. While the nobles were still in session, Sobieski, fresh from his glorious victory, entered and proposed the prince of Condé. A stormy discussion ensued, and in the midst of it one of the nobles, Jablonowski, was heard to say, “Let a Pole rule over Poland.” The cry found a magic echo among those who were present, and the gallant Sobieski, the greatest of Polish generals, and one of the first soldiers of his time, was appointed king under the title of John III., although not without considerable opposition from Michael Pac, the general-in-chief of Lithuania, who was, however, ultimately induced to withdraw his protest.

Some years of peace followed, during which the king in vain endeavored to raise supplies for an army to reconquer the provinces which Russia had appropriated. All his plans were neutralized by the absurd practice of the *liberum veto*. In 1683 the Turks made their grand invasion which they had long been preparing. After scouring the plains of Hungary, they advanced to the very walls of Vienna. The emperor Leopold at once fled with his court, but had great difficulty to avoid falling into the hands of the Mongols. The elector of Saxony, John George, marched out of Dresden on July 22d with 12,000 men and 18 guns, and reached Krems on August 28th. The Polish king, who had been solicited by the emperor himself, and to whom all Europe looked now as its savior, left Cracow accompanied by his son, and succeeded in reaching the quarters of Prince Charles of Lorraine. He was to act in concert with a man who had been competitor with him for the Polish crown; their meeting passed off amicably, and no subsequent jealousies seem to have marred their operations. The Polish and German troops effected their junction at Krems on the Danube, near Vienna; there were about 77,000 men ready for active operations in the field. On September 12th, after mass, Sobieski descended from the city to encounter the dense masses of the Moslems in the plains below.

The assault was made simultaneously on the wings

and center of the enemy. In spite of the bravery of the Turks they were overpowered by the *élan* of the Poles. Six pashas were slain, and the vizier fled with the remnant of his army. The booty taken was immense.

The king, after this brilliant achievement, showed some inclination to be reconciled to Louis XIV., but the emperor succeeded in diverting him by holding out hopes of securing the government of Moldavia and Wallachia for his son. By the treaty of Moscow, which Sobieski concluded in 1686 with Sophia, the regent of Russia, Smolensk, Severia, Tchernigoff, and Kieff were definitely annexed to the latter country. The private life of Sobieski was embittered by family dissensions; he was very much under the influence of his wife, a woman of great beauty, but avaricious, fond of power, and revengeful. Thus the illustrious soldier had not peace in his own house, nor was he likely to meet with it in the stormy debates of the diet; and so wearisome had his position become that he several times thought of abdicating, and the Austrian party (such was the gratitude he met with) sought to effect this. He finally sank under an accumulation of disorders, and expired on June 17, 1696, at his favorite castle of Willanow. Many incidents of his death-bed have been recorded by Zaluski, the bishop of Plock, which show that the king died ill at ease, being filled with the gravest apprehensions concerning the future of his country. The family is now extinct. With him sank the glory of Poland, which was rapidly hastening to its fall.

After a time the diet met as usual to elect the new sovereign. The three chief candidates were James Sobieski, the son of the late king; the prince of Condé, a nephew of Louis XIV.; and the elector of Saxony. The elector was appointed, and, in order to qualify for the throne, abjured Protestantism. In 1699, by the peace of Carlowitz, the Turks renounced all claim over the Ukraine and Podolia, but the king was foolish enough to allow himself to be drawn into a war with the Swedes, in consequence of which Cracow was taken in 1702. Charles XII. of Sweden became master of the country, and deposed the newly elected Frederick Augustus, in whose place was chosen Stanislaw Leszczyński, palatine of Posen, a man of benevolence and learning. All the courts of Europe recognized this new king except the czar Peter, and when the latter defeated Charles at the battle of Poltava in 1709 Leszczyński was compelled to leave the country, and Augustus II., as he was styled, was restored. Stanislaw at the approach of the Russian troops retired to Lorraine, which he governed till his death at an advanced age. In this reign Poland lost Courland, which had long been one of its fiefs, but was now seized by the Russians and given by the empress Anne to her favorite Biren. The *Dissidents*, as the Protestants were called, were slowly decreasing in number, and in an *émeute* which occurred at Thorn in 1724 many were cruelly put to death. A little later, in 1733, a law was passed by which they were declared incapable of holding any office or enjoying any dignity. Augustus II. died at Warsaw in the last mentioned year. He was a contemptible king, notorious for his private vices. At the instigation of many of the Poles, Stanislaw Leszczyński, who was now residing in Lorraine, and had become the father-in-law of Louis XV., was induced to return to Poland, and was elected king at Warsaw by a large majority. This election, however, was displeasing to Austria and Russia, who resolved to resist his pretensions and to secure the election of Frederick Augustus, the son of the late king. A Russian army arrived in the neighborhood of Warsaw, and a party of the nobles opposed to the French influence proclaimed the Saxon. He accordingly swore to the *pacta conventa*, and was crowned

king at Cracow in 1734. Meanwhile the unfortunate Stanislaw fled to Dantzic, where he hoped to hold out until assistance should arrive from France. The city, however, was obliged to capitulate after a siege of five months; and Stanislaw, after many adventures and narrow escapes, reached the Prussian dominions. In 1736 a diet of pacification was held at Warsaw, which was followed by a general amnesty. The condition of the country during this reign was deplorable, although Poland was engaged in no wars. Factions rent the government, and the peasantry, crushed and suffering, betook themselves to robbery and pillage. The king was a man of low tastes, and abandoned himself to pleasure. One of his favorite amusements was shooting dogs from the windows of his palace at Warsaw, in consequence of which dogs became very scarce in the city. He was too idle to learn a word of Polish, and left everything to the management of his minister Brühl. Frederick died October 3, 1763, at Dresden, where he was buried. In 1764 Stanislaw August Poniatowski was elected king, chiefly through the machinations of the Russian empress Catherine. The new monarch was a man of refined manners and elegant mind, but weak, and a mere puppet in Muscovite hands. In 1768 a few patriots met at the little town of Bar in Podolia, and formed what was called the Confederation of Bar, their object being to free the country from foreign influence. Among the members of this confederation were the Pulawskis (Casimir and Joseph), Joachin Potocki, and Adam Krasinski, bishop of Kamenets. Their military operations extended over all Poland and Lithuania, but the Russian troops stationed round the capital prevented the junction of the confederates with the national army. Moreover the confederates, whose number amounted to about eight thousand fighting men, were badly organized. In spite of a few trifling successes they saw their efforts gradually growing weaker. Nor did a bold attempt to carry off the king result in success. Their party speedily broke up, and Casimir Pulawski, one of the leading spirits, left the country and joined the Americans in their War of Independence, in which he soon afterward perished. But the partition of the country had already been secretly agreed upon by Russia, Prussia, and Austria. The idea appears to have been first suggested by Frederick the Great.

In 1772 Prussia took the Palatinates of Malborg, Pomeria, and Warmia, Culm, except Dantzic and Thorn, and a part of Great Poland; Austria took Red Russia or Galicia, with a part of Podolia, Sandomir, and Cracow; and Russia took White Russia, with all the part beyond the Dnieper. The Poles were obliged to sanction this plundering of their country in a diet held in 1778. The only real benefit conferred on the nation by this diet was the introduction of a better system of education; the Jesuits were also suppressed, and their immense estates became national property. Although the country had been mutilated in this fashion, it yet enjoyed tranquillity for a short time, and even made some material progress. Thus some useful manufactures were introduced. In 1788 a remarkable diet was opened which lasted four years—the longest on record, for the others had only endured a few days or a few weeks at most. At this many important changes were introduced, such as the amelioration of the condition of the burghers and peasants; but it was now too late. On this occasion the *liberum veto* was decisively suppressed and the throne declared hereditary. The elector of Saxony, grandson of the wretched and incapable Augustus III., was declared the successor of Stanislaus. The Roman Catholic was to be the dominant religion, but the Dissidents were to be tolerated. The burghers were to send deputies to the diet on the same footing as the nobles.

The peasants were not yet emancipated, but their condition was improved. The new constitution was finally promulgated on May 3, 1791. The king and the two chambers took the oaths to preserve it. The country now seemed to breathe afresh, and to be established upon a new basis. But the selfishness of the Polish nobles, who had always been the evil genius of the country, overturned all the arrangements. Among the most prominent non-contents was Felix Potocki, who was anxious to restore to the nobility the privileges they had lost by the new constitution. In concert with him were Francis Xavier Branicki and Severin Rzewuski, who sought the assistance of foreign powers, and especially Russia. These enemies of their country formed, in 1792, the Confederation of Targovica, and soon afterward at their instigation Russian troops invaded Poland and Lithuania. The feeble king, Stanislaus Augustus, made no resistance; he signed the convention of Targovica, and the Russians occupied Warsaw.

In 1793 another treaty of partition was signed, by which Prussia acquired the remainder of Great and a portion of Little Poland, and the Russian boundary was advanced to the center of Lithuania and Volhynia. An insurrection now broke out under the leadership of Thaddeus Kosciuszko, which at first made head against the Prussians and Russians, who had invaded the country from all quarters; but the successes of the insurgents were stained by the murders committed by the popular party at Warsaw. Suwaroff now entered the country, and Kosciuszko was finally defeated and made prisoner at the battle of Maciejowice in 1794; there is no truth, however, in the assertion that he cried out on that occasion, "Finis Poloniae;" this he always denied till the day of his death. After storming the suburb Praga, Suwaroff took Warsaw, and the city was sacked with great cruelty. The kingdom of Poland was now at an end, and the third division took place. Austria had Cracow, with the country between the Pilica, the Vistula, and the Bug; Prussia had the capital, with the territory as far as the Niemen; and the rest went to Russia. Stanislaus resigned the crown at Grodno on April 25, 1795; he was summoned to St. Petersburg, where he is said to have endured many indignities from the emperor Paul, who never allowed him to remain seated in his presence. There he died in 1798.

Many of the Poles now entered foreign services, as, for instance, the legion which followed the fortunes of France; but the fate of these exiled patriots was often a sad one. Many perished on the burning sands of St. Domingo. Many were killed in the famous expedition to Moscow. The Poles looked anxiously to the success of Napoleon. But all that the conqueror did for them was to form the duchy of Warsaw, consisting of six departments—Posen, Kalisz, Plock, Warsaw, Lomza, and Bydgoszcz—with a population of more than 2,000,000, which he united with Saxony.

A resettlement of Poland took place by the treaty of Vienna (1814). (1) Austria was to have Galicia and the salt-mines of Wieliczka. (2) Posen was to belong to Prussia. This power was also confirmed in what it had gained at the first partition. (3) The city and district of Cracow were to form an independent republic under the guarantee of the three powers. This historical town was annexed by Austria in 1846 in defiance of all international law. (4) The remainder of ancient Poland, comprising the chief parts of the recent grand-duchy of Warsaw (embracing a tract bounded by a line drawn from Thorn to near Cracow on the west, to the Bug and Niemen in the east), reverted to Russia, and was to form a constitutional kingdom subject to the czar. This constitution, considering the circum-

stances, was a very liberal one. Poland was to be governed by responsible ministers, a senate, and a legislative chamber. There were to be a national army under the national flag and a separate budget. Polish was to be the official language; personal liberty and the freedom of the press were also guaranteed. It was obvious from the first that it would be difficult to unite a country with such a liberal constitution to another still governed by a patriarchal despotism. Zajacek was named viceroy, and the grand-duke Constantine, brother of the emperor Alexander, took the command of the army.

The rebellions of the Poles in 1830 and 1863 more properly belong to Russian history; perhaps, however, a few facts connected with them may be appropriately introduced here.

Considering the delicate position of affairs in Russian Poland, things had worked fairly well. The impulse to the Polish revolution was undoubtedly given by the French. It was begun by some students, who hoped to seize the grand-duke Constantine at his residence, Belvedere, in the vicinity of Warsaw. In the evening of November 29, 1830, they accordingly proceeded to the palace, but did not succeed in capturing the grand-duke. The city, however, rose, the troops fraternized with the people, and the chief command was intrusted to General Chlopicki, a veteran of the wars of Napoleon. Early in 1831 a large Russian army, commanded by Diebitsch, advanced to reduce them to submission. Chlopicki laid down his dictatorship, but the Poles pursued the insurrection with vigor under the command of Prince Adam Czartoryski. They were disappointed in their hopes of assistance from foreign powers. On September 8th Warsaw surrendered to Paskewitch, who had taken the command, Diebitsch having died of cholera (June 10th), and a few weeks afterward the grand-duke Constantine died at Vitebsk. On February 26, 1832, Poland was declared a Russian province.

No other outbreak occurred till 1863, but for some time previously the country had been disturbed. On November 29, 1860, on the occasion of the thirtieth anniversary of the revolution of 1830, many political manifestations took place both in the churches and streets, and portraits of Kosciuszko and Killinski, a patriot of the time of the last partition, were distributed. Some riots took place, and unfortunately several persons were killed. These proceedings were followed by concessions from the emperor Alexander, who established municipal institutions in Warsaw and the chief cities of the kingdom. The Russian czar was acting under the advice of Wielopolski, a Pole, who was appointed director of public instruction and worship. Riots, however, still continued, and in 1862 the grand-duke Constantine was named viceroy. On the night of January 15, 1863, a secret conscription was held, and the persons suspected of being most hostile to the government were dragged from their beds and enlisted as soldiers. Immediately after this the insurrection broke out, which was directed by a secret committee (Rzad), the proceedings of which were as mysterious as those of the Fehmgerichte. Soon after bands of rebels began to make their appearance in the Polish forests. There were, however, no regular battles between the Russian troops and the Poles—only guerilla fighting, in which the Poles, under the greatest disadvantages, showed splendid heroism. The secret emissaries of the revolutionary government, armed with daggers, succeeded in putting to death many Russian spies—not the least memorable case being that of the Jew Hermani, stabbed while on the staircase of the Hôtel de l'Europe at Warsaw. On the other hand the chiefs of the insurg-

ents captured were shot or hanged. Langiewicz held out for some time, but was defeated by the Russians, and succeeded in making his escape into Galicia. A reign of terror was inaugurated by General Mouravieff, and all attempts at reconciliation made by the great powers of Europe were useless. By May, 1864, the rebellion was quite suppressed, and it will be seen by the results that it cost Poland dear. The kingdom of Poland now ceased to exist; it has been parceled out into six governments. The Russian language was ordered to be used in all public documents instead of Polish, and the university of Warsaw has been Russified, all lectures now being delivered in that language.

We have not dwelt upon the terrible massacres of the Polish nobles by the peasants in Galicia in 1836, said to have been instigated by the Austrian Government. This province has been tolerably quiet since, but the Poles have to struggle with the large Ruthenian or Red-Russian population, speaking a different language, and being adherents of the Greek Church or Uniates.

In Prussian Poland, though it is but fair to add that we hear no stories of massacres, the Germanization of the province has been more complete. Posen will soon be lost as a Polish town, and many historical places have had their names obliterated for such substitutes as Bismarcksdorf and Sedan.

#### POLISH LITERATURE.

The Polish Language, according to the latest statistics, is still spoken by nearly 10,000,000 of people, distributed, according to the *Revue Slave* (Warsaw, 1878), as follows:—in Russia, 4,640,000; in Austria, 2,444,200; in Prussia, 2,405,800; in Turkey, 10,000. It belongs to the western branch of the Slavonic tongues, and exhibits the closest affinities with the Czech or Bohemian and Lusatian Wendish (see SLAVONIC LANGUAGES). Unlike the people of other Slavonic countries, the Poles are comparatively poor in popular and legendary poetry, but such compositions undoubtedly existed in early times, as may be seen by the writings of their chroniclers; thus Gallus translated into Latin a poem written on Boleslaw the Brave, and a few old Polish songs are included in Wojcicki's *Library of Ancient Writers*. A great deal of early literature written in Poland is in Latin. The earliest specimen of the Polish language is the so-called Psalter of Queen Margaret, discovered in 1826 at the convent of St. Florian. The date of the MS. appears to be the middle of the fourteenth century, in its present form it is only a copy of a much older text. The ancient Polish hymn or war song, "Piesn Boga Rodzica," was an address to the Virgin, sung by the Poles when about to fight. The oldest manuscript of this production is dated 1408, and is preserved at Cracow.

The next monument of Polish literature to which we come is the Bible of Queen Sophia or Bible of Szarospatak. It is imperfect and only contains the early books, viz., the Pentateuch, Joshua, Ruth, and Kings; there are, however, fragments of three others. It is said to have been written by Sophia, the fourth wife of Jagiello, about the year 1455.

Perhaps a few words should be said concerning the writers in Latin. Martin Gallus lived in Poland between 1110 and 1135. From his name he has been supposed by some to have been a Frenchman, and we must remember that Poland swarmed at the time with foreign ecclesiastics. The education of the country was wholly in the hands of the ecclesiastics, many of whom were foreigners. In this way we must explain the prevalence of the Latin language. Such a system would be sure to stifle all national outgrowth, and accordingly we have among the Poles none of those early monuments of the language of which other nations

boast. For instance, there are no *bilini* or legendary poems, such as are found among the Russians, although many passages in the ancient chroniclers from their poetical coloring seems to be borrowed from old songs or legends, and the first verses of some of these compositions have been preserved.

**POLAND, RUSSIAN.** After the three dismemberments of the old kingdom, the name of Poland was chiefly retained by the part of the divided territory annexed to Russia. Since the insurrection of 1863, however, the name "kingdom of Poland" has disappeared. Thenceforward this portion of the Russian empire is referred to in official documents only as the "territory of the Vistula," and later on as the "Vistula governments." Nevertheless the geographical position of Russian Poland, its ethnographical features, its religion, and its traditions differentiate it so widely from the remainder of the Russian empire that the name of Poland still survives in current use. The area of this territory is 49,157 square miles, and the population exceeds 7,300,000. See **RUSSIA**.

**POLARITY AND ENANTIOMORPHISM.** Any figure, such as a solid of revolution which has one line in it in reference to which the figure is symmetrical may be said to have an axis, and the points at which the axis cuts the surface of the figure are poles. But the term polarity when applied to material figures or substances is usually confined to cases where there are not only a definite axis and poles, but where the two poles have distinct characters which enable us to recognize them and say which is which. It is in this sense that the word is used here.

Two figures or two portions of matter are said to be *enantiomorphous* to each other when these forms are not superposable, *i.e.*, the one will not fit into a mold which fits the other, but the one is identical in form with the mirror image of the other.

*Polarity.*—As examples of polarity we may take an awn of barley or a cat's tail, in which we recognize the distinction between the two poles or ends, which we may call A and B by finding that it is easy to stroke from say A to B, but not in the opposite direction. As an example of enantiomorphism we may take our two hands, which will not fit the same mold or glove, but the one of which resembles in figure the mirror image of the other.

*Enantiomorphism.*—A figure having polarity of the first kind gives a mirror image resembling itself in form and in position; a figure having polarity of the second kind gives a mirror image resembling itself in form but not in position—the poles being inverted. A figure the axis of which has both kinds of polarity will, therefore, give a mirror image not superposable to the figure itself, because the polarity of the second kind is reversed, while that of the first kind remains unchanged. The figure and its mirror image are enantiomorphous, as well as polar. We can construct a figure which is enantiomorphous to its mirror image, but not polar. Imagine a muff so made

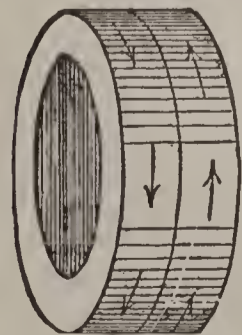


Fig. 1.

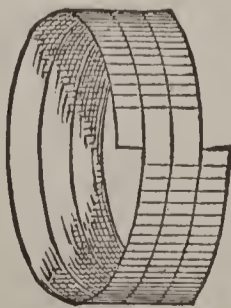


Fig. 2.

that in one half the fur lies the one way, and the opposite way in the other half (fig. 1, where the arrow-heads indicate the lie of the fur). In whichever way we put our hands into this muff one end will be wrong; the muff in the figure has, in fact, two right-hand ends. It has, therefore, no polarity; the two ends are exactly alike.

But there are two ways in which such a non-polar muff could be made—with two right-hand ends as in the figure, or with two left-hand ends, and these two forms are enantiomorphous. A helix or screw has similar properties (compare fig. 2 with fig. 1); if uniform it is non-polar, but is either right or left-handed. Hence the property which each of two enantiomorphous bodies possesses has been called by Sir William Thompson "helicoidal asymmetry."

**POLARIZATION OF LIGHT.** See **LIGHT**.

**POLAR REGIONS.** The polar regions extend respectively from the Arctic and Antarctic Circles, in  $66^{\circ} 32'$  N. and S., to the north and south poles, the circles being 1,408 geographical miles from the poles. The intense cold and the difficulties of ice navigation have made the discovery and examination of these regions a slow and hazardous task. Millions of square miles are still entirely unknown. In the present article the history of the progress of discovery within the north polar region will be traced, and some account of its physical geography will follow. A similar review of work in the south polar region will conclude the article.

#### NORTH POLAR REGION.

The Arctic Circle is a ring running a little south of the northern shores of America, Asia, and Europe, so that those shores form a fringe within the polar region, and are its boundary to the south, except at three openings—those of the North Atlantic, of Davis Strait, and of Behring's (more properly Bering's) Strait.

The width of the approach to this region by the Atlantic Ocean, in its narrowest part, is 660 miles, from the Norwegian Islands of Lofoten to Cape Hodgson, on the east coast of Greenland. The width of the approach by Davis Strait in the narrowest part, which is nearly on the Arctic Circle, is 165 miles; and the width of Behring's Strait is forty-five miles. Thus out of the whole ring of 8,640 miles along which the Arctic Circle passes about 900 miles is over water.

A rumor respecting Thule, an island on the Arctic Circle, first brought by **PYTHEAS** (*q.v.*), and afterward doubted, was the extent of the knowledge of the north polar regions with which the ancients can be credited. But in the ninth century some Irish monks really appear to have visited Iceland. The monk Dicuil, writing about 825, says that he had information from brethren who had been at Thule during several months, and they reported that there was no darkness at the summer solstice.

King Alfred told the story of the first polar voyages undertaken for discovery and the acquisition of knowledge, in his very free translation of **Orosius**.

The Norsemen of the Scandinavian peninsula, after colonizing Iceland, were the first to make permanent settlements on the shores of Greenland, and to extend their voyages beyond the Arctic Circle along the western coast of that vast glacier-covered land. (See **GREENLAND**.)

The last trace of communication between Greenland and Norway was in 1347. The black death broke out in Norway and the far off colony was forgotten.

Sebastian Cabot, whose own northern voyages have been spoken of in the article **CABOT**, was the chief promoter of the expedition which sailed under Sir Hugh Willoughby and Richard Chancellor, on May 20, 1553, "for the search and discovery of the northern parts of the world, to open a way and passage to our men, for travel to new and unknown kingdoms." Chancellor reached the Bay of St. Nicholas, and landed near Archangel, which was then only a castle. He undertook a journey to Moscow, made arrangements for commercial intercourse with Russia, and returned safely. His suc-



cess proved the practical utility of polar voyages. It led to a charter being granted to the Association of Merchant Adventurers, of which Cabot was named governor for life, and gave fresh impulse to arctic discovery.

In the spring of 1556 Stephen Burrough, who had served with Chancellor, sailed in a small pinnace called the *Searchthrift* and kept a careful journal of his voyage. He went to Archangel, and discovered the strait leading into the Kara Sea, between Nova Zembla and the island of Waigat. In May, 1580, the company fitted out two vessels under Arthur Pet and Charles Jackman, with orders to pass through the strait discovered by Burrough, and thence to sail eastward beyond the mouth of the river Obi. Pet discovered the strait into the Kara Sea, between Waigat and the mainland, and made a persevering effort to push eastward, returning to England in safety. Jackman, after wintering in a Norwegian port, sailed homeward but was never heard of again.

In 1558 a narrative and map were published at Venice which profoundly affected the system of polar cartography for many years afterward. The publication was the handiwork of a Venetian nobleman named Niccolò Zeno.

We now come to the voyages of Frobisher, undertaken to obtain the means for equipping an expedition for the discovery of a shorter route to India by the northwest. Aided by Michael Lok, an influential merchant and diligent student of geography, Frobisher sailed, in the spring of 1576, with two small vessels of twenty to twenty-five tons, called the *Gabriel* and *Michael*.

John Davis, who made the next attempt to discover a northwest passage, was one of the most scientific seamen of that age. He made three voyages in three successive years, aided and fitted out by William Sander-son and other merchants. Sailing from Dartmouth on June 7, 1585, he was the first to visit the west coast of Greenland subsequent to the abandonment of the Norse colonies. He called it "The Land of Desolation." He discovered Gilbert's Sound in  $64^{\circ} 10'$  (where now stands the Danish settlement of Godthaab) and then, crossing the strait which bears his name, he traced a portion of its western shore.

In 1594 the Amsterdam merchants fitted out a vessel of 100 tons, under the command of Willem Barents. The coast of Nova Zembla was sighted on July 4th, and from that date until August 3d Barents continued perseveringly to seek a way through the ice-floes, and discovered the whole western coast as far as Cape Nassau and the Orange Islands at the northwest extremity. The second voyage in which Barents was engaged merely made an unsuccessful attempt to enter the Kara Sea. The third was more important. The voyages of Barents stand in the first rank among the polar enterprises of the sixteenth century. They led directly to the flourishing whale and seal fisheries which long enriched the Netherlands.

The English enterprises were continued by the Muscovy Company, and by associations of patriotic merchants of London; and even the East India Company sent an expedition under Captain Waymouth in 1602 to seek for a passage by the opening seen by Davis, but it had no success.

The best servant of the Muscovy Company in the work of polar discovery was Henry Hudson. His first voyage was undertaken in 1607, when he discovered the most northern known point of the east coast of Greenland in  $73^{\circ}$  north named "Hold with Hope," and examined the edge of the ice between Greenland and Spitzbergen, reaching a latitude of  $80^{\circ} 23'$  north. On his way home he discovered the island now called Jan

Mayen, which he named "Hudson's Tutches." In his second expedition, during the season of 1608, Hudson examined the edge of the ice between Spitzbergen and Nova Zembla. In his third voyage he was employed by the Dutch East India Company, and he explored the coasts of North America, discovering the Hudson river. In 1610 he discovered Hudson's Strait, and the great bay which bears and immortalizes his name (see HUDSON).

The voyages of Hudson led immediately to the Spitzbergen whale fishery. From 1609 to 1612 Jonas Poole made four voyages for the prosecution of his lucrative business, and he was followed by Fotherby, Baffin, Joseph, and Edge. These bold seamen, while in the pursuit of whales, added considerably to the knowledge of the archipelago of islands known under the name of Spitzbergen, and in 1617 Captain Edge discovered a large island to the eastward, which he named Wyche's Land.

At about the same period the kings of Denmark began to send expeditions for the rediscovery of the lost Greenland colony. In 1605 Christian IV. sent out three ships, under the Englishmen Cunningham and Hall, and a Dane named Lindenov, which reached the western coast of Greenland and had much intercourse with the Eskimo. Other expeditions followed in 1606-7.

Meanwhile the merchant adventurers of London continued to push forward the western discovery. Sir Thomas Button, in command of two ships, the *Resolution* and *Discovery*, sailed from England in May, 1612. He entered Hudson's Bay, crossed to its western shore, and wintered at the mouth of a river in  $57^{\circ} 10'$  N., which was named Nelson's river after the master of the ship, who died and was buried there. Next year Button explored the shore of Southampton Island as far as  $65^{\circ}$  N., and returned home in the autumn of 1613. An expedition under Captain Gibbons, dispatched in 1614, was a miserable failure; but in 1615 Robert Bylot as master and William Baffin as pilot and navigator in the *Discovery* examined the coasts of Hudson's Strait, and Baffin, who was the equal of Davis as a scientific seaman, made many valuable observations. In 1616 Bylot and Baffin again set out in the *Discovery*. Sailing up Davis Strait they passed that navigator's farthest point at Sanderson's Hope, and sailed round the great channel with smaller channels leading from it which has been known ever since as Baffin's Bay. Baffin named the most northern opening Smith Sound, after the first governor of the East India Company, and the munificent promoter of the voyage, Sir Thomas Smith. Wolstenholme Sound, Cape Dudley Digges, Hakluyt Island, Lancaster Sound, Jones Sound, and Cary Islands were named after other promoters and friends of the voyage.

In 1631 two expeditions were dispatched, one by the merchants of London, the others by those of Bristol. In the London ship *Charles* Luke Fox explored the western side of Hudson's Bay as far as the place called "Sir Thomas Roe's Welcome." In August he encountered Captain James and the Bristol ship *Maria* in the middle of Hudson's Bay, and went north until he reached "Northwest Fox his furthest," in  $66^{\circ} 47'$  N. He then returned home and wrote the most entertaining of all the polar narratives. Captain James was obliged to winter off Charlton Island, in the southern extreme of Baffin's Bay, and did not return until October, 1632. Another English voyager, Captain Wood, attempted, without success, to discover a northeast passage in 1676.

The sixteenth and seventeenth centuries were periods of discovery and daring enterprise, and the results gained

by the gallant seamen of those times are marvelous when we consider their insignificant resources and the small size of their vessels. Hudson's Strait and Bay, Davis Strait, and Baffin's Bay, the icy seas from Greenland to Spitzbergen, and from Spitzbergen to Nova Zembla, had all been discovered. The following century was rather a period of reaping the results of former efforts than of discovery. It saw the settlement of the Hudson's Bay Territory and of Greenland, and the development of the whale and seal fisheries.

The Hudson's Bay Company was incorporated in 1670, and Prince Rupert sent out Zachariah Gillan, who wintered at Rupert's river. At first very slow progress was made. A voyage undertaken by Mr. Knight, who had been appointed governor of the factory at Nelson river, was unfortunate, as his two ships were lost and the crews perished. This was in 1719. In 1722 John Scroggs was sent from Churchill river in search of the missing ships, but merely entered Sir Thomas Roe's Welcome and returned. His reports were believed to offer decisive proofs of the existence of a passage into the Pacific; and a naval expedition was dispatched under the command of Capt. Christopher Middleton, consisting of the *Discovery* pink and the *Furnace* bomb. Wintering in Churchill river, Middleton started, in July, 1742, and discovered Wager river and Repulse Bay. In 1746 Capt. W. Moore made another voyage in the same direction, and explored the Wager Inlet. Captain Coats, who was in the service of the company, 1727-51, wrote a useful account of the geography of Hudson's Bay. Later in the century the Hudson's Bay Company's servants made some important land journeys to discover the shores of the American polar ocean. From 1769 to 1772 Samuel Hearne descended the Coppermine river to the polar sea; and in 1789 Alexander Mackenzie discovered the mouth of the Mackenzie river.

The countrymen of Barents vied with the countrymen of Hudson in the perilous calling which annually brought fleets of ships to the Spitzbergen seas during the eighteenth century. The Dutch had their large summer station for boiling down blubber at Smeerenberg, near the northern extreme of the west coast of Spitzbergen. Captain Vlamingh, in 1664, advanced as far round the northern end of Nova Zembla as the winter quarters of Barents. In 1700 Capt. Cornelis Roule is said by Witsen to have sailed north in the longitude of Nova Zembla, and to have seen an extent of forty miles of broken land. But Theunis Ys, one of the most experienced Dutch navigators, was of opinion that no vessel had ever been north of the 82d parallel. In 1671 Frederick Martens visited the Spitzbergen group, and wrote the best account of its physical features and natural history that existed previous to the time of Scoresby. In 1707 Captains Gilies and Outsger Rep went far to the eastward along the northern shores of Greenland, and saw very high land in 80° N. which has since been known as Gilies Land. The Dutch geographical knowledge of Spitzbergen was embodied in the famous chart of the Van Keulens (father and son), 1700-1728. The Dutch whale fishery continued to flourish until the French Revolution, and formed a splendid nursery for training the seamen of the Netherlands. From 1700 to 1775 the fleet numbered 100 ships and upward. In 1719 the Dutch opened a whale fishery in Davis Strait, and continued to frequent the west coast of Greenland for upward of sixty years from that time. In the course of 6,372 Dutch whaling voyages to Davis Strait between 1719 and 1775 only thirty-eight ships were wrecked.

Since the year 1773 the objects of polar exploration, at least so far as England is concerned, have been mainly

the acquisition of knowledge in various branches of science. It was on these grounds that the Honorable Daines Barrington and the Royal Society induced the government to undertake arctic exploration once more. The result was that two vessels, the *Racehorse* and *Carcass* bombs, were commissioned, under the command of Captain Phipps. The expedition sailed from the Nore on June 2, 1773, and was stopped by the ice to the north of Hakluyt Headland, the northwestern point of Spitzbergen. They reached the Seven Islands and discovered Walden Island; but beyond this point progress was impossible. When they attained their highest latitude in 80° 48' N., north of the central part of the Spitzbergen group, the ice at the edge of the pack was twenty-four feet thick. Captain Phipps returned to England in September, 1773. Five years afterward Captain Cook received instructions to proceed northward from Kamchatka and search for a northeast or northwest passage from the Pacific to the Atlantic. In accordance with these orders Captain Cook, during his third voyage, reached Cape Prince of Wales, the western extremity of America, on August 9, 1778. His ships, the *Resolution* and *Discovery*, arrived at the edge of the ice, after passing Behring Strait, in 70° 41' N. On August 17th the farthest point seen on the American side was named Icy Cape. On the Asiatic side Cook's survey extended to Cape North. In the following year Captain Clerke, who had succeeded to the command, made another attempt, but his ship was beset in the ice, and so much damaged that further attempts were abandoned.

The wars following the French Revolution put an end to the voyages of discovery till, after the peace of 1815, north polar research found a powerful and indefatigable advocate in Sir John BARROW, (*q.v.*) Through his influence a measure for promoting polar discovery became law in 1818 (58 Geo. III c. 20), by which a reward of £20,000 (\$100,000) was offered for making the northwest passage, and of £5,000 (\$25,000) for reaching 89° N., while the commissioners of longitude were empowered to award proportionate sums to those who might achieve certain portions of such discoveries. In 1817 the icy seas were reported by Captain Scoresby and others to be remarkably open, and this circumstance enabled Barrow to obtain sanction for the dispatch of two expeditions, each consisting of two whalers—one to attempt discoveries by way of Spitzbergen and the other by Baffin's Bay. The vessels for the Spitzbergen route, the *Dorothea* and *Trent*, were commanded by Capt. David Buchan and Lieut. John Franklin, and sailed in April, 1818. Driven into the pack by a heavy swell from the south, both vessels were severely nipped, and had to return to England. The other expedition, consisting of the *Isabella* and *Alexander*, commanded by Capt. John Ross and Lieut. Edward Parry, followed in the wake of Baffin's voyage of 1616. Ross sailed from England in April, 1818. The chief merit of his voyage was that it vindicated Baffin's accuracy as a discoverer. Its practical result was that the way was shown to a very lucrative fishery in the "North Water" of Baffin's Bay, which continued to be frequented by a fleet of whalers every year. Captain Ross thought that the inlets reported by Baffin were merely bays, while the opinion of his second in command was that a wide opening to the westward existed through Lancaster Sound of Baffin.

Parry was consequently selected to command a new expedition in the following year. The vessels returned in October, 1820; and a fresh expedition in the *Fury* and *Hecla*, again under the command of Captain Parry, sailed from the Nore on May 8, 1821, and passed their first winter on the coast of the newly discovered Melville

Peninsula in  $66^{\circ} 11'$  N. The expedition returned in the autumn of 1823. Meantime Parry's friend Franklin had been employed in attempts to reach by land the northern shores of America, hitherto only touched at two points by Hearne and Mackenzie. Franklin went out in 1819, accompanied by Doctor Richardson, George Back, and Hood. They landed at York factory, and proceeded to the Great Slave Lake. In August of the following year they started for the Coppermine river, and, embarking on it, reached its mouth on July 18, 1821. From that point 550 miles of coast-line were explored, the extreme point being called Cape Turnagain. Most frightful sufferings, from starvation and cold, had to be endured during the return journey; but eventually Franklin, Richardson, and Back arrived safely at Fort Chippewyan. It was now thought desirable that an attempt should be made to connect the Cape Turnagain of Franklin with the discoveries made by Parry during his second voyage; but the first effort, under Captain Lyon in the *Griper*, was unsuccessful.

In 1824 three combined attempts were organized. While Parry again entered by Lancaster Sound and pushed down a great opening he had seen to the south named Prince Regent's Inlet, Captain Beechey was to enter Behring's Strait, and Franklin was to make a second journey to the shores of Arctic America. Parry was unfortunate, but Beechey entered Behring Strait in the *Blossom* in August, 1826, and extended our knowledge as far as Point Barrow in  $71^{\circ} 23' 30''$  N. latitude. Franklin, in 1825-26, descended the Mackenzie river to its mouth, and explored the coast for 374 miles to the westward; while Doctor Richardson discovered the shore between the mouths of the Mackenzie and Coppermine, and sighted land to the northward, named by him Wollaston Land, the dividing channel being called Union and Dolphin Strait. They returned in the autumn of 1826.

Work was also being done in the Spitzbergen and Barents Seas. From 1821 to 1824 the Russian Captain Lutke was surveying the west coast of Nova Zembla as far as Cape Nassau, and examining the ice of the adjacent sea. In May, 1823 the *Griper* sailed, under the command of Captain Clavering, to convey Captain Sabine to the polar regions in order to make pendulum observations. Clavering pushed through the ice in  $75^{\circ} 30'$  N., and succeeded in reaching the east coast of Greenland, where observations were taken on Pendulum Island. He laid down the land from  $76^{\circ}$  to  $72^{\circ}$  N.

Parry's attempt in 1827 to reach the pole from the northern coast of Spitzbergen, by means of sledge-boats, has been described under the heading PARRY. The highest latitude reached was  $82^{\circ} 45'$  N.; and the attempt showed that it is useless to leave the land and trust to the drifting pack in polar exploration.

In 1829 the Danes undertook an interesting piece of exploration on the east coast of Greenland. Captain Graah of the Danish navy rounded Cape Farewell in boats, with four Europeans and twelve Eskimo. He advanced as far as  $65^{\circ} 18'$  N. on the east coast, where he was stopped by an insurmountable barrier of ice. He wintered at Nugarlik in  $63^{\circ} 22'$  N., and returned to the settlements on the west side of Greenland in 1830.

In the year 1829 Capt. John Ross, with his nephew James, having been furnished with sufficient funds by a wealthy distiller named Felix Booth, undertook a private expedition of discovery in a small vessel called the *Victory*. Eventually they were picked up by a whaler in Barrow Strait, and brought home. Great anxiety was naturally felt at their prolonged absence, and in 1833 Sir George Back, with Dr. Richard King as a companion, set out by land in search of the missing explorers.

The tracing of the polar shores of America was completed by the Hudson's Bay Company's servants. In June, 1837, Messrs. Simpson and Dease left Chippewyan, reached the mouth of the Mackenzie, and connected that position with Point Barrow, which had been discovered by the *Blossom* in 1826. During the spring of 1847 Doctor Rae explored on foot the shores of a great gulf having seven hundred miles of coast-line. He thus connected the work of Parry, at the mouth of Fury and Hecla Strait, with the work of Ross on the coast of Boothia, proving that Boothia was part of the American continent.

While the English were thus working hard to solve some of the geographical problems relating to Arctic America, the Russians were similarly engaged in Siberia. In 1821 Lieutenant Anjou made a complete survey of the New Siberia Islands. Baron Wrangell prosecuted similar investigations from the mouth of the Kolyma between 1820 and 1823. In 1843 Middendorf was sent to explore the region which terminates in Cape Tchel-yuskin.

The success of Sir James Ross' Antarctic expedition and the completion of the northern coast-line of America by the Hudson's Bay Company's servants gave rise in 1845 to a fresh attempt to make the passage from Lancaster Sound to Behring Strait. The story of this unhappy expedition of Sir John Franklin, in the *Erebus* and *Terror*, has already been told under FRANKLIN (*q.v.*); but some geographical details may be given here.

It was not until 1848 that anxiety began to be felt about the Franklin expedition. In the spring of that year Sir James Ross was sent with two ships, the *Enterprise* and *Investigator*, by way of Lancaster Sound. He wintered at Leopold Harbor, near the northeast point of North Devon. In the spring he made a long sledge journey with Lieutenant M'Clintock along the northern and western coasts of North Somerset.

On the return of the Ross expedition without any tidings the country became thoroughly alarmed. An extensive plan of search was organized—the *Enterprise* and *Investigator* under Collinson and M'Clure proceeding by Behring Strait, while the *Assistance* and *Resolute* with two steam tenders, the *Pioneer* and *Intrepid*, sailed May 3, 1850, to renew the search by Barrow Strait, under Captain Austin. Two brigs, the *Lady Franklin* and *Sophia*, under Captain Penny, a very energetic and able whaling captain, were sent by the same route. He had with him Doctor Sutherland, a naturalist, who did much valuable scientific work.

In 1851 the *Prince Albert* schooner was sent out by Lady Franklin, under Captain Kennedy, with Lieutenant Bellot of the French navy as second. They wintered on the east coast of North Somerset, and in the spring of 1852 the gallant Frenchman, in the course of a long sledging journey, discovered Bellot Strait separating North Somerset from Boothia—this proving that the Boothia coast facing the strait was the northern extremity of the continent of America.

The *Enterprise* and *Investigator* sailed from England in January, 1850.

The Hudson's Bay Company assisted in the search for Franklin. In 1848 Sir John Richardson and Doctor Rae examined the American coast from the mouth of the Mackenzie to that of the Coppermine. In 1849 and 1850 Rae continued the search; and by a long sledge journey in the spring of 1851, and a boat voyage in the summer, he examined the shores of Wollaston and Victoria Lands, which were afterward explored by Captain Collinson in the *Enterprise*.

In 1852 the British government resolved to dispatch another expedition by Lancaster Sound. Austin's four

vessels were recommissioned, and the *North Star* was sent out as a depot ship at Beechey Island. Captain Kellett received command of the *Resolute*, with M'Clintock in the steam tender *Intrepid*. Among Kellett's officers were the best of Austin's sledge travelers, M'Clintock, Meham, and Vesey Hamilton, so that good work was sure to be done.

The traveling parties of Kellett's expedition, led by M'Clintock, Meham, and Vesey Hamilton, completed the discovery of the northern and western sides of Melville Island, and the whole outline of the large Island of Prince Patrick, still farther to the westward. M'Clintock was away from the ship with his sledge party for 105 days and traveled over 1,328 miles. Meham was away ninety-four days and traveled over 1,163 miles. Sherard Osborn, in 1853, was away ninety-seven days and traveled over 935 miles. The *Resolute* was obliged to winter in the pack in 1853-54, and in the spring of 1854 Meham made a most remarkable journey in the hope of obtaining news of Captain Collinson at the Princess Royal Islands. Leaving the ship on April 3d he was absent seventy days, out of which there were sixty-one and a half days of traveling. The distance gone over was 1,336 statute miles. The average rate of the homeward journey was twenty-three and one half miles a day, the average time of traveling each day nine hours twenty-five minutes. This journey is without a parallel in arctic records.

The catastrophe to Sir John Franklin's expedition led to 7,000 miles of coast-line being discovered, and to a vast extent of unknown country being explored, securing very considerable additions to geographical knowledge. Much attention was also given to the collection of information, and the scientific results to the various search expeditions were considerable. The catastrophe also afforded a warning which would render any similar disaster quite inexcusable. If arrangements are always carefully made for a retreat beforehand, if a depot ship is always left within reach of the advancing expedition as well as of the outer world, and if there is annual communication, with positive rules for depositing records, no such catastrophe can ever happen again.

The American nation was first led to take an interest in polar research through a very noble and generous feeling of sympathy for Franklin and his brave companions. Mr. Grinnell of New York gave practical expression to his feeling. In 1850 he equipped two vessels, the *Advance* and *Rescue*, to aid in the search, commanded by Lieutenants De Haven and Griffith, and accompanied by Doctor Kane. They reached Beechey Island on August 27, 1850 and assisted in the examination of Franklin's winter quarters, but returned without wintering. In 1853 Doctor Kane, in the little brig *Advance* of 120 tons, undertook to lead an American expedition up Smith Sound, the most northern outlet from Baffin's Bay.

On July 10, 1860, Doctor Hayes, who had served with Kane, sailed from Boston for Smith Sound, in the schooner *United States* of 130 tons and a crew of fifteen men. His object was to follow up the line of research opened by Doctor Kane. He wintered at Port Foulke, in  $78^{\circ} 17' N.$ , and about ten miles from Cape Alexander, which forms the eastern portal of Smith Sound. Doctor Hayes crossed Smith Sound in the spring with dog-sledges, but his observations are not to be depended upon, and it is very uncertain how far he advanced northward on the other side. He returned to Boston on October 23, 1861.

The story of Charles Hall of Cincinnati, who was led to become an arctic explorer through his deep interest in the search for Franklin, has been told in the article devoted to him.

The Spitzbergen seas have been explored, in recent years by Norwegian fishermen as well as by Swedish and German expeditions and by English yachtsmen.

Between 1858 and 1872 the Swedes sent seven expeditions to Spitzbergen and two to Greenland. All returned with valuable scientific results.

The gallant enterprises of other countries rekindled the zeal of England for arctic discovery; and in October, 1874, the prime minister announced that an expedition would be dispatched in the following year. Two powerful screw steamers, the *Alert* and *Discovery*, were selected for the service, and Captain Nares was selected as leader. The expedition returned to England in October, 1876. The *Alert* reached the highest northern latitude ever attained by any ship, and wintered farther north than any ship had ever wintered before. The results of the expedition were the discovery of 300 miles of new coast-line, the examination of this part of the frozen polar ocean, a series of meteorological, magnetic, and tidal observations at two points farther north than any such observations had ever been taken before, and large geological and natural history collections.

In the same year, 1875, Sir Allen Young undertook a voyage in his steam yacht the *Pandora* to attempt to force his way down Peel Sound to the magnetic pole, and if possible to make the northwest passage by rounding the eastern shore of King William Island. The *Pandora* entered Peel Sound on August 29, 1875, and proceeded down it much further than any vessel had gone before since it was passed by Franklin's two ships in 1846. Sir Allen reached a latitude of  $72^{\circ} 14' N.$

In 1879 an enterprise was undertaken in the United States, with the object of throwing further light on the sad history of the retreat of the officers and men of Sir John Franklin's expedition, by examining the west coast of King William Island in the summer, when the snow is off the ground. The party consisted of Lieutenant Schwatka, of the United States Army, and three others. Wintering near the entrance of Chesterfield Inlet, in Hudson's Bay, they set out overland for the estuary of the Great Fish River, assisted by Eskimo and dogs, on April 1, 1879. They only took one month's provisions, their main reliance being upon the game afforded by the region to be traversed. The party obtained, during the journeys out and home, no less than 522 reindeer. After collecting various stories from the Eskimo at Montreal Island and at an inlet west of Cape Richardson, Schwatka crossed over to Cape Herschel, on King William Island, in June. He examined the western shore of the island with the greatest care for relics of Sir John Franklin's parties, as far as Cape Felix, the northern extremity. The return journey was commenced in November by ascending the Great Fish River for some distance, and then marching over the intervening region to Hudson's Bay. The cold of the winter months in this country is intense, the thermometer falling as low as  $-70^{\circ}$ , so that the return journey was most remarkable, and reflects the highest credit on Lieutenant Schwatka and his companions. As regards the search little was left to be done after M'Clintock, but some graves were found, as well as a medal belonging to Lieutenant Irving, of H.M.S. *Terror*, and some bones believed to be his, which were brought home and interred at Edinburgh.

Mr. Gordon Bennett, the proprietor of the *New York Herald*, having resolved to dispatch an expedition of discovery at his own expense by way of Behring Strait, the *Pandora* was purchased from Sir Allen Young, and rechristened the *Jeannette*. Lieutenant De Long of the United States navy was appointed to com-

mand, and it was made a national undertaking by special Act of Congress, the vessel being placed under martial law and officered from the navy. The *Jeanette* sailed from San Francisco on July 8, 1879, and was last seen steaming toward Wrangell Land on September 3d. This land had been seen by Captain Kellett, in U.S.S. *Herald* on August 17, 1879, but no one had landed on it, and it was shown on the charts by a long dotted line. The *Jeannette* was provisioned for three years, but as no tidings had been received of her up to 1881, two steamers were sent up Behring Strait in search. One of these, the *Rodgers*, under Lieutenant Berry, anchored in a good harbor on the south coast of Wrangell Land, in  $70^{\circ} 57' N.$  on August 26, 1881. The land was explored by the officers of the *Rodgers* and found to be an island of about seventy miles long by twenty-eight, with a ridge of hills traversing it east and west, the seventy-first parallel running along its southern shore. Lieutenant Berry then proceeded to examine the ice to the northward, and attained a higher latitude by twenty-one miles than had ever been reached before on the Behring Strait meridian, namely,  $73^{\circ} 44' N.$  Sir R. Collinson, in 1850, had reached  $73^{\circ} 23'$ . No news was obtained of the *Jeannette*, but soon afterward melancholy tidings arrived from Siberia. After having been beset in heavy pack ice for twenty-two months, the *Jeannette* was crushed and sunk on June 12, 1881, in  $77^{\circ} 15' N.$  latitude and  $155^{\circ} E.$  longitude. The officers and men dragged their boats over the ice to an island which was named Bennett Island, where they landed on July 29th. They reached one of the New Siberia Islands on September 10th, and on the 12th they set out for the mouth of the Lena. But in the same evening the three boats were separated in a gale of wind. A boat's crew with Mr. Melville, the engineer, reached Irkutsk, and Mr. Melville set out in search of Lieutenant De Long and his party, who had also landed. The other boat was lost. Eventually Melville discovered the dead bodies of De Long and two of his crew on March 13, 1883. They had perished from exhaustion and want of food. The *Rodgers* was burnt in its winter quarters, and one of the officers, Mr. Gilder, made a hazardous journey homeward through northeast Siberia.

On September 18, 1875, Lieutenant Weyprecht, one of the discoverers of Franz-Josef Land, read a thoughtful and carefully prepared paper before a large meeting of German naturalists at Gratz on the scientific results to be obtained from polar research and the best means of securing them. He urged the importance of establishing a number of stations within or near the Arctic Circle, in order to record complete series of synchronous meteorological and magnetic observations. Lieutenant Weyprecht did not live to see his suggestions carried into execution, but they bore fruit in due time. The various nations of Europe were represented at an international polar conference at Hamburg in 1879, and at another at St. Petersburg in 1882; and it was decided that each nation should establish one or more stations where synchronous observations should be taken from August, 1882. This useful project was matured and executed. The stations were at the following localities round the Arctic Circle:—

Norwegians...	<i>Bosekop</i> , Alten Fjord, Norway,	M. Aksel S. Steen
Swedes.....	<i>Ice Fjord</i> , Spitzbergen,	Mr. Ekholm.
Dutch.....	<i>Dickson Harbor</i> , mouth of Yenisei, Siberia,	Dr. Smaller.
Russians...	{ <i>Sagastyr Island</i> , mouth of Lena, Siberia,	Lieut. Jurgens.
	{ <i>Moller Bay</i> , Nova Zembla,	Lieut. Andreief.
	{ <i>Point Barrow</i> , N. America,	Lieut. Ray, U.S.A.
Americans..	{ <i>Lady Franklin Bay</i> , $81^{\circ} 44' N.$ ,	Lieut. Greely, U.S.A.

English.....	<i>Great Slave Lake</i> , Dominion of Canada,	Lieut. Dawson.
Germans.....	<i>Cumberland Bay</i> , west side of Davis Strait,	Dr. Giese.
Danes.....	<i>Godthaab</i> , Greenland,	A. Paulsen.
Austrians....	<i>Jan Mayen</i> , North Atlantic, $71^{\circ} N.$ ,	Lieut. Wohlgenuth.

The whole scheme was successfully accomplished with the exception of the part assigned to the Dutch at Dickson Harbor. They started in the *Varna* but were beset in the Kara Sea and obliged to winter there. The *Varna* was lost, and the crew took refuge on board Lieutenant Hovgaard's vessel, which was also forced to winter in the pack during 1882-83.

The American stations commenced work in 1882. Lieutenant Greely's party consisted of two other lieutenants, of twenty sergeants and privates of the United States army, and of Doctor Pavy, an enthusiastic explorer who had been educated in France, and had passed the previous winter among the Eskimo of Greenland. On August 11, 1881, the steamer *Proteus* conveyed Lieutenant Greely and his party to Lady Franklin Bay during an exceptionally favorable season; a house was built at the *Discovery's* winter-quarters, and they were left with two years' provisions. The regular series of observations was at once commenced, and two winters were passed without accident. Traveling parties were also sent out in the summer, dogs having been obtained at Disco. Lieutenant Lockwood made a journey along the north coast of Greenland, and reached a small island in  $83^{\circ} 24' N.$  and  $44^{\circ} 5' W.$  Doctor Pavy, with one companion, went a short distance beyond the winter-quarters of the *Alert* and two trips were made into the interior of Grinnell Land. The coast on the western side was reached, and a large lake was discovered near Discovery Harbor. The chief value of the work of Lieutenant Greely's party consisted in the synchronous observations taken during 1882. As no succor arrived in the summer of 1883—though relieving vessels were dispatched both in 1882 and in 1883—Lieutenant Greely started from Lady Franklin Bay with his men on August 9th, expecting to find a vessel in Smith Sound. On October 21st they were obliged to encamp at Cape Sabine, on the western shore of Smith Sound, and build a hut for wintering. A few depots were found, which had been left by Sir George Nares and Lieutenant Beebe, but all was exhausted before the spring. Then came a time of indescribable misery and acute suffering. The poor fellows began to die of actual starvation; and, when the relieving steamers *Thetis* and *Bear* reached Cape Sabine, Lieutenant Greely and six suffering companions were found just alive. If the simple and necessary precaution had been taken of stationing a depot ship in a good harbor at the entrance of Smith Sound, in annual communication with Greely on one side and with America on the other, there would have been no disaster. If precautions proved to be necessary by experience are taken, there is no undue risk or danger in polar enterprise.

#### SOUTH POLAR REGION.

The south polar region, unlike the northern region, is almost covered by the ocean, the only extensive land being far to the south. It was of course entirely unknown to the ancients and to the early navigators of modern Europe, although a theory prevailed among geographers that a great continent existed round the south pole; the "Terra Australis Incognita." Lope Garcia de Castro, the governor of Peru, sent his nephew Alvaro Mendaña in search of it, who sailed from Callao in 1567. Another expedition under Pedro Fernandez de Quiros left Callao in 1605, and discovered

land in April, 1606, which he called Australia del Espiritu Santo, now known to be one of the New Hebrides group. These were the first regular expeditions in search of the supposed southern continent.

The first ship that ever approached the Antarctic Circle was one of a fleet which sailed from Rotterdam under the command of Jacob Mahu as admiral, in June, 1598. She was called the *Good News*, a yacht of 150 tons, with Dirk Gerritz as her captain. She was separated from the rest of the fleet in Magellan's Strait in 1599, and was carried by tempestuous weather far to the south, discovering higher land in 64° S. This appears to have been the land afterward named the South Shetlands. Gerritz and his crew were eventually captured by the Spaniards at Valparaiso. In 1671 La-Roche discovered South Georgia, a solitary island in the South Atlantic, but north even of the latitude of Cape Horn. Where so little is known, and where there is so little land, the discoveries within a few hundred miles of the Antarctic Circle come to be spoken of as south polar.

Captain Cook, in January, 1773, sailed southward from the Cape of Good Hope in the *Resolution*, with the *Adventurer* in company, and, after passing much ice, crossed the Antarctic Circle on the 17th, in longitude 39° 35' E. In the same afternoon they sighted thirty-eight icebergs to the southward besides much loose ice; and in 67° 15' their progress was stopped. Cook did not think it prudent to persevere in getting farther south, and bore up for New Zealand.

Auckland Island was discovered by Captain Bristow in 1806, and Campbell Island by Hazleburgh in 1810, both south of New Zealand, but far to the north of the Antarctic Circle. In 1818 Mr. William Smith of Blyth rediscovered the land known as South Shetland. His work was confirmed by Mr. Bransfield, the master of H.M.S. *Andromache*, flag-ship on the west coast of South America, who further discovered another portion named Bransfield Land. Further coast-line was cited by the French expedition under Dumont d'Urville in 1838, who named it Prince de Joinville and Louis Philippe Land.

The South Orkneys were discovered by Capt. George Powell, in the ship *Dove*, on October 6, 1821. Mr. Weddell, R.N., with the sailing vessels *Jane* and *Beaufoy*, penetrated as far south as 74° 15' S. on February 20, 1823.

POLE, REGINALD, generally known as Cardinal Pole, was born at Stourton Castle, Staffordshire, March 3, 1500. Henry VIII. was eager to keep him at court, but Pole appears to have held aloof from politics until the question of the king's divorce drew him from his retirement. He was probably from the first opposed to Henry's policy, but we find him, nevertheless, in 1530, at Paris, charged with the duty of obtaining the decision of the Sorbonne on the question at issue. That decision given, he returned to England, but refused to approve the king's divorce, or the other measures connected with it. The king, anxious to gain his adhesion, offered him the archbishopric of York, vacant by the death of Wolsey in 1531. After some hesitation, he refused the offer and left the country.

Late in 1536 he was made cardinal, and early next year he was sent as papal legate with the object of uniting Charles V. and Francis I. in an attack upon England, which was to coincide with a rising of the Romanists in that country. In 1549 he was a candidate for the papacy on the death of Paul III., and at one moment was on the point of being elected, but in the end was unsuccessful, and retired to Maguazzano, on the Lake of Garda. The pope at once on the accession of Mary appointed him legate, and entered into negotiations with the

queen. A marriage between her and Pole was at one moment contemplated, but the state of public feeling in England rendered his return impossible, and he was kept waiting for a year in Flanders and Germany. The reaction at length produced a parliament favorable to Rome, and enabled him to return (November, 1554). Pole became Mary's chief adviser, and, with her, must bear the blame of the persecution which followed on the reunion with Rome. On Cranmer's death (March, 1556) he became archbishop of Canterbury, but soon afterward (May, 1557) fell into disgrace with the pope, Paul IV., who was his personal enemy. On the outbreak of war with France, Paul, the political ally of that country, canceled Pole's legatine powers and even charged him with heresy. No remonstrances on the part of Mary and Pole himself could induce the pope to retract this sentence, and Pole died (November 18, 1558) at enmity with the power in whose support he had spent his life.

POLECAT. This name is applied to one of the English members of the large Family *Mustelidæ*, which contains besides the Martens, Weasels, Otters, and Badgers. The polecat ranges over the greater part of Europe and America. It is not found in the extreme south. In fine weather it lives either in the open air, in holes, fox-earths, rabbit-warrens, under rocks, or in wood-stacks; while in winter it seeks the protection of deserted buildings, barns, or stables. During the day it sleeps in its hiding place, sallying forth at night to plunder dovecots and hen-houses. It climbs but little, and shows far less activity than the marten. It feeds ordinarily on small mammals. The polecat is very tenacious of life and will bear many severe wounds before succumbing; it is also said to receive with impunity the bite of the adder. Its fetid smell has become proverbial.

The Siberian Polecat (*Putorius evermanni*), is very like the European in size, color, and proportions, but with head and back both nearly or quite white, and skull more heavily built and sharply constricted behind the orbits, at least in fully adult individuals. It inhabits the greater part of southwestern Siberia, extending from Tibet into the steppes of southeastern European Russia.

The Black-footed or American polecat (*Putorius nigripes*), a native of the central plateau of the United States, and extending southward into Texas. It is very closely allied to the last species, but has nevertheless been made the type of a special sub-genus named *Cynomyonax*, or "King of the Prairie Marmots," a name which expresses its habit of living in the burrows of, and feeding upon, the curious prairie marmots (*Cynomys*) of the United States. An excellent account of this species may be found in Dr. Elliott Coues' *Furbearing Animals of North America*.

The Mottled Polecat (*Putorius sarmaticus*), a rare and peculiar species occurring in southern Russia and southwestern Asia, extending from eastern Poland to Afghanistan.

POLEVOY. See RUSSIAN LITERATURE.

POLICE. The branch of criminal justice which comprises a methodical system for the prevention and detection of crime is commonly known by the name of "Police." With the system having these objects is combined the execution of many duties not strictly involved in the popular definition of crime, but materially affecting the security and convenience of the public. Bentham, more comprehensively, says that police is in general a system of precaution either for the prevention of crime or of calamities. It is destined to prevent evils and provide benefits.

In this view the definition and use of the word

"Police," as meaning the regulation and government of the city and country in relation to the inhabitants, are not sufficiently close. When Blackstone says that by the public police and economy he means "the due regulation and domestic order of the kingdom, whereby the individuals of the State, like members of a well governed family, are bound to conform their general behavior to the rules of propriety, good neighborhood, and good manners, and to be decent, industrious, and inoffensive in their respective stations," the definition is capable of an interpretation at once too wide and too narrow for the present purpose. It is vain to look for an accurate description of police, as a system, in writers of a period when the thing sought for had no existence. The system is of recent growth, and it is necessarily more associated with personal instruments for the attainment of objects than with the objects to be attained. An observation of Gibbon, referring to the *ædiles* and *quæstors* of the Roman empire, that officers of the police or revenue easily adapt themselves to any form of government, correctly presents the idea of distinctive personal elements. A system of police administration includes neither the making of the law nor the law itself. Officers of police are neither legislators nor (in the usual sense) magistrates. They are the instruments by which conformity to the rules of the commonwealth is obtained.

Apart from the repression of crime as generally understood, it is plain that, at least in crowded cities, a power ought to exist for the suppression of noise and disorder, the regulation of locomotion and traffic, the correction of indecency, and the prevention of a numerous class of annoyances and impositions which can only be restrained by cognizance being taken of them at the instant. To these may be added a number of petty disputes the immediate settlement of which tends materially to the public peace. Over such subjects as these it is obviously for the general advantage that the police should have a summary control. Any apprehension of danger to liberty can only be founded on its abuse and not upon its proper exercise.

Employment of persons in these various duties, as well as in the prevention and detection of graver matters of crime, constitutes division of state labor. Therefore, while it is perfectly correct to speak of the various legislative and other measures for good order as "matters of police," the organization and management of the police forces constitute a distinct subject.

The essential features of the established police system, alike in Great Britain and in foreign states, in cities and towns as in countries, and village communities comprise the following matters:—

I. A body of persons in relation to the state enforcing obedience to the criminal law, the prevention and detection of crime, and the preservation of order, over a defined area, generally divided and subdivided for the purpose of description and immediate government of the force, but having one jurisdiction throughout.

II. The division of that force into classes of various rank, comprising, in general, in ascending order, constables, sergeants, inspectors, and superintendents (or their equivalents)—the constables being the most numerous and themselves divided into classes.

III. General control of the entire body by heads, whether styled commissioners or chiefs, having power to make regulations for the government of the force, subject in turn to the control of state authorities.

IV. Patrol day and night of the streets, roads, and public places—the "beats" and "tours of duty" of constables being prescribed by regulations, and actual performance and compliance being secured by the sergeants and inspectors.

V. The payment of the force, including establishment charges, out of public funds provided for the purpose.

The police force of the British empire, metropolitan, municipal, and rural together, is about 210,000. Of this total, 51,000 are in the United Kingdom and 147,000 in India, the remainder being in the colonies and dependencies. If to this total be added the number of village police in India who are legally recognized, whose number is not less than 350,000, the grand total of the police for the empire is 560,000. Thus we have for the whole empire an average of one policeman to every 571 of the people and to every 16 square miles (Sir Richard Temple).

The different States of the Union have a system of police closely resembling that of England, and founded similarly on acts of the legislature combined with common law applicable to peace officers. Congress as well as the States separately may establish police regulations, and it is to be observed that the criminal law of England has been reproduced in various shapes in nearly all the States. The source of revenue for the maintenance of the police is taxation of real and personal property. Every State and every city in a State has its separate special administration. For the purposes of this article New York must suffice. The regulations of the police of Brooklyn, Philadelphia, and other cities present the same general features.

The police department of the city of New York consists of a "board of police" composed of four "commissioners" (appointed by the mayor with the consent of the board of aldermen) and the "police force" and officers appointed by the board. The board, consisting of the commissioners, is the head of the police department, and governs and controls its business; it is invested with and exercises all the powers conferred by law upon the police department, makes appointments, and by rules and regulations through a superintendent prescribes the general discipline of the department. The orders cannot, however, conflict with the constitution of the United States nor with the constitution or laws of the State of New York.

The police force of the city comprises officers ranking as follows: Superintendent of the whole force; four inspectors (the whole area of the city being divided into four inspection districts, subdivided into precincts, with an inspector to each), sergeants, and roundsmen who are visiting officers—the body of the force being termed "patrol men," with "overmen" at stations and prisons.

The force (clothed in uniform) is divided into as many companies as there are precincts, and such other companies and "squads" as the board may order. The superintendent is the chief executive officer of the force, subject to the orders, rules, and regulations of the board, and it is his duty to enforce in the city all the laws of the State and ordinances of the city, and the rules and regulations of the police board. The superintendent promulgates written or printed orders to the officers and members of the police force not inconsistent with law or the rules and regulations of the board. It is the duty of the police force at all times of the day and night within the city and county of New York, and they are accordingly empowered, to especially preserve the public peace; prevent crime; detect and arrest offenders; suppress riots and insurrections; protect the rights of persons and of property; guard the public health; preserve order at every primary and public election; remove nuisances existing in public streets, roads, places, and highways; repress and restrain disorderly houses and houses of ill-fame; arrest all street beggars and mendicants; provide a proper police attendance at every fire in order that the firemen, fire-engines, and property exposed may be suitably assisted or protected;

assist, advise, and protect immigrants, strangers, and travelers in public streets, or at steamboat and ship landings or railroad stations; enforce any law relating to the suppression and punishment of crime, or to the observance of Sunday, or regarding pawnbrokers, or mock auctions, or emigration, or elections, or gambling, or intemperance, or lotteries, or lottery policies, or vagrants, or disorderly persons, or the public health, or any ordinance or resolution of common councils, within the said district, applicable to police, health, or criminal procedure.

Special regulations are made on these and other kindred subjects, such as the regulation of traffic, preventing obstructions, the visitation of places of amusement, public houses and drinking places, observation of servants in charge of houses, and of suspicious persons, lost children, processions, balls and parties, elections, etc., and the attendance of an adequate number of police at every assembly of citizens.

The detective force, called the "detective squad," consists of a captain and other members assigned by the board to detective duty. This portion of the force has an office, as other portions of the police force, and is under the direct orders of the superintendent, to whom reports are made, and who in turn reports to the board. There is also a "special service squad" under the officer commanding the detective force.

There is a sanitary code, and a "sanitary police company" is set apart from the police force by the board of police, performing duties assigned by the board. The captain of the sanitary company assigns policemen to act as school officers. There are harbor police, a police steamboat and steam-boiler inspection squad to enforce the statute law on the subject, an "ordinance police squad" to enforce ordinances of the corporation, and a "property office."

Members of the force are subject to rules; at the discretion of the board, on written application, they are permitted to receive rewards or presents for services rendered by them in the discharge of duties which are both "meritorious and extraordinary," but for such only.

Admission to the force, examination, instruction, drill, and discipline are provided for by special regulations. The right of every member of the police force to entertain political or partisan opinions, and to express the same freely when such expression shall not concern the immediate discharge of his official duties, as well as the right of the elective franchise, is deemed sacred and inviolable; but no member of the force is permitted to be a delegate or representative to, or member of, or to take part in any political or partisan convention, whose purpose is the nomination of a candidate or candidates to any political office. Upon the days of election for public offices held under the laws of the State, he must do all within his power to preserve the peace, protect the integrity of the ballot box, enforce the rights of lawful voters, and prevent illegal and fraudulent voting. As an adjunct to the police in most American cities may be mentioned the patrol wagons (in which a number of police can be hurriedly transported to any given point), and the ambulances for the removal of the victims of accident or sudden disease.

POLIGNAC, an ancient French family, which had its seat in the Cevennes near Puy-en-Velay (Haute-Loire). Cardinal MELCHOIR DE POLIGNAC (1661-1742) was a younger son of Armand XVI., marquis de Polignac, and at an early age achieved distinction as a diplomatist. In 1726 he received the archbishopric of Auch, and he died in Paris in 1742. Count JULES DE POLIGNAC (ob. 1817), grand-nephew of the preceding, was created duke by Louis XVI., in 1780, and in 1782

was made postmaster-general. His position and influence at court were largely due to his wife, the bosom friend of Marie Antoinette. The duchess died shortly after the queen, but her husband, who had received an estate from Catherine II., in the Ukraine, survived till 1817. Of their three sons the second, Prince JULES DE POLIGNAC (1780-1847), held various offices after the restoration of the Bourbons, received from the pope his title of "prince" in 1820, and in 1823 was made ambassador to the court of St. James. On the revolution of July, 1830, he fled for his life, but after wandering for some time among the wilds of Normandy, was arrested at Granville. His trial before the chamber of peers resulted in his condemnation to perpetual imprisonment (at Ham), but he was benefited by the amnesty of 1836, when the sentence was commuted to one of exile. During his captivity he wrote *Considérations politiques* (1832). He afterward spent some years in England, but finally was permitted to reënter France on condition that he did not take up his abode in Paris. He died at St. Germain on March 29, 1847.

POLILLO. See PHILIPPINE ISLANDS.

POLITIAN. Angelo Ambrogini, known in literary annals as ANGELO POLIZIANO or POLITIANUS, from his birth-place, was born at Montepulciano, in Tuscany, in the year 1454.

Poliziano was great as a scholar, as a professor, as a critic, and as a Latin poet at an age when the classics were still studied with the passion of assimilative curiosity, and not with the scientific industry of a later period. He died half broken-hearted by the loss of his friend and patron, Lorenzo de' Medici, in 1494, at the age of forty, just before the wave of foreign invasion which was gathering in France swept over Italy.

POLITICAL CONVENTIONS are conventions composed of delegates from any of the several political organizations of the United States, for the purpose of formulating a platform of political principles, and nominating as candidates for office those whose political affiliations and rules of conduct are in harmony with the views of such party. Delegates are chosen by popular vote, and representation is based upon the number of voters in the precinct, county, district, or State whence such delegates are elected. This fact is determined by the central committee, which has been previously selected, and upon the discretion of which the party relies for the disposition of business connected with the conduct of a campaign, and for the success of the campaign itself. These committees, in brief, exercise a political trust committed to their care, and are held responsible for its faithful discharge. The ethics of a convention, so to speak, demand concert of action, the settlement of internal differences, the cordial and substantial support of the nominees, and the employment of all honorable means for the promotion of harmony in the party to the end that failure shall not be the sequel. The convention is presided over by a chairman selected from among the delegates in attendance, who appoints the various committees, decides all points of parliamentary law raised during the proceedings, promulgates the result of ballots ordered as the same are reached, and generally exercises a supervision over the entire deliberations. He is assisted in his administration by a secretary, sergeant-at-arms, and other officers; and at the final conclusion of the proceedings affixes his signature to the same, in testimony to their correctness. He is not debarred from calling a delegate to preside and participating in the convention debates, nor from submitting such opinions, motions or amendments as may in his opinion promote the expedition of business or the attainment of purposes under consideration.

Delegates, in addition to the forming of a platform



and the nomination of candidates, also participate in the selection of campaign committees, local, county, State and National, who, as already stated, have charge of the campaign, the apportionment of future representation and the calling of future conventions. Upon the completion of the business for the transaction of which the convention assembled, an adjournment follows, and if there is necessity for further deliberation, owing to circumstances arising subsequent to adjournment, the executive committee convenes and decides where to re-call the convention, or pass upon the matter in executive session.

**POLITICAL ECONOMY.** The present condition of the study of political economy seems to prescribe, as most suitable for these pages, a treatment of the subject different from that adopted in relation to other departments of knowledge.

The history of economic inquiry is most naturally divided into the three great periods of (1) the ancient, (2) the mediæval, and (3) the modern worlds.

#### ANCIENT TIMES.

*The Oriental Theocracies.*—The earliest surviving expressions of thought on economic subjects have come down to us from the Oriental theocracies.

*Greek and Roman Antiquity.*—The practical economic enterprises of Greek and Roman antiquity could not, even independently of any special adverse influences, have competed in magnitude of scale or variety of resource with those of modern times. The unadvanced condition of physical science prevented a large application of the less obvious natural powers to production, or the extensive use of machinery, which has acquired such an immense development as a factor in modern industry. The imperfection of geographical knowledge and of the means of communication and transport were impediments to the growth of foreign commerce. These obstacles arose necessarily out of the mere immaturity of the industrial life of the periods in question. Now the historical vocation of the ancient civilization was to be accomplished, not through industry, but through war, which was in the end to create a condition of things admitting of its own elimination and of the foundation of a regime based on pacific activity.

*The Greeks.*—This office was, however, reserved for Rome, as the final result of her system of conquest; the military activity of Greece, though continuous, was incoherent and sterile, except in the defense against Persia, and did not issue in the accomplishment of any such social mission.

In the *Works and Days* of Hesiod, we find an order of thinking in the economic sphere very similar to that of the theocracies. With a recognition of the divine disposing power, and traditional rules of sacerdotal origin, is combined practical sagacity embodied in precept or proverbial saying. But the development of abstract thought, beginning from the time of Thales, soon gives to Greek culture its characteristic form, and marks a new epoch in the intellectual history of mankind.

The movement was now begun, destined to mold the whole future of humanity, which, gradually sapping the old hereditary structure of theological convictions, tended to the substitution of rational theories in every department of speculation.

In the Greek thinking on such questions, as on all sociological subjects, the following general features are observable:

1. The individual is conceived as subordinated to the state, through which alone his nature can be developed and completed, and to the maintenance and service of which all his efforts must be directed. The great aim of all political thought is the formation of good citizens;

every social question is studied primarily from the ethical and educational point of view. The citizen is not regarded as a producer, but only as a possessor, of material wealth; and this wealth is not esteemed for its own sake or for the enjoyments it procures, but for the higher moral and public aims to which it may be made subservient.

2. The state, therefore, claims and exercises a controlling and regulating authority over every sphere of social life, including the economic, in order to bring individual action into harmony with the good of the whole.

3. With these fundamental notions is combined a tendency to attribute to institutions and to legislation an unlimited efficacy, as if society had no spontaneous tendencies, but would obey any external impulse, if impressed upon it with sufficient force and continuity.

Every eminent social speculator had his ideal state, which approximated to or diverged from the actual or possible, according to the degree in which a sense of reality and a positive habit of thinking characterized the author.

The most celebrated of these ideal systems is that of Plato. In it the Greek idea of the subordination of the individual to the state appears in its most extreme form. In that class of the citizens of this republic who represent the highest type of life, community of property and of wives is established, as the most effective means of suppressing the sense of private interest, and consecrating the individual entirely to the public service.

*The Romans.*—Notwithstanding the eminently practical, realistic, and utilitarian character of the Romans, there was no energetic exercise of their powers in the economic field; they developed no large and many-sided system of production and exchange. Their historic mission was military and political, and the national energies were mainly devoted to the public service at home and in the field. To agriculture, indeed, much attention was given from the earliest times, and on it was founded the existence of the hardy population which won the first steps in the march to universal dominion. But in the course of their history the cultivation of the soil by a native yeomanry gave place to the introduction on a great scale of slave laborers, acquired by their foreign conquests; and for the small properties of the earlier period were substituted the vast estates—the *latifundia*—which, in the judgment of Pliny, were the ruin of Italy. The industrial arts and commerce (the latter, at least when not conducted on a great scale) they regarded as ignoble pursuits, unworthy of free citizens; and this feeling of contempt was not merely a prejudice of narrow and uninstructed minds, but was shared by Cicero and others among the most liberal spirits of the nation. As might be expected from the want of speculative originality among the Romans, there is little evidence of serious theoretic inquiry on economic subjects. Their ideas on these as on other social questions were for the most part borrowed from the Greek thinkers. Such traces of economic thought as do occur are to be found in (1) the philosophers, (2) the writers *de re rustica*, and (3) the jurists. It must, however, be admitted that many of the passages in these authors referred to by those who assert the claim of the Romans to a more prominent place in the history of the science often contain only obvious truths or vague generalities.

In the philosophers, whom Cicero, Seneca, and the elder Pliny sufficiently represent (the last indeed being rather a learned encyclopædist or polyhistor than a philosopher), we find a general consciousness of the decay of industry, the relaxation of morals, and the growing spirit of self-indulgence among their contem-

poraries, who are represented as deeply tainted with the imported vices of the conquered nations.

Looking back on the history of ancient economic speculation, we see that, as might be anticipated *a priori*, the results attained in the field by the Greek and Roman writers were very scanty.

#### MIDDLE AGES.

The Middle Ages (400-1300 A.D.) form a period of great significance in the economic, as in the general, history of Europe. They represent a vast transition, in which the germs of a new world were deposited, but in which little was fully elaborated. There is scarcely anything in the later movement of European society which we do not find there, though as yet, for the most part, crude and undeveloped.

No large or varied economic activity was possible under the ascendancy of feudalism. That organization, as has been abundantly shown by philosophical historians, was indispensable for the preservation of order and for public defense, and contributed important elements to general civilization. But, while recognizing it as opportune and relatively beneficent, we must not expect from it advantages inconsistent with its essential nature and historical office. The class which predominated in it was not sympathetic with industry, and held the handicrafts in contempt, except those subservient to war or rural sports. The whole practical life of the society was founded on territorial property; the wealth of the lord consisted in the produce of his lands and the dues paid to him in kind; this wealth was spent in supporting a body of retainers whose services were repaid by their maintenance. There could be little room for manufactures, and less for commerce; and agriculture was carried on with a view to the wants of the family, or at most of the immediate neighborhood, not to those of a wider market. The economy of the period was therefore simple, and, in the absence of special motors from without, unprogressive.

In the latter portion of the Middle Ages several circumstances came into action which greatly modified these conditions. The crusades undoubtedly produced a powerful economic effect by transferring in many cases the possessions of the feudal chiefs to the industrious classes, while by bringing different nations and races into contact, by enlarging the horizon and widening the conceptions of the populations, as well as by affording a special stimulus to navigation, they tended to give a new activity to international trade. The independence of the towns and the rising importance of the burgher class supplied a counterpoise to the power of the land aristocracy; and the strength of these new social elements was increased by the corporate constitution given to the urban industries, the police of the towns being also founded on the trade guilds, as that of the country districts was on the feudal relations. The increasing demand of the towns for the products of agriculture gave to the prosecution of that art a more extended and speculative character; and this again led to improved methods of transport and communication. But the range of commercial enterprise continued everywhere narrow, except in some favored centers, such as the Italian republics, in which, however, the growth of the normal habits of industrial life was impeded or perverted by military ambition, which was not, in the case of those communities, checked as it was elsewhere by the pressure of an aristocratic class.

The enfranchisement of the working classes was the most important practical outcome of the Middle Ages. The first step in this movement was the transformation of slavery, properly so called, into serfdom. The latter is, by its nature, a transitory condition. The serf was

bound to the soil, had fixed domestic relations, and participated in the religious life of society; and the tendency of all his circumstances, as well as of the opinions and sentiments of the time, was in the direction of liberation. This issue was, indeed, not so speedily reached by the rural as by the urban workman. Already in the second phase serfdom is abolished in the cities and towns, while agricultural serfdom does not disappear before the third. The latter revolution is attributed by Adam Smith to the operation of selfish interests, that of the proprietor on the one hand, who discovered the superior productiveness of cultivation by free tenants, and that of the sovereign on the other, who, jealous of the great lords, encouraged the encroachments of the villeins on their authority. But that the church deserves a share of the merit seems beyond doubt—moral impulses, as often happens, conspiring with political and economic motives. The serfs were treated best on the ecclesiastical estates, and the members of the priesthood, both by their doctrine and by their situation since the Northern conquests, were constituted patrons and guardians of the oppressed or subject classes.

Out of the liberation of the serfs rose the first lineaments of the hierarchical constitution of modern industry in the separation between the entrepreneurs and the workers. The personal enfranchisement of the latter, stimulating activity and developing initiative, led to accumulations, which were further promoted by the establishment of order and good government by the civic corporations which grew out of the enfranchisement. Thus an active capital class came into existence. It appeared first in commerce, the inhabitants of the trading cities importing expensive luxuries from foreign countries, or the improved manufactures of richer communities, for which the great proprietors gladly exchanged the raw produce of their lands. In performing the office of carriers, too, between different countries, these cities had an increasing field for commercial enterprise. At a later period, as Adam Smith has shown, commerce promoted the growth of manufactures, which were either produced for foreign sale, or made from foreign materials, or imitated from the work of foreign artificers. But the first important development of handicrafts in modern Europe belongs to the fourteenth and fifteenth centuries, and the rise of manufacturing entrepreneurs is not conspicuous within the Middle Ages properly so called. Agriculture, of course, lags behind; though the feudal lords tend to transform themselves into directors of agricultural enterprise, their habits and prejudices retard such a movement, and the advance of rural industry proceeds slowly. It does, however, proceed, partly from the stimulation arising from the desire to procure the finer objects of manufacture imported from abroad or produced by increased skill at home, partly by the expenditure on the land of capital amassed in the prosecution of urban industries.

Some of the trade corporations in the cities appear to have been of great antiquity; but it was in the thirteenth century that they rose to importance by being legally recognized and regulated.

#### MODERN TIMES.

The close of the Middle ages, as Comte has shown, must be placed at the end, not of the fifteenth, but of the thirteenth century. The modern period, which then began, is filled by a development exhibiting three successive phases, and issuing in the state of things which characterizes our own epoch. During the fourteenth and fifteenth centuries the Catholic-feudal system was breaking down by the mutual conflicts of its own official members, while the constituent elements of

a new order were rising beneath it. On the practical side the antagonists matched against each other were the crown and the feudal chiefs; and these rival powers sought to strengthen themselves by forming alliances with the towns and the industrial forces they represented. The movements of this phase can scarcely be said to find an echo in any contemporary economic literature. In the second phase of the modern period, which opens with the beginning of the sixteenth century, the spontaneous collapse of the mediæval structure is followed by a series of systematic assaults which still further disorganize it. During this phase the central temporal power, which has made a great advance in stability and resources, lays hold of the rising elements of manufactures and commerce, and seeks, while satisfying the popular enthusiasm for their promotion, to use them for political ends, and make them subserve its own strength and splendor by furnishing the treasure necessary for military success. With this practical effort and the social tendencies on which it rests the mercantile school of political economy, which then obtains a spontaneous ascendancy, is in close relation. While partially succeeding in the policy we have indicated, the European Governments yet on the whole necessarily fail, their origin and nature disqualifying them for the task of guiding the industrial movement; and the discredit of the spiritual power, with which most of them are confederate, further weakens and undermines them. In the last phase, which coincides approximately with the eighteenth century, the tendency to a completely new system, both temporal and spiritual, becomes decisively pronounced, first in the philosophy and general literature of the period, and then in the great French explosion. The universal critical doctrine, which had been announced by the Protestantism of the previous phase, and systematized in England toward the close of that phase, is propagated and popularized, especially by French writers. The spirit of individualism inherent in the doctrine was eminently adapted to the wants of the time, and the general favor with which the dogmas of the social contract and *laissez faire* were received indicated a just sentiment of the conditions proper to the contemporary situation of European societies.

#### FIRST MODERN PHASE.

The first phase was marked, on the one hand, by the spontaneous decomposition of the mediæval system, and, on the other, by the rise of several important elements of the new order. The spiritual power became less apt as well as less able to fulfil its moral office, and the social movement was more and more left to the irregular impulses of individual energy, often enlisted in the service of ambition and cupidity. Strong governments were formed, which served to maintain material order amid the growing intellectual and moral disorder. The universal admission of the commons as an element in the political system showed the growing strength of the industrial forces, as did also in another way the insurrections of the working classes. The decisive prevalence of peaceful activity was indicated by the rise of the institution of paid armies—at first temporary, afterward permanent—which prevented the interruption or distraction of labor by devoting a determinate minority of the population to martial operations and exercises. Manufactures became increasingly important; and in this branch of industry the distinction between the entrepreneur and the workers was first firmly established, while fixed relations between these were made possible by the restriction of military training and service to a special profession. Navigation was facilitated by the use of the mariner's compass. The art of printing

showed how the intellectual movement and the industrial development were destined to be brought into relation with each other and to work toward common ends. Public credit rose in Florence, Venice, and Genoa, long before Holland and England attained any great financial importance. Just at the close of the phase, the discovery of America and of the new route to the East, while revolutionizing the course of trade, prepared the way for the establishment of colonies, which contributed powerfully to the growing preponderance of industrial life, and pointed to its ultimate universality. It is doubtless due to the equivocal nature of the stage, standing between the mediæval and the fully characterized modern period, that on the theoretic side we find nothing corresponding to this marvelous practical ferment and expansion. The general political doctrine of Aquinas was retained, with merely subordinate modifications. The only special economic question which seems to have received particular attention was that of the nature and functions of money, the importance of which began to be felt as payments in service or in kind were discontinued, and regular systems of taxation began to be introduced.

#### SECOND MODERN PHASE—MERCANTILE SYSTEM.

Throughout the first modern phase the rise of the new social forces had been essentially spontaneous; in the second they became the object of systematic encouragement on the part of governments, which, now that the financial methods of the Middle Ages no longer sufficed, could not further their military and political ends by any other means than increased taxation, implying augmented wealth of the community. Industry thus became a permanent interest of European governments, and even tended to become the principal object of their policy. In natural harmony with this state of facts, the mercantile system arose and grew, attaining its highest development about the middle of the seventeenth century.

The mercantile doctrine, stated in its most extreme form, makes wealth and money identical, and regards it, therefore, as the great object of a community so to conduct its dealings with other nations as to attract to itself the largest possible share of the precious metals. Each country must seek to export the utmost possible quantity of its own manufactures, and to import as little as possible of those of other countries, receiving the difference of the two values in gold and silver. This difference is called the balance of trade, and the balance is favorable when more money is received than is paid. Governments must resort to all available expedients—prohibition of, or high duties on, the importation of foreign wares, bounties on the export of home manufactures, restrictions on the export of the precious metals—for the purpose of securing such a balance.

But this statement of the doctrine, though current in the text books, does not represent correctly the views of all who must be classed as belonging to the mercantile school. Many of the members of that school were much too clear-sighted to entertain the belief, which the modern student feels difficulty in supposing any class of thinkers to have professed, that wealth consists exclusively of gold and silver. The mercantilists may be best described, as Roscher has remarked, not by any definite economic theorem which they held in common, but by a set of theoretic tendencies, commonly found in combination, though severally prevailing in different degrees in different minds. These tendencies may be enumerated as follows:—(1) toward overestimating the importance of possessing a large amount of the precious metals; (2) toward an undue exaltation (*a*) of foreign trade over domestic, and (*b*) of the industry which

works up materials over that which provides them; (3) toward attaching too high a value to a dense population as an element of national strength; and (4) toward invoking the action of the state in furthering artificially the attainment of the several ends thus proposed as desirable.

We must not expect from the writers of this stage any exposition of political economy as a whole; the publications which appeared were for the most part evoked by special exigencies, and related to particular questions, usually of a practical kind, which arose out of the great movements of the time. They were in fact of the nature of counsels to the governments of states, pointing out how best they might develop the productive powers at their disposal and increase the resources of their respective countries. They are conceived (as List claims for them) strictly in the spirit of *national* economy, and cosmopolitanism is essentially foreign to them. On these monographs the mercantile theory sometimes had little influence, the problems discussed not involving its tenets. But it must in most cases be taken to be the scheme of fundamental doctrine (so far as it was ever entitled to such a description) which in the last resort underlies the writer's conclusions.

While the mercantile system represented the prevalent form of economic thought in the seventeenth century, and was alone dominant in the reign of practical statesmanship, there was growing up, side by side with it, a body of opinion, different and indeed hostile in character, which was destined ultimately to drive it from the field. The new ideas were first developed in England, though it was in France that in the following century they took hold of the public mind, and became a power in politics. That they should first show themselves here, and afterward be extended, applied, and propagated throughout Europe by French writers, belongs to the order of things according to which the general negative doctrine in morals and politics, undoubtedly of English origin, found its chief home in France, and was thence diffused in widening circles through the civilized world. In England this movement of economic thought took the shape mainly of individual criticism of the prevalent doctrines, founded on a truer analysis of facts and conceptions; in France it was penetrated with a powerful social sentiment, furnished the creed of a party, and inspired a protest against institutions and an urgent demand for practical reform.

#### THIRD MODERN PHASE—SYSTEM OF NATURAL LIBERTY.

Both in England and France the ruling powers had already begun to be alarmed by the subversive tendencies which appeared inherent in the modern movement, and took up in consequence an attitude of resistance. Reaction became triumphant in France during the latter half of the reign of Louis XIV. under the disastrous influence of Madame de Maintenon. In England, after the transaction of 1688, by which the government was consolidated on the double basis of aristocratic power and official orthodoxy, the state policy became not so much retrograde as stationary, industrial conquest being put forward to satisfy the middle class and wean it from the pursuit of a social renovation. In both countries there was for some time a noticeable check in the intellectual development, and Roscher and others have observed that, in economic studies particularly, the first three decades of the eighteenth century were a period of general stagnation, eclectic for the most part taking the place of originality. The movement was, however, soon to be resumed, but with an altered and more formidable character. The negative

doctrine, which had risen and taken a definite form in England, was diffused and popularized in France, where it became evident, even before the decisive explosion, that the only possible issue lay in a radical social transformation. The political schools of Voltaire and Rousseau in different ways led up to a violent crisis, while taking little thought of the conditions of a system which could replace the old; but the more complete and organic school, of which Diderot is the best representative, looked through freedom to reorganization. Its constructive aim is shown by the design of the *Encyclopédie*—a project, however, which could have only a temporary success, because no real synthesis was forthcoming, and this joint production of minds often divergent could possess no more than external unity. It was with this great school that the physiocrats were specially connected; and, in common with its other members, while pushing toward an entire change of the existing system, they yet would gladly have avoided political demolishing through the exercise of a royal dictatorship, or contemplated it only as the necessary condition of a new and better order of things. But, though marked off by such tendencies from the purely revolutionary sects, their method and fundamental ideas were negative, resting, as they did, essentially on the basis of the *jus nature*.

The more liberal, as well as more rational, principles put forward by the English thinkers of the new type began, early in the eighteenth century, to find an echo in France, where the clearer and more vigorous intellects were prepared for their reception by a sense of the great evils which exaggerated mercantilism, serving as instrument of political ambition, had produced in that country. The impoverished condition of the agricultural population, the oppressive weight and unequal imposition of taxation, and the unsound state of the public finances had produced a general feeling of disquiet, and led several distinguished writers to protest strongly against the policy of Colbert and to demand a complete reform.

The heads of the physiocratic school were François Quesnay (1694-1774) and Jean Claude Marie Vincent, sieur de Gournay (1712-1759).

The general political doctrine is as follows. Society is composed of a number of individuals all having the same natural rights. If all do not possess (as some members of the negative school maintained) equal capacities, each can at least best understand his own interest, and is led by nature to follow it. The social union is really a contract between these individuals, the object of which is the limitation of the natural freedom of each, just so far as it is inconsistent with the rights of the others. Government, though necessary, is a necessary evil; and the governing power appointed by consent should be limited to the amount of interference absolutely required to secure the fulfilment of the contract. In the economic sphere, this implies the right of the individual to such natural enjoyments as he can acquire by his labor. That labor, therefore, should be undisturbed and unfettered; and its fruits should be guaranteed to the possessor; in other words, property should be sacred. Each citizen must be allowed to make the most of his labor; and therefore freedom of exchange should be insured, and competition in the market should be unrestricted, no monopolies or privileges being permitted to exist.

The physiocratic school never obtained much direct popular influence, even in its native country, though it strongly attracted many of the more gifted and earnest minds.

In Italy, as in the other European nations, there was little activity in the economic field during the first

half of the eighteenth century. It was then, however, that a really remarkable man appeared, the archdeacon Salustio Antonio Bandini (1677-1760), author of the *Discorso sulla Maremma Siense*, written in 1737, but not published till 1775. The object of the work was to raise the Maremma from the wretched condition into which it had fallen through the decay of agriculture. This decay he showed to be, at least in part, the result of the wretched fiscal system which was in force; and his books led to important reforms in Tuscany, where his name is held in high honor. Not only by Pecchio and other Italian writers, but by Roscher also, he is alleged to have anticipated some leading doctrines of the physiocrats, but this claim is disputed. There was a remarkable renaissance of economic studies in Italy during the latter half of the century, partly due to French influence, and partly, it would appear, to improved government in the northern states.

The same breath of a new era which was in the air elsewhere in Europe made itself felt also in Spain.

In both Italy and Spain, as is well observed by Comte, the impulse toward social change took principally the direction of economic reform, because the pressure exercised by governments prevented so large a measure of free speculation in the fields of philosophy and general politics as was possible in France. In Italy, it may be added, the traditions of the great industrial past of the northern cities of that country also tended to fix attention chiefly on the economic side of public policy and legislation.

We have seen that in Italy and England political economy had its beginnings in the study of practical questions relating chiefly to money or to foreign commerce. In Germany it arose (as Roscher has shown) out of the so-called cameralistic sciences. From the end of the Middle Ages there existed in most German countries a council, known as the Kammer (Lat. *camera*), which was occupied with the management of the public domain and the guardianship of regal rights. The emperor Maximilian found this institution existing in Burgundy, and established, in imitation of it, aulic councils at Innsbruck and Vienna in 1498 and 1501. Not only finance and taxation, but questions also of economic policy, came to be intrusted to these bodies. A special preparation became necessary for their members, and chairs of cameralistic science were founded in universities for the teaching of the appropriate body of doctrine. One side of the instruction thus given borrowed its materials from the sciences of external nature, dealing, as it did, with forestry, mining, general technology, and the like; the other related to the conditions of national prosperity as depending on human relations and institutions; and out of the latter German political economy was at first developed.

In no country had mercantilist views a stronger hold than in Germany, though in none, in the period we are now considering, did the system of the balance of trade receive a less extensive practical application. All the leading German economists of the seventeenth century—Bornitz, Besold, Klock, Becher, Horneck, Seckendorf, and Schröder—stand on the common basis of the mercantile doctrine. And the same may be said of the writers of the first half of the eighteenth century in general.

The stagnation in economic inquiry which showed itself in England in the early part of the eighteenth century was not broken by any notable manifestation before 1735, when Bishop Berkeley put forward in his *Querist*, with much force and point, views opposed to those of the mercantile school on the nature of national wealth and the functions of money, though not without

an admixture of grave error. But soon a more decisive advance was made. While in France the physiocrats were working after their own fashion toward the construction of a definitive system of political economy, a Scottish thinker of the first order was elucidating, in a series of short but pregnant essays, some of the fundamental conceptions of the science. What had been written on these questions in the English language before his time had remained almost altogether within the limits of the directly practical sphere. With Locke, indeed, the general system of the modern critical philosophy had come into relation with economic inquiry, but only in a partial and indeterminate way. But in Hume the most advanced form of this philosophy was represented, and his appearance in the field of economics decisively marks the tendency of the latter order of speculation to place itself in connection with the largest and deepest thought on human nature and general human history. Most of the essays here referred to first appeared in 1752, in a volume entitled *Political Discourses*, and the number was completed in the collection of *Essays and Treatises on Several Subjects*, published in the following year. The most important of them are those on Commerce, on Money, on Interest, and on the Balance of Trade. Yet these should not be separated from the rest, for notwithstanding the unconnected form of these little treatises, there runs through them a profound unity of thought, so that they indeed compose in a certain sense an economic system. They exhibit in full measure Hume's wonderful acuteness and subtlety, which indeed sometimes dispose him to paradox, in combination with the breadth, the absence of prejudice and the social sympathies which so eminently distinguish him, and they offer, besides, the charm of his easy and natural style and his rare power of lucid exposition.

The characteristics of Hume which are most important in the history of economic investigation are (1) his practice of bringing economic facts into connection with all the weighty interests of social and political life, and (2) his tendency to introduce the historical spirit into the study of those facts. He admirably illustrates the mutual action of the several branches of industry, and the influences of progress in the arts of production and in commerce on general civilization, exhibits the striking contrasts of the ancient and modern system of life (see especially the essay *On the Populousness of Ancient Nations*), and considers almost every phenomenon which comes under discussion in its relations to the contemporary stage of social development. It cannot be doubted that Hume exercised a most important influence on Adam Smith, who in the *Wealth of Nations* calls him "by far the most illustrious philosopher and historian of the present age," and who esteemed his character so highly that, after a friendship of many years had been terminated by Hume's decease, he declared him to have "approached as nearly to the idea of a perfectly wise and virtuous man as perhaps the nature of human frailty will permit."

Coming now to the great name of Adam Smith (1723-1790), it is of the highest importance that we should rightly understand his position and justly estimate his claims. It is plainly contrary to fact to represent him, as some have done, as the creator of political economy. The subject of social wealth had always in some degree, and increasingly in recent times, engaged the attention of philosophic minds. The study had even indisputably assumed a systematic character, and, from being an assemblage of fragmentary disquisitions on particular questions of national interest, had taken the form, notably in Turgot's *Réflexions*, of an organized body of doctrine. The truth is that Smith took up the science

when it was already considerably advanced; and it was this very circumstance which enabled him, by the production of a classical treatise, to render most of his predecessors obsolete. But, while all the economic labors of the preceding centuries prepared the way for him, they did not anticipate his work. His appearance at an earlier stage, or without those previous labors, would be inconceivable; but he built, on the foundation which had been laid by others, much of his own that was precious and enduring.

There has been much discussion on the question—What is the scientific method followed by Smith in his great work? By some it is considered to have been purely deductive, a view which Buckle has perhaps carried to the greatest extreme.

That Smith does, however, largely employ the deductive method is certain; and that method is quite legitimate when the premises from which the deduction sets out are known universal facts of human nature and properties of external objects. Whether this mode of proceeding will carry us far may indeed well be doubted; but its soundness cannot be disputed.

Smith's earliest critics were Bentham and Lauderdale, who, though in general agreement with him, differed on special points. Jeremy Bentham was author of a short treatise entitled *A Manual of Political Economy* (1843), and various economic monographs, the most celebrated of which was his *Defense of Usury* (1787). This contained (Letter xiii.) an elaborate criticism of a passage in the *Wealth of Nations*, already cited, in which Smith had approved a legal maximum rate of interest fixed but a very little above the lowest market rate, as tending to throw the capital of the country into the hands of sober persons, as opposed to "prodigals and projectors." Smith is said to have admitted that Bentham had made out his case. He certainly argues it with great ability; and the true doctrine no doubt is that, in a developed industrial society, it is expedient to let the rate be fixed by contract between the lender and the borrower, the law interfering only in case of fraud.

Lord Lauderdale, in his *Inquiry into the Nature and Origin of Public Wealth* (1804), a book still worth reading, pointed out certain real weaknesses in Smith's account of value and the measure of value, and of the productivity of labor, and threw additional light on several subjects, such as the true mode of estimating the national income, and the reaction of the distribution of wealth on its production.

Alongside of evils of the new industrial system just then arising, socialism appeared as the alike inevitable and indispensable expression of the protest of the working classes and the aspiration after a better order of things; and what we now call "the social question," that inexorable problem of modern life, rose into the place which it has ever since maintained. This question was first effectually brought before the English mind by Thomas Robert Malthus (1766–1834), not, however, under the impulse of revolutionary sympathies, but in the interests of a conservative policy.

The first edition of the work which achieved this result appeared anonymously in 1798 under the title—*An Essay on the Principle of Population, as it affects the future improvement of Society, with remarks on the speculations of Mr. Godwin, M. Condorcet, and other writers*. This book arose out of certain private controversies of its author with his father Daniel Malthus, who had been a friend of Rousseau, and was an ardent believer in the doctrine of human progress as preached by Condorcet and other French thinkers and by their English disciples. The most distinguished of the latter was William Godwin, whose *Enquiry concerning Political Justice* had been published in 1793. The

views put forward in that work had been restated by its author in the *Enquirer* (1797), and it was on the essay in this volume entitled *Avarice and Profusion* that the discussion between the father and the son arose, "the general question of the future improvement of society" being thus raised between them—the elder Malthus defending the doctrines of Godwin, and the younger assailing them. The latter "sat down with an intention of merely stating his thoughts on paper in a clearer manner than he thought he could do in conversation," and the *Essay* on population was the result.

The project of a formal and detailed treatise on population was an afterthought of Malthus. The essay in which he had studied a hypothetic future led him to examine the effects of the principle he had put forward on the past and present state of society; and he undertook an historical examination of these effects, and sought to draw such inferences in relation to the actual state of things as experience seemed to warrant. The consequence of this was such a change in the nature and composition of the essay as made it, in his own language, "a new work." The book, so altered, appeared in 1803 under the title—*An Essay on the Principle of Population, or a View of its Past and Present Effects on Human Happiness; with an Enquiry into our prospects respecting the future removal or mitigation of the evils which it occasions*.

Malthus had undoubtedly the great merit of having called public attention in a striking and impressive way to a subject which had neither theoretically nor practically been sufficiently considered. But he and his followers appear to have greatly exaggerated both the magnitude and the urgency of the dangers to which they pointed. In their conceptions a single social imperfection assumed such portentous dimensions that it seemed to overcloud the whole heaven and threaten the world with ruin. This doubtless arose from his having at first omitted altogether from his view of the question the great counteracting agency of moral restraint.

David Ricardo (1772–1823) is essentially of the school of Smith, whose doctrines he in the main accepts, while he seeks to develop them, and to correct them in certain particulars. But his mode of treatment is very different from Smith's. The latter aims at keeping close to the realities of life as he finds them—at representing the conditions and relations of men and things as they are; and, as Hume remarked on first reading his great work, his principles are everywhere exemplified and illustrated with curious facts. Quite unlike this is the way in which Ricardo proceeds. He moves in a world of abstractions. He sets out from more or less arbitrary assumptions, reasons deductively from these, and announces his conclusions as true, without allowing for the partial unreality of the conditions assumed or confronting his results with experience. When he seeks to illustrate his doctrines, it is from hypothetical cases—his favorite device being that of imagining two contracting savages, and considering how they would be likely to act. He does not explain—probably he had not systematically examined, perhaps was not competent to examine—the appropriate method of political economy; and the theoretic defense of his mode of proceeding was left to be elaborated by J. S. Mill and Cairnes.

The most complete exposition of his system is to be found in his *Principles of Political Economy and Taxation* (1817). This work is not a complete treatise on the science, but a rather loosely connected series of disquisitions on value and price, rent, wages and profits, taxes, trade, money and banking.

On the whole what seems to us true of Ricardo is this, that, while he had remarkable powers, they were

not the powers best fitted for sociological research. Nature intended him rather for a mathematician of the second order than for a social philosopher.

After Malthus and Ricardo, the first of whom had fixed public attention irresistibly on certain aspects of society, and the second had led economic research into new, if questionable, paths, came a number of minor writers who were mainly their expositors and commentators, and whom, accordingly, the Germans, with allusion to Greek mythical history, designate as the Epigoni. By them the doctrines of Smith and his earliest successors were thrown into more systematic shape, limited and guarded so as to be less open to criticism, couched in a more accurate terminology, modified in subordinate particulars, or applied to the solution of the practical questions of their day.

The most systematic and thorough-going contemporary critic of the Ricardian system was Richard Jones (1790–1855), professor at Haileybury. Jones has received scant justice at the hands of his successors. J. S. Mill, while using his work, gave his merits but faint recognition. Even Roscher says that he did not thoroughly understand Ricardo, without giving any proof of that assertion, while he is silent as to the fact that much of what has been preached by the German historical school is found distinctly indicated in Jones' writings.

In 1844 J. S. Mill published five *Essays on some Unsettled Questions of Political Economy*, which had been written as early as 1829 and 1830, but had, with the exception of the fifth, remained in manuscript. In these essays is contained any dogmatic contribution which he can be regarded as having made to the science. The subject of the first is the laws of interchange between nations.

In 1848 Mill published his *Principles of Political Economy, with some of their Applications to Social Philosophy*. This title, though, as we shall see, open to criticism, indicated on the part of the author a less narrow and formal conception of the field of the science than had been common among his predecessors. He aimed, in fact, at producing a work which might replace in ordinary use the *Wealth of Nations*, which in his opinion was "in many parts obsolete and in all imperfect." Adam Smith had invariably associated the general principles of the subject with their applications, and in treating those applications had perpetually appealed to other and often far larger considerations than pure political economy affords. And in the same spirit Mill desired, while incorporating all the results arrived at in the special science by Smith's successors, to exhibit purely economic phenomena in relation to the most advanced conceptions of his own time in the general philosophy of society, as Smith had done in reference to the philosophy of his century. This design he certainly failed to realize.

The question of economic method was also taken up by the ablest of his disciples, John Elliott Cairnes (1824–75), who devoted a volume to the subject (*Logical Method of Political Economy*, 1857; 2d ed., 1875). Professor Walker has lately spoken of the method advocated by Cairnes as different from that put forward by Mill, and has even represented the former as similar to, if not identical with, that of the German historical school. But this is certainly an error.

Cairnes' most important economic publication was his last, entitled *Some Leading Principles of Political Economy Newly Expounded* (1874). In this work, which does not profess to be a complete treatise on the science, he criticises and emends the statements which preceding writers had given of some of its principal doctrines, and treats elaborately of the limitations with which

they are to be understood, and the exceptions to them which may be produced by special circumstances. Whilst marked by great ability, it affords evidence of what has been justly observed as a weakness in Cairnes' mental constitution—his "deficiency in intellectual sympathy," and consequent frequent inability to see more than one side of a truth.

All the later European economic schools presuppose—in part adopting, in part criticising—the work of the English economists from Smith to Ricardo and the Epigoni. The German school has had in a greater degree than any other a movement of its own—following, at least in its more recent period, an original method, and tending to special and characteristic conclusions. The French school, on the other hand—if we omit the socialists, who do not here come under consideration—has in the main reproduced the doctrines of the leading English thinkers—stopping short, however, in general, of the extremes of Ricardo and his disciples. In the field of exposition the French are unrivaled; and in political economy they have produced a series of more or less remarkable systematic treatises, text books, and compendiums, at the head of which stands the celebrated work of J. B. Say. But the number of seminal minds which have appeared in French economic literature—of writers who have contributed important truths, introduced improvements of method, or presented the phenomena under new lights—has not been large. Sismondi, Dunoyer, and Bastiat will deserve our attention, as being the most important of those who occupy independent positions (whether permanently tenable or not), if we pass over for the present the great philosophical renovation of Auguste Comte, which comprehended actually or potentially all the branches of sociological inquiry. Before estimating the labors of Bastiat, we shall find it desirable to examine the views of Carey, the most renowned of American economists, with which the latest teachings of the ingenious and eloquent Frenchmen are, up to a certain point, in remarkable agreement. Cournot, too, must find a place among the French writers of this period, as the chief representative of the conception of a mathematical method in political economy.

Of Jean Baptiste Say (1767–1832) Ricardo says—"He was the first, or among the first, of Continental writers who justly appreciated and applied the principles of Smith, and has done more than all other Continental writers taken together to recommend that enlightened and beneficial system to the nations of Europe." His *Traité d'Économie Politique* (1803) was essentially founded on Smith's work, but he aimed at arranging the materials in a more logical and instructive order.

Jean Charles L. Simonde de Sismondi (1773–1842), author of the *Histoire des Républiques Italiennes du moyen âge*, represents in the economic field a protest, founded mainly on humanitarian sentiment, against the dominant doctrines. He wrote first a treatise, *De la Richesse Commerciale* (1803), in which he followed strictly the principles of Adam Smith. But he afterward came to regard these principles as insufficient and requiring modification. He contributed an article on political economy to the *Edinburgh Encyclopædia*, in which his new views were partially indicated. They were fully developed in his principal economic work, *Nouveaux Principes d'Économie Politique ou de la Richesse dans ses rapports avec la Population* (1819; 2d ed., 1827).

The personal union in Sismondi of three nationalities, the Italian, the French, and the Swiss, and his comprehensive historical studies, gave him a special largeness of view; and he was filled with a noble sympathy for the suffering members of society. He stands nearer to

socialism than any other French economist proper, but it is only in sentiment, not in opinion, that he approximates to it.

In no French economic writer is greater force or general solidity of thought to be found than in Charles Dunoyer (1786–1862), author of *La Liberté du Travail* (1845; the substance of the first volume had appeared under a different title in 1825), honorably known for his integrity and independence under the régime of the Restoration.

At this point it will be convenient to turn aside and notice the doctrines of the American economist Carey. Not much had been done before him in the science by citizens of the United States. Benjamin Franklin, otherwise of world-wide fame, was author of a number of tracts, in most of which he merely enforces practical lessons of industry and thrift, but in some throws out interesting theoretic ideas. Thus, fifty years before Smith, he suggested (as Petty, however, had already done) human labor as the true measure of value (*Modest Inquiry into the Nature and Necessity of a Paper Currency*, 1721), and in his *Observations Concerning the Increase of Mankind* (1751) he expresses views akin to those of Malthus. Alexander Hamilton, secretary of the treasury, in 1791 presented in his official capacity to the House of Representatives of the United States a report on the measures by which home manufactures could be promoted. In this document he gives a critical account of the theory of the subject, represents Smith's system of free trade as possible in practice only if adopted by all nations simultaneously, ascribes to manufactures a greater productiveness than to agriculture, and seeks to refute the objections against the development of the former in America, founded on the want of capital, the high rate of wages, and the low price of land. The conclusion at which he arrives is, that for the creation of American manufactures a system of moderate protective duties was necessary, and he proceeds to describe the particular features of such a system. There is some reason to believe that the German economist List, was influenced by Hamilton's work, having, during his exile from his native country, resided in the United States, where he doubtless became acquainted with Hamilton's writings.

Henry Charles Carey (1793–1879), son of an American citizen who had emigrated from Ireland, represents a reaction against the dispiriting character which the Smithian doctrines had assumed in the hands of Malthus and Ricardo. His aim was, while adhering to the individualistic economy, to place it on a higher and surer basis, and fortify it against the assaults of socialism, to which some of the Ricardian tenets had exposed it. The most comprehensive as well as mature exposition of his views is contained in his *Principles of Social Science* (1859). Inspired with the optimistic sentiment natural to a young and rising nation with abundant undeveloped resources and an unbounded outlook toward the future, he seeks to show that there exists, independently of human wills, a natural system of economic laws, which is essentially beneficent, and of which the increasing prosperity of the whole community, and especially of the working classes, is the spontaneous result—capable of being defeated only by the ignorance or perversity of man resisting or impeding its action. He rejects the Malthusian doctrine of population, maintaining that numbers regulate themselves sufficiently in every well governed society, and that their pressure on subsistence characterizes the lower, not the more advanced, stages of civilization. He rightly denies the universal truth, for all stages of cultivation, of the law of diminishing returns from land. His fundamental theoretic position relates to the antithesis of wealth and value.

Frédéric Bastiat (1801–1850), though not a profound thinker, was a brilliant and popular writer on economic questions. Though he always had an inclination for such studies, he was first impelled to the active propagation of his views by his earnest sympathy with the English anti-corn law agitation. Naturally of an ardent temperament, he threw himself with zeal into the free-trade controversy, through which he hoped to influence French economic policy, and published in 1845 a history of the struggle under the title of *Cobden et la Ligue*. In 1845–48 appeared his *Sophismes Économiques* (Eng. trans. by P. J. Stirling, 1873), in which he exhibited his best qualities of mind.

Bastiat is weak on the philosophical side; he is filled with the ideas of theological teleology, and is led by these ideas to form *a priori* opinions of what existing facts and laws must necessarily be. And the *jus nature*, which, like metaphysical ideas generally, has its root in theology, is as much a postulate with him as with the physiocrats.

Augustin Cournot (1801–1877), appears to have been the first (the German, H. H. Gossen, praised by Jevons, wrote in 1854), who, with a competent knowledge of both subjects, endeavored to apply mathematics to the treatment of economic questions. His treatise entitled *Recherches sur les Principes Mathématiques de la Théorie des Richesses* was published in 1838. He mentions in it only one previous enterprise of the same kind (though there had in fact been others)—that, namely, of Nicolas François Canard, whose book, published in 1802, was crowned by the Institute, though “its principles were radically false as well as erroneously applied.” Notwithstanding Cournot's just reputation as a writer on mathematics, the *Recherches* made little impression.

The first Italian translation of the *Wealth of Nations* appeared in 1780. The most distinguished Italian economist of the period here dealt with was, however, no disciple of Smith. This was Melchiorre Gioja, author, besides statistical and other writings, of a voluminous work entitled *Nuovo Prospetto delle Scienze Economiche* (6 vols., 1815–17; the work was never completed), intended to be an encyclopædia of all that had been taught by theorists, enacted by governments, or effected by populations in the field of public and private economy. We can but very briefly notice Bomagnosi (d. 1835), who, by his contributions to periodical literature, and by his personal teaching, greatly influenced the course of economic thought in Italy; Antonio Scialoja (*Principii d'Economia Sociale*, 1840; and *Carestia e Governo*, 1853), an able advocate of free trade (d. 1877); Luigi Cibrario, well known as the author of *Economia Politica del medio evo* (1839; 5th ed. 1861; French trans. by Barneaud, 1859), which is in fact a view of the whole social system of that period; Girolamo Boccardo (b. 1829; *Trattato Teorico-pratico di Economia politica*, 1853); the brilliant controversialist Francesco Ferrara, professor at Turin from 1849 to 1858 (in whose school most of the present Italian teachers of the science were, directly or indirectly, educated), a partisan of the *laissez faire* doctrine in its most extreme form, and an advocate of the peculiar opinions of Carey and Bastiat on the subject of rent; and, lastly, the Neapolitan minister Ludovico Bianchini (*Principii della Scienza del Ben Vivere Sociale*, 1845 and 1855), who is remarkable as having followed in some degree an historical direction, and asserted the principle of relativity, and who also dwelt on the relations of economics to morals, by a due attention to which the Italian economists have, indeed, in general been honorably distinguished.

The *Wealth of Nations* was translated into Spanish



by Ortiz in 1794. It may perhaps have influenced Gaspar de Jovellanos, who in 1795 presented to the council of Castile and printed in the same year his celebrated *Informe de la Sociedad Economica de Madrid en expediente de Ley Agraria*, which was a powerful plea for reform, especially in taxation and the laws affecting agriculture, including those relating to the systems of entail and mortmain. An English version of this memoir is given in the translation (1809) of Laborde's *Spain*. vol. iv.

Roscher observes that Smith did not at first produce much impression in Germany. He does not appear to have been known to Frederick the Great; he certainly exercised no influence on him. Nor did Joseph II. take notice of his work. And of the minor German princes, Karl Friedrich of Baden, as a physiocrat, would not be accessible to his doctrines. It was otherwise in the generation whose principal activity belongs to the first decade of the nineteenth century. The Prussian statesmen who were grouped round Stein had been formed as economists by Smith, as had also Gentz, intellectually the most important man of the Metternich régime in Austria.

The highest form of the Smithian doctrine in Germany is represented by four distinguished names:—Karl Heinrich Rau (1792–1870), Friedrich Nebenius (1784–1857), Friedrich Benedict Wilhelm Hermann (1795–1868), and Johann Heinrich von Thünen (1783–1850.)

#### THE HISTORICAL SCHOOL.

The negative movement which filled the eighteenth century had for its watchword on the economic side the liberation of industrial effort from both feudal survivals and governmental fetters. But in all the aspects of that movement, the economic as well as the rest, the process of demolition was historically only the necessary preliminary condition of a total renovation, toward which western Europe was energetically tending, though with but an indistinct conception of its precise nature. The disorganization of the body of opinion which underlay the old system outran the progress toward the establishment of new principles adequate to form a guidance in the future. The critical philosophy which had wrought the disorganization could only repeat its formulas of absolute liberty, but was powerless for reconstruction. And hence there was seen throughout the West, after the French explosion, the remarkable spectacle of a continuous oscillation between the tendency to recur to outworn ideas and a vague impulse toward a new order in social thought and life, this impulse often taking an anarchical character.

From this state of oscillation, which has given to our century its equivocal and transitional aspect, the only possible issue was in the foundation of a scientific social doctrine which should supply a basis for the gradual convergence of opinion on human questions. The foundation of such a doctrine is the immortal service for which the world is indebted to Auguste Comte.

The leading features of sociology, as he conceived it, are the following: (1) it is essentially *one* science, in which all the elements of a social state are studied in their relations and mutual actions; (2) it includes a dynamical as well as a statical theory of society; (3) it thus eliminates the absolute, substituting for an imagined fixity the conception of ordered change; (4) its principal method, though others are not excluded, is that of historical comparison; (5) it is pervaded by moral ideas, by notions of social duty, as opposed to the individual rights which were derived as corollaries

from the *jus naturæ*; and (6) in its spirit and practical consequences it tends to the realization of all the great ends which compose "the popular cause"; yet (7) it aims at this through peaceful means, replacing revolution by evolution.

Omitting preparatory indications and undeveloped germs of doctrine, we must trace the origin of the school to Wilhelm Roscher.

Among the earlier writers of the school is Bruno Hildebrand, who, in 1848, published the first volume of a work, which, though he lived for many years after, he never continued, entitled *Die National-ökonomie der Geyenwart und Zukunft*. In 1853 appeared the work of Karl Knies, entitled *Die Politische Oekonomie vom Standpunkte der geschichtlichen Methode*.

The historical method has exhibited its essential features more fully in the hands of the younger generation of scientific economists in Germany, among whom may be reckoned Lujo Prentano, Adolf Held, Erwin Nasse, Gustav Schmoller, H. Rösler, Albert Schäffle, Hans von Scheel, Gustav Schönberg, and Adolf Wagner.

It is to be regretted that very little is known in America of the writings of the recent Italian economists. Luigi Cossa's *Guida*, which was translated at the suggestion of Jevons, has given us some notion of the character and importance of their labors. In America some notoriety has attached to the economic movement advocated by Henry George, a serious disturbance occurring in the Catholic Church on account of the advocacy of his opinions by a priest. (See HENRY GEORGE, vol. X.)

In France the historical school has not made so strong an impression—partly, no doubt, because the extreme doctrines of the Ricardian system never obtained much hold there. In England too, the dualism which exists on the Continent has been established; and there is reason to expect that here more speedily and decisively than in France or Italy the historical school will displace its antagonist. It is certainly in England next after Germany that the preaching of the new views has been most vigorously and effectively begun.

POLK, JAMES KNOX, eleventh president of the United States was of Scoto-Irish descent, his ancestors, whose name was Pollok, having emigrated from Ireland in the eighteenth century. He was the eldest of ten children, and was born November 2, 1795, in Mecklenburg county, N. C., from which his father, who was a farmer, removed in 1806 to the valley of the Duck river, Tennessee. At an early age he was placed in a merchant's office, but as he showed a disinclination for business his father at last permitted him to begin preparatory studies for the university. In 1815 he entered the university of North Carolina, where in 1818 he graduated with the highest honors. Called to the bar in 1820, he speedily made for himself a high reputation, and in 1823 he entered the State legislature. In August, 1825, he was chosen to represent his district in Congress, to which he was reelected every succeeding two years until 1839. As a strong supporter of Democratic opinions he identified himself with every important discussion, and, though he was not a brilliant speaker, his solid abilities, extraordinary energy, and indomitable will soon gave him a place in the front rank of politicians. In 1835 he was chosen speaker of the House of Representatives, to which he was reelected in 1837, and in 1839 he was elected governor of Tennessee. In 1844 he was the Democratic candidate for the presidency, and was chosen over Clay by a majority of sixty-five electoral votes. The election in great measure turned on the annexation of Texas, which was effected before his in-

auguration. One of the earliest questions with which his administration had to deal was the boundary of Oregon, which, although he had previously declared the title of the United States to Oregon to be "clear and undisputed," was finally fixed at the parallel of 49° instead of 54° 40.' Following the annexation of Texas came the Mexican war, resulting in the treaty of Guadalupe Hidalgo, February 2, 1848, by which New Mexico and California were ceded to the United States. Other important measures of his administration were the admission of Iowa and Wisconsin to the Union, the adoption of a low tariff in 1846, the organization of the department of the interior, and the adoption of the method of collecting government revenues by specie without the aid of the banks. Polk retired from office March 4, 1849, and died in Nashville, June 15th of the same year.

POLLACK (*Gadus pollachius*), a species of cod-fish, abundant on rocky coasts of northern Europe, and extending as far south as the western parts of the Mediterranean, where, however, it is much scarcer and does not attain to the same size as in its real northern home. In Scotland and some parts of Ireland it is called *Lythe*. It is distinguished from other species of the genus *Gadus* by its long pointed snout, which is twice as long as the eye, with projecting lower jaw, and without a barbel at the chin. The three dorsal fins are composed of respectively twelve, eighteen or twenty, and from seventeen to nineteen rays, and the two anal fins of thirty-one and nineteen or twenty. A black spot above the base of the pectoral fin is another distinguishing mark.

POLLAN (*Coregonus pollan*), a species of the Salmonoid genus *Coregonus* which has been found in the large and deep loughs of Ireland only.

POLLIO, CAIUS ASINIUS, a Roman orator, poet, and historian, who played a conspicuous part in the troubled history of his time, was born in 76 B.C., and died in his villa at Tusculum in 4 A.D.

PÖLLNITZ, KARL LUDWIG, FREIHERR VON, known as a writer of memoirs, was born on February 25, 1692. He was repeatedly converted to Catholicism and re-converted to the Reformed faith; but he died a Catholic on June 23, 1775.

POLLOK, ROBERT, was the author of *The Course of Time*, a poem that has passed through many editions, and is still a favorite in serious households in Scotland. He was born in 1798 at Moorhouse, in the parish of Eaglesham in Renfrewshire, took his degree at Glasgow, and died in 1827.

POLLOKSHAWS, a burgh of barony in Renfrewshire, Scotland, situated near the White Cart, on the Glasgow and Kilmarnock Railway, two and one-half miles south-by-west of Glasgow, of which it is now reckoned a suburb, connected by tramway. The staple industries are cotton-spinning, hand and power-loom weaving of silk and cotton fabrics, dyeing, bleaching, and calico-printing. There are also paper works, potteries, and large engineering works. Population in 1871, 8,921; in 1881, 9,363; and estimated 11,500 in 1890.

POLLUX. See CASTOR AND POLLUX.

POLLUX, JULIUS, of Naucratis in Egypt, a Greek sophist of the second century. He taught at Athens, where, according to Philostratus, he was appointed to the professorship by the emperor Commodus on account of his melodious voice. He died at the age of fifty-eight, leaving a son behind him.

POLO. This game, which is a species of "hockey on horseback," is of Eastern origin, and seems to have been a favorite pastime in Persia, Tartary, and the frontiers of India from prehistoric times.

The English name of the game is perhaps derived from "pulu," which is the Tibetan for a ball, and the

pastime itself reached India from Persia through Afghanistan. It speedily gained favor with the officers of British cavalry regiments quartered in India, and was introduced into the United Kingdom in 1871, and into the United States about the same time.

POLO, MARCO, the Venetian, the most famous perhaps of all travelers.

Venetian genealogies and traditions of uncertain value trace the Polo family to Sebennico in Dalmatia, and before the end of the eleventh century names of its members are found in the Great Council of the Republic.

Andrea Polo, of S. Felice, was the father of three sons, Marco, Nicolo and Maffeo, of whom the second was the father of the subject of this article.

In 1260 we find Nicolo and Maffeo at Constantinople. In the year named the two brothers went on a speculation to the Crimea, whence a succession of chances and openings carried them to the court of Barka Khan at Sarai, and further north, and eventually across the steppes to Bokhara. Here they fell in with certain envoys who had been on a mission from the Great Khan Kublai to his brother Hulagu in Persia, and by them were persuaded to make the journey to Cathay in their company. It was the first time that the khan, a man of full energy and intelligence, had fallen in with European gentlemen. He was delighted with the Venetian brothers, listened eagerly to all that they had to tell of the Latin world, and decided to send them back as his envoys to the pope, with letters requesting the dispatch of a large body of educated men to instruct his people in Christianity and in the liberal arts.

The brothers arrived at Acre in April, 1269. They learned that Clement IV. had died the year before, and no new pope had yet been chosen. So they went home to Venice, where they found that Nicolo's wife was dead, but had left a son Marco, now a fine lad of fifteen. The papal interregnum was the longest that had been known, at least since the dark ages. After the Polos had spent two years at home there was still no pope; and the brothers resolved on starting again for the East, taking young Mark with them.

The second start from Acre must have taken place about November, 1271; and from a careful consideration of the indications and succession of chapters in Marco Polo's book, it would seem that the party proceeded from Ayas to Sivas, and then by Mardin, Mosul, and Bagdad to Hormuz at the mouth of the Persian Gulf (see ORMUS), with the purpose of going on to China by sea; but that, some obstacle having interfered which compelled them to abandon this plan, they returned northward through Persia.

The Venetians, in their further journey, were met and welcomed by the Great Khan's people, and at last reached his presence at Shangtu, in the spring of 1275. Kublai received them with great cordiality, and took kindly to young Mark, by this time about twenty-one years of age. The "young bachelor," as the book calls him, applied himself diligently to the acquisition of divers languages and written characters chiefly in use among the multifarious nationalities included in the khan's court and administration; and Kublai, seeing that he was both clever and discreet, soon began to employ him in the public service.

His first public mission was one which carried him through the provinces of Shansi, Shensi, and Szechuen, and the wild country on the coast of Tibet, to the remote province of Yunnan, called by the Mongols *Karajang*, and into northern Burmah (Mien), a country which twenty years ago was an almost *terra incognita*. Marco rose rapidly in favor, and was often again employed on distant missions, as well as in domestic administration;

but we are able to gather but few details of his employment.

Some years pass ere we hear more of Marco Polo; and it is then in a militant capacity.

Jealousies, always too characteristic of Italian communities, were in the case of Venice and Genoa sharpened by direct commercial rivalry. In 1298 the Genoese made preparations to strike a blow at their rivals on their own ground, and a powerful fleet of galleys, under Lamba Doria as admiral, made straight for the Adriatic. Venice, on hearing of the Genoese armament, hastily equipped a fleet still more numerous, and placed it under the command of Andrea Dandolo. The crew of a Venetian galley at this time amounted, all told, to 250 men, under a *comito* or master, but besides this officer each galley carried a *sopracomito* or gentleman commander, who was usually a noble. On one of the galleys of Dandolo's fleet went Marco Polo in this last capacity.

The hostile fleets met before the island of Curzola on September 6th, and engaged next morning. The battle ended in a complete victory to Genoa. Sixty-six Venetian galleys were burnt in the Bay of Curzola, and eighteen were carried to Genoa, with 7,000 prisoners, one of whom was Marco Polo. The captivity of less than a year's duration was memorable as being the means of bringing about the record of his remarkable experiences in the east. Up to this time he had doubtless often related his stories of Cathay among his friends; and from these stories indeed, and the frequent employment in them of a numerical expression unfamiliar in those days, he had acquired the nickname of *Marco Millioni*. Yet it would seem that he had committed nothing to writing, but, in the prison of Genoa, Marco Polo fell in with a certain person of writing propensities, Rusticiano or Rustichello of Pisa, who was also a captive of the Genoese. He it was, apparently, who persuaded Marco Polo to defer no longer the committal to paper of his wonderful experiences. In any case it was he who wrote down these experiences at Marco's dictation; and he is the man therefore to whom we owe the existence of this record, and possibly the preservation even of the traveler's name and memory.

We learn but little of Marco Polo's personal or family history after this captivity. On January 9, 1324, the traveller, now in his seventieth year, and sinking day by day under bodily infirmity, sent for a neighboring priest and notary to make his testament. We do not know the exact time of his death, but it fell almost certainly within the year 1324, for we know from a scanty series of documents, commencing in June, 1325, that he had at the latter date been some time dead. He was buried in accordance with his will, in the church of St. Lorenzo, where the family burying-place was marked by a sarcophagus, erected by his filial care for his father Nicolo, which existed till near the end of the sixteenth century. On the renewal of the church in 1592 this seems to have been cast aside and lost.

The copious archives of Venice have yielded up a few traces of our traveler. Besides his own will just alluded to, there are in the library the wills of his uncle Marco and of his younger brother Maffeo; a few legal documents connected with the house property in St. John Chrysostom, and other papers of similar character; and two or three entries in the record of the *Maggior Consiglio*. We have mentioned the sobriquet of Marco Millioni which he got from his young townsmen. It is alleged that long after the traveler's death there was always in the Venetian masques one individual who assumed the character of Marco Millioni, and told Munchausen-like stories to divert the vulgar. Such, if this be true, was the honor of our great man in his own country.

No genuine portrait of Marco Polo exists. There is a medallion portrait on the wall of the Sala dello Scudo in the ducal palace, which has become a kind of type; but it is a work of imagination no older than 1761. The oldest professed portrait is one in the gallery of Monsignor Badia at Rome. The Europeans at Canton have attached the name of Marco Polo to a figure in a Buddhist temple there containing a gallery of "Arhans" or Buddhist saints, and popularly known as the "temple of the five hundred gods." There is a copy of this at Venice, which the Venetian municipality obtained on the occasion of the Geographical Congress there in 1881. But the whole notion was a groundless fancy.

POLOTSK, a district town of the government of Vitebsk, at the confluence of the Polota with the Dwina (Düna), five miles from the Smolensk and Riga Railway, is one of the oldest towns in Russia. The town is now of trifling importance, and the population, 12,200 in 1880, has since decreased. Upward of two-thirds of the inhabitants are Jews; the remainder have belonged mostly to the Greek Church since 1839.

POLTAVA, a government of southwestern Russia, bounded by Tchernigoff on the north, Kharkoff on the east, Ekaterinoslaff and Kherson on the south, and Kieff on the west, and having an area of 19,265 square miles.

POLTAVA, capital of the above government, stands on the right bank of the Vorskla, eighty-eight miles by rail to the south-southwest of Kharkoff. There are two lyceums for boys and girls, a "realschule," a military school for cadets, a theological seminary, and two girls' colleges, besides Russian, German, and Jewish primary schools. The manufactures are insignificant; the principal are tobacco works (\$135,000), and a tannery (\$70,000). In 1889 the population was 41,050.

POLYÆNUS, a Macedonian, lived at Rome as a rhetorician and pleader in the second century. When the Parthian war (162-165 A.D.) broke out, Polyænus, too old to share in the campaign, dedicated to the emperors Marcus Antoninus and Lucius Verus a work, still extant, called *Strategica* or *Strategemata*, an historical collection of stratagems and maxims of strategy written in Greek and strung together in the form of anecdotes. His works on Macedonia, on Thebes, and on tactics (if indeed this be not identical with the *Strategica*) are lost.

POLYANTHUS. See PRIMROSE.

POLYBIUS, the historian, was a native of Megalopolis in Arcadia, the youngest of Greek cities, but one which played an honorable part in the last days of Greek freedom as a staunch member of the Achæan league. He died at the age of eighty-two. We may therefore follow the majority of authorities in placing his birth between 214 and 204 B.C. Little is known of his early life. As the son of Lycortas he was naturally brought into close contact with the leading men of the Achæan league. With the foremost of them, Philopœmen, he seems to have been on intimate terms, and after Philopœmen's tragic death in Messenia (182), he was intrusted with the honorable duty of conveying home the urn in which his ashes had been deposited. The next year (181), witnessed his first entry into political life. The next twelve years of his life are a blank, but in 169 he reappears as a trusted adviser of the Achæans at a difficult crisis in the history of the league. In 171 war had broken out between Rome and the Macedonian king Perseus. The final defeat of Perseus was rapidly followed by the arrival in Achaia of Roman commissioners charged with the duty of securely establishing Roman interests there. As a result of their proceedings 1,000 of the principal Achæans were arrested and carried off

to Italy. Polybius was among the number, but, while his companions were condemned to a tedious incarceration in the country towns of Italy, he obtained permission to reside in Rome.

In 151, after seventeen years of banishment, the few surviving exiles were allowed to return to Greece. But the stay of Polybius in Achaia was brief. For when, in 147, Scipio himself took the command in Africa, Polybius hastened to join him, and was an eye-witness of the siege and destruction of Carthage. He returned in 146 to find Corinth in ruins, the fairest cities of Achaia at the mercy of the Roman soldiery, and the famous Achæan league shattered to pieces. All the influence he possessed was freely spent in endeavoring to shield his countrymen from the worst consequences of their rashness. The excesses of the soldiery were checked, and at his special intercession the statues of Aratus and Philopœmen were preserved. An even more difficult task was that intruded to him by the Roman authorities themselves, of persuading the Achæans to acquiesce in the new régime imposed upon them by their conquerors, and of setting the new machinery in working order. With this work, which he accomplished so as to earn the heartfelt gratitude of his countrymen, his public career seems to have closed.

**POLYCARP.** The importance of Polycarp, bishop of Smyrna, for the earliest period of church history arises from his historical position. He was on the one hand a disciple of John and other apostles and disciples of Jesus; on the other hand he was the teacher of Irenæus, the first of the catholic fathers. The chief facts to be gathered about the life of Polycarp are these. He must have been born before the year 69, for on the day of his death he declared that he had served the Lord for eighty-six years. He became a Christian in his earliest youth, and was an associate of the apostle John and other disciples of Jesus who had come from Palestine to Asia Minor. What he heard from them he kept in lifelong remembrance, and in his manhood and old age he used to gather the young people round him, and repeat to them what he had learned from those who had seen Christ in the flesh. Among these youthful hearers was Irenæus, who has recorded much of what he thus learned.

In early life Polycarp became the head of the Church of Smyrna, where he was held in the highest respect. The congregation looked up to him as an apostolic and prophetic teacher, and consequently as combining in himself all the spiritual gifts which God had conferred on Christendom. How great his reputation was is best shown by the fury of the heathen and the Jews in his martyrdom. But his reputation extended far beyond the limits of his own diocese. His letter to the church at Philippi shows us how fully his apostolic spirit, his wisdom and justice, must have been recognized even in Macedonia. It is one of the interesting incidents in the church history of the second century that Polycarp, in the year before his death, when he was above ninety years of age undertook the journey to Rome in order to visit the bishop Anicetus. On his return to Smyrna he enjoyed only about six months of uninterrupted activity. Then, on the occasion of the festive games, there arose, as in so many other instances, an outburst of popular feeling against the Christians, in which Polycarp was to die a martyr's death. The proconsul was anxious to save him, and tried to induce him to recant, but he remained steadfast. He was delivered up to the populace, and his body was burned. By his death Polycarp shielded his congregation from further persecution.

**POLYCLETUS.** Two Greek sculptors bore this name. For the most part the younger Polycletus con-

finied himself to statues of athletes who had won prizes at Olympia. In recent excavations there two bases of statues by him have been found, but no remains of his work. We may assign him to about the date 371 B.C.

**POLYCRATES,** a celebrated Greek tyrant of Samos, was the son of Æaces. After distinguishing himself by his liberality toward his poorer fellow-citizens he took advantage of a festival to Hera in order to make himself master of Samos, (537 or 536 B.C.) Allied with Amasis, king of Egypt, he prospered greatly, so that his fame went forth through all Greece and Ionia. He had 100 ships and 1,000 bowmen. He made war indiscriminately on friend and foe, declaring with grim humor that he gratified his friends more by returning to them their own than by not taking it at all. His great public works were executed, according to Aristotle, for the purpose of employing his subjects and diverting their thoughts from the recovery of their freedom. The splendor of his palace is attested by the design which many centuries later the emperor Caligula formed of rebuilding it. Polycrates was also a patron of letters; he collected a library and lived on terms of intimate friendship with the poet Anacreon, whose verses were full of references to his patron. When the Persians under King Cambyses were preparing to invade Egypt, Polycrates, anxious to conciliate the growing power of Persia, sent forty ships to their help, (525 B.C.) But the squadron had hardly reached the island of Carpathus when the crew mutinied and turned the ships' heads back to Samos. Not very long afterward Oroëtes, the Persian satrap of Sardes, by working on the avarice and ambition of Polycrates, lured him to Magnesia and put him to a shameful death, (522 B.C.)

**POLYGLOT.** A polyglot is a book which contains side by side versions of the same text in several different languages; and the most important polyglots are editions of the Bible, or its parts, in which the Hebrew and Greek originals are exhibited along with the great historical versions, which are of value for the history of the text and its interpretation.

**POLYGNOTUS,** a Greek painter of whom very little is known. He was born at Thasus, and son of the painter Aglaophon. His works included paintings at Athens, Delphi, etc. He died about 476 B.C.

**POLYHISTOR, CORNELIUS ALEXANDER,** a Milesian and disciple of Crates, who through the fortune of war became the slave and afterward the freedman of Cornelius Lentulus. He received the Roman citizenship from Sulla, and wrote books on historical and geographical subjects, of which more than a hundred and fifty fragments have been collected. The most interesting refer to the history of the Jews, for which Alexander drew on historical and poetical works of Jewish and Samaritan Hellenists. The date of his death is uncertain.

**POLYNESIA.** Polynesia has been used to denote all the intertropical islands of the Pacific Ocean eastward of the Philippine Islands to the north and the New Hebrides to the south of the equator. The New Hebrides and other islands west of that group were included under the term Australasia. Of late years these islands (sometimes also including Fiji) have been known as Melanesia, while the western islands of the North Pacific have been known as Micronesia. Thus Polynesia has been restricted to the central and eastern islands inhabited by the brown or Sawaiori race, becoming an ethnographic rather than a geographical term. Articles dealing with the western islands north and south of the equator will be found under MICRONESIA and MELANESIA. The western boundary of this region runs from the great barrier reef of Australia eastward of New Guinea and the Philippine Islands.

All the intertropical islands of the Pacific eastward of this imaginary line are included, and also a few others which extend outside the tropic of Capricorn to nearly 30° S. latitude. Any other divisions for geographical purposes, except those of groups of islands, appear to be unnatural and uncalled for. For ethnographical purposes special terms are used for the three different classes of people found in this wide area.

If we exclude NEW CALEDONIA (*q.v.*), which is of older formation than the rest, all the islands of Polynesia are either of volcanic or of coral formation. The volcanic islands, with the exception of the Hawaiian archipelago, are all south of the equator. Within the volcanic region there are a few coral islands, but these are all more or less elevated. The soil in the volcanic islands is generally very fertile. The climate is hot and moist in most of them; consequently the vegetation is wonderfully rich. The islands are densely clothed with luxuriant verdure from the sea-beach to the summits of the mountains. In addition to several species of palms, beautiful ferns, dracænas, crotons, and other elegant foliage plants abound. Pines are found on some of the western islands. For flowers none of them will compare with the hedgerows and meadows of England. There are, it is true, many beautiful and sweet-scented flowers, but they are not usually found in great profusion.

Fruits are abundant. Some of the indigenous kinds are good, and many of the best productions of other tropical countries have been introduced and flourish. Oranges are plentiful in many islands; also pine-apples, guavas, custard apples, and bananas. The mango has been introduced into some islands, and flourishes well. Most of these fruits have been introduced by missionaries. One of the fruits most abundantly used, both in a ripe state and cooked when unripe as a vegetable, is the Chinese banana, *Musa Cavendishii*.

The natives live chiefly upon vegetable food. In most of the volcanic islands the taro is the most important food-producer. Next to this comes the yam. Probably next in importance to this are the plantains and bananas, then the bread-fruit and arrow-root. The bread-fruit is more or less plentiful in most of the volcanic islands, and during one season of the year the natives very largely subsist upon it. It is not, however, by any means so nutritious as the taro or the yam. Although the raw cocoa-nut is not eaten to any considerable extent by the natives of volcanic islands, this must not be omitted in an enumeration of the principal articles of their food supply, for it enters into the composition of most of their made dishes in the form of expressed juice or oil; the soft, half-grown kernel is used as a kind of dessert, and the liquid from it, when the kernel is only half developed, is one of their principal beverages. The *Ava*, or *Kava*, a narcotic drink largely used, is made from the root of a pepper. In some islands the cocoa-nut is the chief article of commerce. The fully-grown kernel is cut into slices, dried in the sun, and sold as "cobra," from which much of the palm oil of commerce is expressed. On many islands cotton is largely grown, and on a few, especially in the Hawaiian archipelago, sugar cultivation has made considerable progress. Many other vegetable products might be utilized if there were a demand for them. The candle-nut is abundant everywhere near the coast. Coffee has not been grown to any considerable extent. Wild ginger and wild nutmegs are abundant on some of the islands. In some places indigo has been introduced, and has spread so much as to become a nuisance. But the probability is that, on these hot, moist, and fertile islands, cocoa-nuts, cotton, or sugar will always be the most profitable crops to cultivate for exportation.

The indigenous fauna of Polynesia is poor in mammals but rich in birds. Some say pigs are indigenous, but they were doubtless introduced by early navigators. Horses and cattle have been introduced. They degenerate very rapidly, unless they are continually improved by newly-imported stock. Sheep and goats are introduced into some islands, but sheep do not usually thrive. Dogs are plentiful. Pigeons and doves, especially the fruit-eating pigeons and doves, are abundant. The *Carpophaga* furnish a very important article of food in some of the islands. Some of the species of *Ptilonopus* are exceedingly beautiful. Certain non-venomous snakes are found in many of the islands. Insect life is abundant, and some of the butterflies are very beautiful.

The lagoons formed by the coral reefs around the islands invariably abound in fish, many of them most gorgeous in their coloring—vying in this respect with the parrots of Australia. Fish form a very important part of the food supply.

One of the most wonderful creatures in the marine fauna of Polynesia is the palolo (*Palola viridis*), an annelid which appears upon the surface of the ocean, near the edge of the coral reef, at certain seasons of the year. The palolo are from nine to eighteen inches long, and about one-eighth of an inch thick. They are eaten by the natives, and are esteemed a great delicacy. They live in the interstices of the coral reef, and are confined to a few localities.

The atolls differ in almost every respect from the islands of volcanic origin. Little that is said of one class would be true of the other. These coral islands are all low, generally not more than ten or twelve feet above the high-water mark. They are simply sand-banks formed by the accumulation of debris washed onto the reefs during strong winds.

The vegetation of the atolls is extremely poor, not more than about fifty species of plants being found in Tokelau, Ellice and Gilbert groups, in all of which groups collections have been made. The cocoa-nut is abundant on most of these islands. Indeed, that, with fish and the fruit of the screw-pine (*Pandanus*), constitutes the main food supply on some atolls.

The fauna of the atolls consists mainly of a few birds, some lizards and insects. Fish abound about the reefs, and most of the natives are deep-sea fishermen. In the Ellice Islands the people domesticate frigate birds.

There are comparatively few of the elevated coral islands in Polynesia, but they are so distinct from both the atolls and the volcanic islands that they need a separate description. They all lie within or near the lines marking off the volcanic ridge upon the map. South of the volcanic ridge there are many coral reefs forming shoals. The elevated coral islands doubtless were once such reefs. Lying within the area of volcanic action, they have participated in the upward movement, and have been raised from shoals to become islands. Some have evidently been lifted by successive stages and apparently by sudden movements. None of the islands can be compared with the volcanic islands for fertility, all having a less rich soil and being much drier; still they are fairly fertile. They suffer sometimes from drought, but are much less seriously affected in this way than the atolls.

The flora of the elevated coral islands is less rich than that of the volcanic islands, but much richer than that of the atolls.

The climate of the islands varies considerably. Some, especially the elevated coral islands, are very healthy for tropical regions. Speaking generally, the average reading of the thermometer over a large extent of Polynesia is about 80° Fahr. It very seldom sinks lower than 60°, and, owing to the small size of most of the islands, and

the prevalence of trade-winds during the greater portion of the year, the heat is always moderated and rarely becomes intense.

A great portion of southern Polynesia is subject to destructive cyclones. The tract over which they pass may be said to be, generally, that of the volcanic chain indicated by the lines on the map, although the northern edge of this region is not so subject to cyclones as the southern portion. The hurricane season is from December to April. Some islands are visited by a more or less destructive cyclone nearly every year; Samoa lies on the upper edge of the tract, and gets one, on an average, about every seven or eight years. The cyclones are always accompanied by considerable electric disturbances, especially when they are passing away. Apart from the fever, ague, and dysentery, there is comparatively little disease in any portion of Polynesia. The principal purely native diseases are such as affect the skin. A form of elephantiasis prevails more or less on all the damp mountainous islands. Many Europeans are subject to it, especially those who are much exposed to the sun by day and the dews by night.

There are in Polynesia people who belong to both the dark and the light sections of the Indo-Pacific races. At present the dark are found only in the western islands as far as Fiji. The whole of eastern Polynesia is inhabited by a light brown people to whom the name Sawaióri is here given. They extend out of Polynesia to New Zealand. The third kind of people, called Tarapon, inhabit the northern portion of western Polynesia, the islands generally known as Micronesia.

Papuans is the name used by the Malays of the Indian Archipelago for the black, frizzly-haired people found in the Aru Islands and New Guinea. That the inhabitants of the western portion of Polynesia ought to be classed with these Papuans there can be no doubt. The older name is therefore adopted here to include the whole, rather than the newer and less distinctive name Melanesian, which has been applied to only a part of the race. For further details the reader is referred to the articles MELANESIA, NEW GUINEA, etc. In speaking of the affinities of the Papuans with other peoples much caution is required; but there is some reason for thinking they may be remotely classified, together with all the other black people of the southern hemisphere, with the tribes of South America. (See NEGRO.)

The Sawaioris or brown people who occupy the islands of eastern Polynesia are generally regarded as having affinities with the Malays of the Indian Archipelago, and are sometimes spoken of as a branch of the Malay race, or family. They cannot, however, with any accuracy be so described. The Malays, as they now exist, are a comparatively modern people, who have become what they are by the mixture of several elements not found in the more primitive race. The Sawaioris and the Tarapons of Polynesia, the Malagasy (Hovas) of Madagascar, and the Malays are allied races, but no one of them can be regarded as the parent of the rest. The parent race has disappeared; but the Sawaióri, as the earliest offshoot from it, and one which, owing to the conditions under which it has lived, has remained almost free from admixture of blood, may be taken as most nearly representing what the parent was.

The Sawaioris are, physically, a very fine race. On some islands they average five feet ten inches in height. They are well developed in proportion to their height. Their color is a brown, lighter or darker generally according to the amount of their exposure to the sun—being darker on some of the atolls, where the people spend much time in fishing, and among fishermen on the volcanic islands, and lighter among women, chiefs, and others less exposed than the bulk of the people.

Their hair is black and straight; but in individual examples it is sometimes wavy, or shows a tendency to curl. They have very little beard. Their features are generally fairly regular; eyes invariably black, and in some persons oblique; jaws not projecting, except in a few instances; lips of medium thickness; noses generally short but rather wide at the bases. The foreheads are fairly high, but rather narrow.

The terms for family among this race are used in two senses—(1) of a household, and (2) of all blood relations on both the male and the female side, including the wife or the husband, as the case may be, brought in by marriage—also those who have been adopted by members of the clan.

Property belonging to a clan is held in common. Each clan usually possesses land, and over this no one member has an exclusive right, but all have an equal right to use it. The chief or recognized head of the clan or section alone can properly dispose of it or assign its use for a time to an outsider; and even he is expected to obtain the consent of the heads of families before he alienates the property. Changes have been made in many islands in this respect; but there can be little reason to doubt that the joint ownership of property in clans was common among the entire race in former times.

The amusements of these people are numerous; throwing the javelin, throwing at a mark with slings, and archery are practiced. Some resort to cock-fighting. There are fishing matches; and at a particular season large companies used to resort to pigeon-catching. In their houses they have a number of games. Betting is very often carried on in connection with these. Much time is spent, especially after the evening meal, in asking riddles, in rhyming, etc. The recital of songs and myths is also a source of great amusement; and on special occasions there is dancing. The night dances were generally accompanied by much indecency and immorality, and for that reason were discountenanced on the introduction of Christianity.

In most of their manufactures they are in advance of the Papuans. They are clever workers in wood, and canoe and house building have become legitimate occupations. In religion they invariably believe in the existence of the spirit of man after death. Their amusements are numerous, some boisterous and even savage.

The Tarapon people have many points of resemblance to the Sawaioris, but, as a rule they are of smaller stature and less robust. They have straight black hair, which is more lank than that of the Sawaioris. The Tarapons, however, differ considerably from one another, and are evidently a mixed race. The natives of the Caroline Islands are larger than the Gilbert Islanders. They are also much lighter in color; they are more yellow, whereas the Gilbert Islanders are darker, than the Sawaioris. In many respects the Tarapons bear a much closer resemblance to the people of some portion of the Indian Archipelago than do the Sawaioris.

The traditions of the Gilbert Islanders tell us that their islands were peopled from the west and also from the east. So far as we have materials for examination, craniometry confirms other evidence, and indicates that the Tarapon people are more mixed than either of the other Polynesian races.

All the Tarapon people are navigators, but, owing to the fact that upon their atolls they have little good timber, most of their canoes are inferior to those of the Sawaioris. Their houses are also inferior. Their arms are fairly well made. In the Gilbert Islands they manufacture elaborate armor, to cover the entire body, from the fiber of the cocoa-nut husk in the Caroline

Islands very fine mats are made; and a hand-loom is used, with which a coarse cloth is made.

There is a general notion abroad that in all the islands of Polynesia the native races are rapidly decreasing; and this supposed fact is sometimes attributed to the missionaries. The alleged diminution, however, is a general conclusion from particular premises, and facts drawn from wider observations do not confirm it. (1) The estimates of population made by the first European or American visitors to Polynesia were far too high. In nearly all islands the people live almost entirely upon the coast; hence it was an error to reckon the inland portions as having a population proportionate to the number of people seen upon the coast. Then, when the visits of foreign ships were a novelty, the people from other districts would crowd to the place where the ships anchored to see them. (2) Those who have resided in Polynesia, and who have made observations on the subject, know that previous to the introduction of Christianity there had been a great decrease in the population of most of the islands. There are numerous evidences that they were formerly much more thickly peopled. On the island of Niue the increase is more than 3 per cent. per annum. The rapid decline of population in Hawaii is entirely exceptional.

**POLYP.** In its Greek and Latin forms the word *polypus*, was first used as descriptive of the CUTTLE-FISH, (*q.v.*) In speaking of the *Acalephæ* Aristotle says, "They hold their prey as the polypus does with its feelers," and there is no doubt that in this and other passages he referred to the octopus. The word was also, though less generally, applied to the woodlouse (*Onistus*)—the reason for both usages being equally evident. Though the former meaning persists in the word *poulpe*, yet by the beginning of the eighteenth century it seems to have been forgotten, and the word was by analogy transferred to a group of animals then beginning to attract much attention. Béaumur and Bernard de Jussieu were the first to fix the usage of the word polyp as applicable to hydroids, corals, and *polyzoa*. In following up the discoveries of Marsigli and Peysonelle in regard to the little coral organisms, Jussieu used the name of polyp definitely to describe those Sertularians, Alcyonians, sea-mats, etc., which were then (1742) known as animals.

Frembley, Ellis, Lamoureaux, Lamarack and others defined the meaning of the term similarly. (See HYDROZOA CORALS.)

**POLYPTERUS**, a genus of Ganoid fishes common in many rivers of tropical Africa, and known on the Nile by the name of *abū bishīr*.

**POLYPUS**, a term in surgery, signifying a tumor which is attached by a narrow neck to the walls of a cavity lined with mucous membrane. The most common variety is a polypus of the nose of a simple character and easily removed. Polypi are also met with in the ear, larynx, uterus, vagina, and rectum. See SURGERY.

**POLYSPERCHON**, one of Alexander's generals, and the successor of Antipater as regent of Macedonia in 318 B.C. He was driven from the kingdom by Cassander in 316. For the leading incidents of his brief term of office see PHOCION; compare also MACEDONIA.

**POLYTECHNIC SCHOOLS** are factors in the educational system which have successfully obtained in the United States of late years, though they were founded abroad, the first being established at Paris in 1794. The latter, however, was changed into a military school by Napoleon, and as such has since been conducted. They are designed to subserve a specific purpose, in affording facilities for an education in, and a practical application of the sciences, particular reference being had to physics, mathematics, and chemistry.

At the date of their establishment in the United States the means therefor, as also for their maintenance, were secured through the liberality and enterprise of private persons, and it was not until 1862 that the government by the donation of lands, created a fund for the promotion of the system. Meanwhile the Rensselaer Institute, founded at Troy, N. Y., in 1824, the first of the kind in America, and the Franklin Institute, founded at Philadelphia the same year, were doing excellent work. Not only had they established reputations for efficiency, invaluable and extended, but their plan had been incorporated in the curriculum of Eastern colleges, and adopted in 1848 by the Mechanics Institute at Cincinnati, Ohio. Prior to this time the Central School of Arts and Manufactures of Paris and the School of Design of Great Britain came into operation and in 1856 the school system of the latter country was further enhanced by the addition of a department of science and art.

Soon after the action of Congress in 1862 many of the States took hold of the subject and equipped schools with apparatus, text-books, etc., designed to promote the acquisition of a scientific and mechanical education. Some of these are now in a flourishing condition, but the schools founded by congressional appropriation have not entirely realized the expectations indulged in that connection. The claim is made that education in various branches is not up to the standard, that in equipment they are lacking, and that the instruction is less practical than the requirements of the service contemplate.

Supplementary to the usual course in the schools of many of the States, a system of scientific education less advanced, however, has been established and manual training schools are now maintained in nearly all the leading cities of the country. The system originated in the Imperial Training School of Moscow, Russia, about 1868, and its work was first exhibited in America upon the occasion of the Centennial Exposition at Philadelphia in 1876. Since that date it has become part of the course at Girard College in that city and of the common schools in Boston, Washington, Baltimore, San Francisco, and elsewhere, and of the workingmen's school and kindergarten, established in New York by Felix Adler, assisted by the society of Ethical Culture. The system finds favor with leading thinkers and educators and will grow in importance in the future.

**POLYXENA**, in Greek legend, a daughter of Priam, last king of Troy, and Hecuba.

**POLYZOA** is the name applied by J. Vaughan Thompson in 1830 to a group of minute polyp-like organisms which were subsequently (1834) termed "Bryozoa" by Ehrenberg. The forms included in this group were stated by Thompson to be "in a general way the whole of the Flustranceæ, in many of which I have clearly ascertained the animals to be Polyzoæ," they having been previously considered by zoölogists to be allied to the Hydra-like polyps. These organisms had previously been known by the hard corneous "cells" or chambers which are formed by the animals on the surface of their bodies, and build up, in consequence of the formation of dense colonies by budding, complex aggregates known as "sea mats" and "sea mosses." Thompson expressly stated the opinion that the organization of the animals detected by him led to the conclusion that "they must be considered as a new type of the Mollusca Acephala."

Subsequently (1844) Henri Milne-Edwards pointed out the relationship of Thompson's Polyzoa to the Brachiopoda, and, adopting the latter's views as to their Molluscan affinities, proposed to unite these two classes with the Tunicata in a group to be called "Mollusco-

idea." Recent researches have entirely separated the Tunicata from this association, and have demonstrated that they belong to the great phylum of Vertebrata. On the other hand, the association of the Polyzoa with the Brachiopoda appear at present to be confirmed, though the relationship of these two classes to the Mollusca has been shown to rest on mistaken identification of parts; see, however, Harmer.

The Polyzoa appear to be related to the Sipunculoid Gephyræan worms (*Gephyræa inermia*) more nearly than to any other class of the animal kingdom. The study and interpretation of the facts of their ontogeny (growth from the egg) presents such extreme difficulty that in the present state of our knowledge it is necessary to regard them *ad interim* as forming with the Brachiopoda and Sipunculoids an isolated group, to which the name "Podaxonia" may be applied, pending the decision of their affinities by the increase of our knowledge of the embryology of important members of the group.

POMBAL, SEBASTIAN JOSEPH DE CARVALHO E MELLO, MARQUIS DE, the greatest statesman Portugal has produced in modern times, was the son of Emmanuel de Carvalho, and was born at Soure, near Pombal, on May 13, 1699. He was educated at the university of Coimbra, was then for a short time in the army, and received his first public appointment, and was sent as minister to London in 1739, and was promoted to the embassy at Vienna by King John V. in 1745, and recalled in 1750 to become minister for foreign affairs. He soon began to show his strength; in 1751 he checked the Inquisition, by allowing no executions without the royal permission; he improved the navy, the police, and the finances, and freed the Indians of the Brazils from slavery. The Count d'Oeyras, as he was now made, then devoted himself to internal administration. On September 3, 1769, an attempt on the king's life was frustrated by the count, who was in 1770 made marquis of Pombal. He remained in power till the death of the king in 1777, but the new sovereign, Queen Maria, at once accepted his resignation, and persecuted him till his death in 1782.

POMEGRANATE forms a tree of small stature, or a bush with opposite, shining leaves, from the axils of some of which proceed the brilliant scarlet flowers. These are raised on a short stalk, and consist of a thick fleshy cylindrical or bell-shaped calyx tube, with five to seven short lobes at the top. From the throat of the calyx proceed five to seven roundish, crumpled, scarlet or crimson petals, and below them very numerous slender stamens. The pistil consists of two rows of carpels placed one above another, both rows embedded in, and partially inseparable from, the inner surface of the calyx tube. The fruit, which usually attains the size of a large orange, consists of a hard leathery rind, which is the enlarged calyx tube, inclosing a quantity of pulp derived from the coats of the numerous seeds. This pulp, filled as it is with refreshing acid juice, constitutes the chief value of the tree.

The tree is without doubt wild in Afghanistan, north-western India, and the districts south and southwest of the Caspian, but it has been so long cultivated that it is difficult to say whether it is really native in Palestine and the Mediterranean region. It has been cited as wild in northern Africa, but this appears to be a mistake. On a review of the whole evidence, botanical, literary, and linguistic, Alphonse de Candolle (*Origine des Plantes Cultivées*) pronounces against its African origin, and decides in favor of its source in Persia and the neighboring countries.

POMERANIA (Germ. *Pommern*) is a maritime province of Prussia, bounded on the north by the Baltic, on the west by Mecklenburg, on the south by Branden-

burg, and on the east by West Prussia. Its area is 11,620 square miles. The province is officially divided into the three districts of Stralsund, Stettin, and Cöslin; but more historical interest attaches to the names of Vorpommern and Hinterpommern, or Hither and Farther Pomerania, applied to the territory to the west and to the east of the Oder respectively. The interior of the province is thickly sprinkled with lakes, the combined area of which is equal to about one-twentieth of its entire surface. The soil of Pomerania is for the most part thin and sandy, especially to the east of the Oder. About 55 per cent. of the surface is under tillage, while 19 per cent. consists of meadow and pasture, and 20 per cent. is covered by forests. The principal crops are potatoes, rye, and oats, but wheat, barley, tobacco, and beetroot for sugar are also cultivated. Large flocks of sheep are kept both for their flesh and wool, and geese and goose-feathers form lucrative articles of export. With the exception of its inexhaustible layers of peat or soft coal, the mineral wealth of Pomerania is insignificant. Its industrial activity is also of no great importance. Commerce, however, is relatively much more flourishing. Stettin is one of the chief seaports of Prussia, and Stralsund, Greifswald, and Colberg also possess a foreign trade, the exports consisting mainly of grain, timber, and fish.

In 1880 Pomerania contained 1,540,034 inhabitants, all of whom were Protestants except 23,877 Roman Catholics and 13,886 Jews. The Slavonic element in the population is now represented only by a few thousand Poles and a handful of the ancient Cassubians on the east border. Pomerania is the most sparsely populated province in Prussia, the ratio being 132 inhabitants per square mile. About 67 per cent. of the population belong to the rural districts, while the remainder live in communities of 2,000 and upward. There are only nine towns with more than 10,000 inhabitants, at the head of which stands Stettin with 91,000.

POMEROY, a city of the United States, in Meigs county, Ohio, lies on the right bank of the Ohio about half-way between Pittsburgh and Cincinnati. It is the terminus of the Ohio River division of the Columbus, Hocking Valley and Toledo Railway, and has extensive coal-mines dating from 1833, salt works (14,000,000 bushels per annum), and bromine factories. Incorporated as a village in 1841 and as a city in 1868, Pomeroy had 5,824 inhabitants in 1870 and 5,560 in 1890.

POMFRET, JOHN, who was born in 1667 and died in 1703, holds a certain place in English letters as the author of a short poem, *The Choice*, which embodies in easy and happy Drydenic diction the refined Epicureanism of the eighteenth century, and was consequently widely popular throughout that century.

POMONA, the old Roman goddess of tree-fruits (*poma*).

POMPADOUR, JEANNE ANTOINETTE POISSON LE NORMANT D'ÉTIOLLES, MARQUISE DE, the most famous of all the mistresses of Louis XV., was born in Paris on December 29, 1721, and was baptized as the legitimate daughter of François Poisson, an officer in the household of the duke of Orleans, and his wife Madeleine de la Motte. In 1741 she was married to a nephew of her protector and guardian, Le Normant d'Étiolles, who was passionately in love with her, and soon became a queen of fashion. She first met Louis XV. at a ball given by the city to the dauphin in 1744, and he was immediately subjugated. She at once gave up her husband, and in 1745 was established at Versailles as "maîtresse en titre." Louis XV. bought her the estate of Pompadour, from which she took her title of Marquise, and the command of the political situation



passed entirely into her hands. The continuous policy of France since the days of Richelieu had been to weaken the house of Austria by alliances in Germany; but Madame de Pompadour changed this hereditary policy because Frederick the Great wrote scandalous verses on her; and because Maria Theresa wrote her a friendly letter she entered into an alliance with Austria. This alliance brought on the Seven Years' War with all its disasters, the battle of Rosbach and the loss of Canada. She even ingratiated herself with the queen, after the example of Madame de Maintenon, and was made a lady-in-waiting; but the end was soon to come. "Ma vie est un combat," she said, and so it was with business and pleasure; she gradually grew weaker and weaker, and when told that death was at hand she dressed herself in full court costume, and met it bravely on April 15, 1764, at the age of forty-three.

POMPEII, an ancient town of Campania, situated on the shore of the Bay of Naples, almost immediately at the foot of Mount Vesuvius. To its proximity to that volcano it owes its celebrity—the peculiar circumstances of its destruction by the great volcanic outburst of Vesuvius and of its rediscovery in modern times, having converted that which would otherwise have been known only as an obscure country town into a place of world-wide fame, as one of the most interesting relics preserved to us from antiquity.

An earthquake, which affected all the neighboring towns, occurred 63 A.D., venting its force especially upon Pompeii, a large part of which, including most of the public buildings, was either destroyed or so seriously damaged as to require to be rebuilt rather than repaired (Tacit., *Ann.*, xv. 21; Seneca, *Q. N.*, vi. 1). The actual amount of the injuries sustained, which is intimated in general terms by Tacitus and Seneca, is more accurately known to us from the existing remains; for the inhabitants were still actively engaged in repairing and restoring the ruined edifices when the whole city was overwhelmed by a much more appalling catastrophe. In 79 A.D. the neighboring mountain of Vesuvius, the volcanic forces of which had been slumbering for unknown ages, suddenly burst into a violent eruption, which, while it carried devastation all around the beautiful gulf, buried the two cities of Herculaneum and Pompeii under dense beds of cinders and ashes.

So completely was the unfortunate city buried under this overwhelming mass that its very site was forgotten, and even the celebrated topographer Cluverius in the seventeenth century was unable to fix it with certainty. It was not till 1755 that systematic excavations on the site were begun, and, though they were thenceforth carried on more or less continuously during the whole of that century, it was not till the beginning of the present century that they assumed a regular character; and the work, which had received a vigorous stimulus during the period of the French Government (1807-1814), was prosecuted, though in a less methodical and systematic manner, under the succeeding rule of the Bourbon kings (1815-1861). Of later years the process has been carried on, under the enlightened direction of Signior Fiorelli, in a much more careful and scientific manner than before, and the results have been in many respects of the highest interest.

The town was situated on a rising ground of small elevation, separated by a distance of less than a mile from the foot of the actual rise of the outer cone of Vesuvius.

The area occupied was of an irregular oval form, and about two miles in circumference. It was surrounded by a wall, which is still preserved around more than two-thirds of its extent.

The general plan of the town is very regular, the

streets being generally straight, and crossing one another at right angles or nearly so; uniformly paved with large polygonal blocks of hard basaltic lava, fitted very closely together, though now in many cases marked with deep ruts from the passage of vehicles in ancient times, and calculated much more for foot passengers than for any extensive traffic of wheeled carriages.

The forum was unquestionably at Pompeii, as at Rome itself, and in all other Italian cities, the focus and center of all the life and movement of the city, and was at once the resort of the lounge and the gathering place of men of business. Hence it was surrounded on all sides by public buildings or edifices of a commanding character, and surrounded on three sides by a portico. It is, however, certain from the existing remains that both this portico and the adjacent buildings had suffered severely from the earthquake of 63. The north end of the forum, where alone the portico is wanting, is occupied in great part by a building, the most imposing in the whole city, which is now generally known as the Temple of Jupiter. On the east side of the forum were four edifices; the first is generally known, though without doubt erroneously, as the Pantheon, or Temple of the twelve gods. Next to this comes a building generally regarded as the curia or senaculum—the meeting-place of the local senate, or town council. Beyond this comes another temple of small dimensions, commonly called the Temple of Mercury; and beyond this again, bounded on the south by a street known as the Street of the Silversmiths, is a large and spacious edifice, erected by a priestess named Eumachia. The south end of the forum is occupied by three small buildings of very similar form and arrangement, which are supposed to have served as courts of law; while the greater part of the west side is occupied by two large buildings—a basilica, which is the largest edifice in Pompeii, and a temple, which is commonly called the Temple of Venus, but without any evidence; the most recent authorities regard it, on somewhat better grounds, as dedicated to Apollo.

Besides the temples which surround the forum, the remains of four others have been discovered, three of which are situated in the immediate neighborhood of the theaters. Among the most conspicuous buildings are the theaters, of which there were two, placed, as was usual in Greek towns, in close juxtaposition with one another. The largest of these, which was partly excavated in the side of the hill, was a building of considerable magnificence, being in great part cased with marble, and furnished with seats of the same material, which have, however, been almost wholly removed. Its internal construction and arrangements resemble those of the Roman theaters in general, though with some peculiarities that show Greek influence, and we learn from an inscription that it was erected in Roman times by two members of the same family, M. Holconius Rufus and M. Holconius Celer, both of whom held important municipal offices at Pompeii during the reign of Augustus. The smaller theater, which was erected, as we learn from an inscription, by two magistrates specially appointed for the purpose by the decurions of the city, was of older date than the large one, and appears to have been constructed about the same time as the amphitheater, soon after the establishment of the Roman colony under Sulla. The smaller theater is computed to have been capable of containing fifteen hundred spectators, while the larger could accommodate five thousand persons. Adjoining the theaters is a large rectangular inclosure, surrounded by a portico, the purpose of which has been the subject of considerable controversy, but it is now generally admitted to have been the quarters or barracks of the gladiators, who were

permanently maintained in the city with a view to the shows in the amphitheater.

Adjoining the amphitheater was found a large open space, nearly square in form, which has been supposed to be a forum boarium or cattle market, but, no buildings of interest being discovered around it, the excavation was filled up again, and this part of the city has not been since examined. Among the more important public buildings of Pompeii were the thermæ, or public baths, an institution that always held a prominent position in every Roman or Græco-Roman town. Three different establishments of this character have been discovered, of which the first, excavated in 1824, was for a long time the only one known.

Great as is the interest attached to the various public buildings of Pompeii, and valuable as is the light that they have in some instances thrown upon similar edifices in other ruined cities, far more curious and interesting is the insight afforded us by the numerous private houses and shops into the ordinary life and habits of the population of an ancient town. In this respect Pompeii stands alone, among all antiquarian discoveries—the difficulties of exploration at Herculaneum having greatly checked all further investigations on that equally promising site. But here again it is impossible in an article like the present to do more than briefly advert to the general results of the excavations (compare ARCHITECTURE). The excavations systematically conducted for many years past have presented us with examples of houses of every description, from the humble dwelling-place of the artisan or proletarian, with only three or four small rooms, to the stately mansions of Sallust and Pansa—the last of which is the most regular as well as the most extensive of all.

Of the numerous works of art discovered in the course of the excavations the statues and large works of sculpture, whether in marble or bronze, are inferior to those found at Herculaneum, but some of the bronze statuettes are of exquisite workmanship, while the profusion of ornamental works and objects in bronze, and the elegance of their design, as well as the finished beauty of their execution, are such as to excite the utmost admiration—more especially when it is considered that these are the casual results of the examination of a second-rate provincial town. The same impression is produced in a still higher degree by the paintings with which the walls of the private houses, as well as those of the temples and other public buildings, are adorned, and which are not merely of a decorative character, but in many instances present us with elaborate compositions of figures, historical and mythological scenes, as well as representations of the ordinary life and manners of the people, which are full of interest to us, though often of inferior artistic execution. An illustration of the character of the Pompeian wall-paintings is given in the article MURAL DECORATION.

The architecture of Pompeii must be regarded as presenting in general a transitional character from the pure Greek style to that of the Roman empire. All the three orders of Greek architecture—the Doric, Ionic, and Corinthian—are found freely employed in the various edifices of the city, but rarely in strict accordance with the rules of art in their proportions and details; while the private houses naturally exhibit still more deviation and irregularity. The architecture of Pompeii suffers also from the inferior quality of the materials generally employed. No good building stone was at hand; and the public as well as private edifices were constructed either of volcanic tuff, or brick, or the irregular masonry known to the Romans as *opus incertum*. In the private houses, even, the columns are mostly of brick, covered merely with a coat of stucco.

In a few instances only do we find them making use of a kind of travertine, found in the valley of the Sarno, which, though inferior to the similar material so largely employed at Rome, was better adapted than the ordinary tuff for purposes where great solidity was required. The portion of the portico surrounding the forum which was in the process of rebuilding at the time when the city was destroyed was constructed of this material, while the earlier portions, as well as the principal temples that adjoined it, were composed in the ordinary manner of volcanic tuff.

Outside the gate leading to Herculaneum is found a house of a different character from all the others, which from its extent and arrangement was undoubtedly a suburban villa, belonging to a person of considerable fortune. It is called—as usual without any authority—the villa of Arrius Diomedes. The remains of a still more extensive suburban house which were discovered in 1764, and to which the name was given, without the slightest foundation, of the villa of Cicero, are no longer visible, having been covered up again with earth.

In the vaulted corridors of the first villa were discovered no less than seventeen skeletons of the unfortunate inhabitants, who had evidently fled thither for protection. Almost all the skeletons and remains of bodies found in the city were discovered in similar situations, in cellars or underground apartments—those who had sought refuge in flight having apparently for the most part escaped from destruction, or having perished under circumstances where their bodies were easily recovered by the survivors.

The road leading from the gate of Herculaneum toward that city is bordered on both sides for a considerable extent by rows of tombs, as was the case with all the great roads leading into Rome, and indeed in all large Roman towns. Without of course approximating to the stately structures that adorned the Via Appia or Latina, these tombs are in many instances monuments of considerable pretension, and of a highly ornamental character, and naturally present in the highest degree the peculiar advantage common to all that remains of Pompeii, in their perfect preservation.

No manuscripts have been discovered in Pompeii. Inscriptions have naturally been found in considerable numbers, and we are indebted to them for much information concerning the municipal arrangements of the town, as well as the construction of various edifices and other public works. The most interesting of these are such as are written in the Oscan dialect, which appears to have continued in official use down to the time when the Roman colony was introduced by Sulla. From that time the Latin language was certainly the only one officially employed, though Oscan may still have been spoken by a portion at least of the population. Still more curious, and almost peculiar to Pompeii, are the numerous writings scratched or rudely painted upon the walls, which have in some instances a semi-public character, such as recommendations of candidates for municipal offices, but more frequently are the mere expression of individual impulse and feeling, not uncommonly conveyed in rude and imperfect verses. In one house also a whole box was found filled with written tablets—diptychs and triptychs—containing the record of the accounts of a banker named L. Cæcilius Jucundus.

POMPEY is the common English form of the Roman name Pompeius.

I. CNEIUS POMPEIUS MAGNUS, the great triumvir, whose name we always associate with Cæsar and Crassus, was born in 106 B.C. and fought by his father's side when a stripling of seventeen in the Social or Italian War on the side of Sulla against the party of Marius

and Cinna. He followed up his successes in Italy by defeating the Marians in Sicily and Africa, and on his return to Rome in 81, though he was still merely an "eques" and not legally qualified to celebrate a triumph, he was allowed by general consent to enjoy this great distinction, while Sulla greeted him with the surname of Magnus, a title he always retained and handed down to his sons. After this he defeated Sertorius in Spain, suppressed in Italy the slave insurrection aroused by Spartacus in 71, and during the same year was elected to the consulship and entered Rome in triumph. In 66 the whole of the Roman empire in the East was put under his control, and in 61, after defeating Pontius, annexing Syria and Palestine, capturing Jerusalem, Asia, and the East, Pompey, in his forty-fifth year, returned to Rome to celebrate the most magnificent triumph ever witnessed there and to be hailed as the conqueror of Spain, Africa, and Asia.

The remainder of Pompey's life is inextricably interwoven with that of Cæsar. He was married to Cæsar's daughter Julia, and as yet the relations between the two had been friendly. With the death of Pompey's wife Julia, in 54, came strained relations between him and Cæsar, and soon afterward he drew closer to what we may call the old conservative party in the senate and aristocracy. The end was now near, and Pompey blundered into a false political position and an open quarrel with Cæsar. Pompey's cause, with that of the senate and aristocracy, was finally ruined by his defeat in 48 in the neighborhood of the Thessalian city Pharsalus. That same year he fled with the hope of finding a safe refuge in Egypt, but was treacherously murdered as he was stepping on the shore by one of his old centurions. He had just completed his fifty-eighth year.

II. SEXTUS POMPEIUS MAGNUS, the younger son of Pompey the Great, born 75 B.C., continued after his father's death to prolong the struggle against the new rulers of the Roman empire. In 43 he was proscribed along with the murderers of Cæsar, and he put himself at the head of a fleet, by means of which he made himself master of Sicily, and thence ravaged the coasts of Italy. Rome was threatened with a famine, as the corn supplies from Egypt and Africa were cut off by his ships, and it was thought prudent to negotiate a peace with him, which was to leave him in possession of Sicily, Sardinia, and Achaia, provided he would allow Italy to be freely supplied with corn. But Sextus renewed the war and gained some considerable successes at sea. However, in 36 his fleet was defeated and destroyed by Agrippa off the north coast of Sicily, and in the following year he was murdered at Mitylene by an officer of Antony.

PONCE DE LEON, LUIS, See LEON, LUIS PONCE DE.

PONCELET, JEAN VICTOR, mathematician, was born at Metz, July 1, 1788. From 1808 to 1810 he attended the Polytechnic School, and afterward, till 1812, the Practical School at Metz. From 1815 to 1825 he was occupied with military engineering at Metz; and from 1825 to 1835 he was professor of mechanics at the Practical School there. In 1834 he became a member of the Academy; from 1838 to 1848 he was professor to the faculty of sciences at Paris, and from 1848 to 1850 commandant of the Polytechnic School, where he effected a reform in the course of study. He died December 22, 1867.

POND, JOHN, astronomer-royal, was born about 1767 in London.

During an administration of nearly twenty-five years, Pond effected a reform of practical astronomy in England comparable to that effected by Bessel in Germany.

He died at Blackheath, September 7, 1836, and was buried beside Halley in the churchyard of Lee. The Copley medal was conferred upon him in 1823, and the Lalande prize in 1817 by the Paris Academy, of which he was a corresponding member. He published eight folio volumes of *Greenwich Observations*, translated Laplace's *Système du Monde* (in 2 vols. 8vo, 1809), and contributed thirty-one papers to scientific collections. His catalogue of 1,112 stars (1833) was of great value.

PONDICHERRI, chief settlement of the French possessions in the East Indies, situated on the Coromandel coast, in  $11^{\circ} 56'$  N. latitude and  $79^{\circ} 53'$  E. longitude; it is eighty-six miles south of Madras, and is connected with the South Indian Railway system. The territory consists of three districts—Pondicherry, Villianur, and Bahur—comprising an area of 112 square miles, with a population in 1881 of 139,210; in 1890, estimated at 145,000.

PONEVYEZH, a district town of Russia, in the government of Kovno, situated on the upper course of the Neveja river, and connected by rail with Libau on the northwest and with Düna (eighty miles distant) on the east. Its population (8,070 in 1865) had in 1881 reached 15,030, of whom nearly one-half were Jews, and to nearly 20,000 in 1890.

PONIATOWSKI, a family of Poland, the earliest member of which to acquire high distinction was STANISLAUS CIOLEK, regarding whose descent there are conflicting accounts. In any case he was born in 1677 and had sufficient influence and ability to insure his rapid promotion in the army of Charles XII., and as major-general at the battle of Poltava in 1709 was able by his self-command in facilitating the passage of the Dnieper to save the retreating army. In 1711 he was sent on a special embassy to Constantinople, when he succeeded in obtaining from the sultan a promise to send an army to aid Charles in the war with Russia; but the promise was never carried out. After the death of Charles he gave his adhesion to Augustus II., by whom he was in 1724 made grand treasurer of Lithuania, and in 1731 palatine of Mazovia. On the death of Augustus II. he sought to effect the promotion of Stanislaus Leszczyński to the throne, but ultimately he gave in his submission to Augustus III., and after holding under him several high offices was in 1752 appointed castellan of Cracow. He died in 1762, leaving by his marriage with Constance Princess Czartoryski four sons, the best known of whom was the second, STANISLAUS AUGUSTUS, king of Poland, born January 17, 1732. Sent by Augustus III. to the court of Russia, he won the favor of the grand-duchess Catherine, who succeeded to the throne by the assassination of her husband, July 9, 1762. Through her influence he was, September 7, 1764, chosen king of Poland. For an account of his despicable and disastrous rule see POLAND. After signing his abdication, November 25, 1795, he took up his residence at St. Petersburg, where he enjoyed a pension of 200,000 ducats paid jointly by Austria, Russia, and Prussia. He died unmarried, February 12, 1798. Of the other sons of Stanislaus Poniatowski, Casimir (born in 1721 and died in 1800), the eldest, was grand chamberlain of Poland and commander of the royal guard. Andrew (born in 1735 and died in 1773), became an Austrian field-marshal; and Michael (born in 1736 and died in 1794), was ultimately promoted primate of Poland. JOSEPH ANTON (1762-1813), prince and marshal of France, son of Andrew Poniatowski was born at Warsaw, May 7, 1762. At the age of sixteen he entered the service of Austria. After the resolution of the diet to reorganize the Polish army he was recalled and obtained the rank

of major-general. On the outbreak of hostilities with Russia in 1792 he was made commander of the army defending central Poland, but on the outbreak of the insurrection in 1794, he enrolled himself as a volunteer under Kosciuszko, although Kosciuszko had previously held inferior military rank to his own. In command of a division he had charge of the defense of the northern side of Warsaw, and after its capitulation he went to Vienna. In Napoleon's campaigns he held the command of the Polish army corps, distinguishing himself at Smolensk, Borodino, and Leipsic, where he took 1,000 prisoners, and in token of his brilliant exploit was created by Napoleon a marshal of France the same evening. He was employed in covering the retreat from Leipsic, and when the enemy obtained possession of the suburbs he endeavored to join the main army by plunging into the Elster, but was fired upon and, enfeebled by wounds, was drowned, October 19, 1813. JOSEPH (1816-1873), grandson of Casimir mentioned above, was born February 4, 1816, at Rome. Entering the Tuscan service, he went in 1849 as minister of Tuscany to London. In 1850 he took up his residence in Paris, and becoming a naturalized citizen was in 1854 chosen a member of the French senate. In 1870 he removed to London, where he supported himself by teaching music. He was the composer of several operas. He died July 3, 1873.

PONS, JEAN LOUIS, French astronomer, born at Peyre (Haut-Dauphiné), December 24, 1761, received a place at the Marseilles observatory in 1789, and in 1819 became the director of the new observatory at Marlia near Lucca, which he left in 1825 for the observatory of the museum at Florence. He died October 14, 1831.

PONSARD, FRANÇOIS, French dramatist, was born at Vienne in Dauphiné on June 1, 1814. He was bred a lawyer, and his first performance in literature was a translation of *Manfred* (1837). But the first important, and indeed the most important, event of his life was the representation of his play *Lucrèce* at the Théâtre Français on April 1, 1843. It so happened that the tastes and capacities of the most popular actress of the day, Rachel, suited his style of drama, and this contributed greatly to his own popularity. He followed up *Lucrèce* with *Agnès de Méranie* (1846), *Charlotte Corday* (1850), and others. Ponsard accepted the empire, though with no very great enthusiasm, and received the post of librarian to the senate, which, however, he soon resigned, fighting a bloodless duel with a journalist on the subject. *L'Honneur et L'Argent*, one of his most successful plays, was acted in 1853, and he became an Academician in 1855. For some years he did little, but in 1866 he obtained great success with *Le Lion Amoureux*. He died a year later at Paris in July, 1867, soon after his nomination to the commandership of the Legion of Honor.

PONTANUS, JOVIANUS, a famous Italian humanist and poet, was born in 1426 at Cerreto in the duchy of Spoleto, where his father was murdered in one of the frequent civil brawls which then disturbed the peace of Italian towns. His mother escaped with the boy to Perugia, and it was here that Pontano received his first instruction in languages and literature. Failing to recover his patrimony, he abandoned Umbria, and at the age of twenty-two established himself at Naples, which continued to be his chief place of residence during a long and prosperous career. He died in 1503 at Naples, where a remarkable group of terra-cotta figures, life-sized and painted, still adorns his tomb in the church of Monte Oliveto. He is there represented together with his patron Alphonso and his friend San-nazzaro in adoration before the dead Christ.

PONTECORVO, a city of Italy in the province of

Caserta, on the left bank of the Garigliano, with a population of 5,172 in 1889 (commune 10,191), answers to the ancient Fregellæ, a Volscian city, colonized in 323 B.C. by the Romans, who thus occasioned the Second Samnite War. The principality of Pontecorvo (about forty square miles in extent), which Napoleon bestowed on Bernadotte in 1806, was in 1810 incorporated with the French empire.

PONTEFRACT, or POMFRET, a market town and municipal and parliamentary borough in the West Riding of Yorkshire, England, finely situated on an eminence near the junction of the Calder and Aire, and on three railway lines, thirteen miles southeast of Leeds, and fourteen northwest of Doncaster. The streets are wide and regular, and there are many good houses and shops. There are extensive gardens and nurseries in the neighborhood, and licorice is largely grown for the manufacture of the celebrated Pomfret cakes. The town possesses iron foundries, sack and matting manufactories, tanneries, breweries, corn mills, and brick and terra-cotta works. The population of the municipal borough (extended in 1875) in 1871 was 6,432, in 1881 it was 8,798, and in 1890 estimated at 10,000. The increase is mainly due to the fact that Pontefract is now a military center.

PONTEVEDRA, a maritime province of Spain, is bounded on the north by Coruña, on the east by Lugo and Orense, on the south by Portugal (Entre Douro e Minho), and on the west by the Atlantic, and has an area of 1,739 square miles. The general character of the province is hilly, with a deeply indented coast; its products are those common to all GALICIA (*q.v.*), of which historical province it formed a part. The population in 1890 is nearly 500,000 and has many municipalities with a population over 10,000.

PONTEVEDRA, capital of the above province, and an episcopal see, is a picturesque old granite-built town, pleasantly situated at the head of the Ria de Pontevedra, where the Lerez is spanned by the old Roman bridge (whence the name—*pons vetus*). The inhabitants engage in agriculture, sardine fishing, and the manufacture of cloth and hats. The population of the municipality in 1890 was 20,857.

PONTIAC, the capital of Oakland county, Mich., one of the Upper Lake States of the United States, is located on Clinton river and is the distributing point for a rich and populous agricultural and lumber territory. It is distant from Detroit twenty-six miles in a northwesterly direction; thirty-seven miles southeast of Flint, and thirty-four miles northeast of Ann Arbor, on the Detroit and Milwaukee railroad, by which, and tributary railway lines, easy communication with other portions of the country is obtainable. The city was incorporated in 1861, and its growth has been steady and permanent. It is the location of the Eastern Michigan Asylum for the insane, erected in 1877, at a cost of \$500,000, also for the Reform School, founded by the State in 1871. It contains a court-house, jail, etc., two high-schools, one of which cost \$70,000, and a number of school buildings, eight churches, three banks, printing offices at which are issued two or more weekly papers, a military academy, four hotels and many stores. In addition to these, there are a number of foundry and machine shops, lumber, planing and grist mills, and other industrial establishments in operation, together with electric-light works, refining, marble, granite and knitting works. The landscape in the immediate vicinity is dotted with many small and beautiful lakes, and is otherwise attractive. The population in 1870 was 4,867, in 1880, 4,509 and 6,243 in 1890.

PONTIANAK. See BORNEO.

PONTIFEX. The principal college of priests in

ancient Rome consisted of the *pontifices*, the *rex sacrorum*, and the *flamines*, under the headship of the *pontifex maximus*. The *rex sacrorum* was the functionary who under the republic succeeded to the sacrificial duties which in old time had been performed by the king; the *flamines* were sacrificial priests of particular gods, the most important being the *flamen Dialis*, or priest of Jupiter, whose wife, the *flaminica Dialis*, was priestess of Juno. The *pontifices* on the other hand were not assigned to the service of particular gods, but performed general functions of the state religion; and their head, the *pontifex maximus*, was the highest religious authority in the state. The functions of *pontifex maximus* were too weighty to be discharged by a subject in a monarchical government, and from Augustus to Gratian (382 A.D.) this supreme priesthood was held by the emperors in person. The supreme pontiff was in the religion of the state what the father was in the religion of the family. His dwelling was in the *regia* close to the altar of Vesta, the sacred hearth of the state; and the most sacred objects of national worship, the *penates publici* and the mysterious palladia of Roman sovereignty, were his special care. The pontiffs supplied technical guidance and help in those religious functions in which the senate or magistrates had the first part; while the charge of the calendar with its complicated intercalation and system of feast days gave them an important influence on the affairs of civil life, also having the weighty function of declaring and interpreting the laws of religion, which involved such important social matters as marriage and testamentary dispositions; but this function was declaratory and not magisterial. The number of *pontifices* was gradually enlarged, first to nine and then, under Sulla, to fifteen, and the emperors exercised the right of adding supernumeraries at will.

PONTINE MARSHES. See LATIUM.

PONTOISE, a commercial town of France, at the head of an arrondissement of the department Seine-et-Oise, eighteen miles by rail northwest of Paris, picturesquely situated on the right bank of the Oise where it is joined by the Viosne, and at the intersection of the railway from Paris to Dieppe by Gisors with that of the valley of the Oise. The traffic on the main river is large, and the tributary drives numerous mills. Grain and flour are the principal staples of the trade of Pontoise; the population in 1881 was 6,675, and estimated in 1890 at 7,500.

PONTOON. pontoons are vessels employed to support the roadway of floating bridges. They may be either open or closed, heavy and only movable when floated, or light enough to be taken out of the water and transported overland, as when required to form part of the equipment of an army in the field. From time immemorial floating bridges of vessels bearing a roadway of beams and planks have been employed to facilitate the passage of rivers and arms of the sea. Xerxes crossed the Hellespont on a double bridge, one line supported on three hundred and sixty, the other on three hundred and fourteen vessels, anchored head and stern with their keels in the direction of the current. Darius threw similar bridges across the Bosphorus and the Danube in his war against the Scythians, and the Greeks employed a bridge of boats to cross the river Tigris in their retreat from Persia. Floating bridges have been repeatedly constructed over rivers in Europe and Asia, not merely temporarily for the passage of an army, but permanently for the requirements of the country; and to this day many of the great rivers in India are crossed, on the lines of the principal roads, by floating bridges, which are for the most part supported on boats such as are employed for ordinary traffic on the river.

But light vessels which can be taken out of the water and lifted onto carriages are required for transport with an army in the field. Alexander the Great occasionally carried with his army vessels divided into portions, which were put together on reaching the banks of a river, as in crossing the Hydaspes. Cyrus crossed the Euphrates on stuffed skins. In the fourth century the emperor Julian crossed the Tigris, Euphrates, and other rivers by bridges of boats made of skins stretched over osier frames. In the seventeenth century the Germans employed timber frames covered with leather as pontoons, and the Dutch similar frames covered with tin; and the practice of carrying about skins to be inflated and employed for the passage of troops across a river, still exists in the East, and has been introduced into America in a modified form, india-rubber being substituted for skins.

Pontoons have been made of a variety of forms and of almost every conceivable description of material available for the purpose of combining the two essential qualities of transportability over land and power of support in water. Numerous expedients for lightening the equipment have been suggested, in America more particularly.

In modern warfare great attention has been paid to the pontoon service. The French bridge of this description is made of wood. It is of adequate length, width and depth, and each boat exceeds 1,400 pounds in weight. The Russians employ frames covered with canvas, while the Austrians use floats of wood. During the Mexican war the subject was first suggested in the United States, but hostilities closed before the suggestion could be practically adopted. When the Civil War broke out, the subject was revived, and every known design was canvassed and tested. Among those which the necessities of the situation gave birth to were the blanket pontoon bridges, improvised in part out of the soldiers' blankets. The boats were a simple, substantial frame of wood, light of weight, and easily handled. They were arranged so as to form floats, over which the blankets were folded and tied by cords; and when a sufficient number had been lashed together were found capable of sustaining a considerable weight. The system was designed by General Haupt; and upon testing the frame or crib it was ascertained that 687 pounds would sink it but one foot. With a proper equipment of boats, and a competent force, a company could cross streams without the delay incident to such occasions, say within less than half an hour from the time of reaching the banks of the same.

PONTOPPIDAN, ERIK, a learned Danish author, was born at Aarhus on August 24, 1698, and studied divinity at the university of Copenhagen. In 1738 he was made professor extraordinarius of theology at Copenhagen, and in 1747 bishop of Bergen, Norway, where he died on December 20, 1764.

PONTORMO, JACOPO DA, whose family name was CARUCCI, a painter of the Florentine school, born at Pontormo in 1494, son of a painter of ordinary ability, was apprenticed to Leonardo da Vinci, and afterward took lessons from Pier di Cosimo. The most extensive series of works which he ever undertook was a set of frescoes in the church of S. Lorenzo, Florence, from the Creation of Man to the Deluge, closing with the Last Judgment. He died of dropsy on January 2, 1557, and was buried below his work in the Servi.

PONTUS was the name given in ancient times to an extensive tract of country in the northeast of Asia Minor, bordering on Armenia and Colchis. It was not, like most of the divisions of Asia, a national appellation, but a purely territorial one, derived from its proximity to the Euxine, often called simply Pontus by the Greeks.

Originally it formed part of the extensive region of Cappadocia, which in early ages extended from the borders of Cilicia to the Euxine; but afterward it came to be divided into two satrapies or governments, of which the northernmost came to be distinguished as "Cappadocia on the Pontus," and thence simply as "Pontus." The term, it is probable, did not come into general use until after the time of Alexander the Great.

The sea-coast, like the rest of the south shore of the Euxine, was from an early period studded with Greek colonies, most of them of Milesian origin, though in many cases deriving their settlement directly from Sinope, itself a colony of Miletus. Next to that city, between the mouth of the Halys and that of the Iris, stood Amisus, originally a colony direct from Miletus, but which subsequently received a body of Athenian settlers. It was one of the most flourishing of the Greek colonies on this coast, and is still a considerable town under the name of Samsun. Proceeding eastward from thence, we find Side, called in later times Polemonium; Cotyora, a colony of Sinope, where Xenophon embarked with the 10,000 Greeks; Cerasus, afterward named Pharnacia; and Trapezus, also a colony of Sinope, which was a flourishing and important town in the days of Xenophon, but did not attain till a later period to the paramount position which it occupied under the Roman and Byzantine empire, and which it still retains under the name of TREBIZOND.

But, besides these Greek settlements, there were in the interior of Pontus several cities of considerable importance. The principal of these were Amasia, on the river Iris, the birth-place of Strabo, which was made the capital of his kingdom by Mithradates the Great; Comana, higher up the valley of the same river, which, like the place of the same name in Cappadocia, was consecrated to a native goddess named Ma; Zela, nearer the frontier of Galatia, which was in like manner consecrated to a goddess named Anaitis; and Cabira, in the valley of the Lycus, afterward called Neocæsarea, a name still retained in the abbreviated form of the modern Niksar. Several smaller towns are mentioned by Strabo as giving name to the surrounding districts, of which he has left us the names of not less than fifteen; but these obscure appellations of local divisions are in themselves of little interest, and for the most part not mentioned by any other writer.

PONTUS DE TYARD, one of the famous Pleiade who helped to reform French literature in the sixteenth century, was the highest in rank and the most affluent in fortune of the seven. He was indeed in some sort an anticipator of Ronsard and Du Bellay. He was seigneur of Bissy in Burgundy, was born at the seigniorial house in or about 1521, and died at a great age at Bragny on the Saône, another seat of his, on September 25, 1605. He was thus the last survivor as well as one of the eldest of the group.

PONTYPOOL, a town and urban sanitary district of Monmouthshire, England, situated on an acclivity above the river Avon Lwyd, on the Monmouthshire Canal, and on the Great-Western and Monmouthshire Railways, eight miles north of Newport. The town possesses large forges and iron-mills for the manufacture of iron-work and tin-plate. The population of the urban sanitary district (area 800 acres) in 1871 was 4,834, in 1881 it was 5,244, and in 1890 (estimated) 7,000.

PONTYPRIDD, sometimes also called Newbridge, a market town of Glamorganshire, Wales, situated on the Taff at its junction with the Rhondda, and on the Glamorganshire Canal, twelve miles north-northwest from Cardiff and twelve south from Merthyr-Tydfil. It receives its name from a remarkable bridge of one arch

spanning the Taff, erected by William Edwards, a self-taught mason. The bridge is a perfect segment of a circle, the chord being 140 feet, and the height at low water 36 feet. Near the town is a far-famed rocking stone nine and a half tons in weight, surrounded by so-called Druidical remains. In the beginning of the century Pontypridd was an insignificant village, and it owes its progress chiefly to the coal and iron in the neighborhood. It possesses anchor, chain, and cable works, chemical works, and iron and brass foundries. The population in 1881 was 12,317, and in 1890 upward of 13,000.

PONZA, the principal island of a small volcanic group, the Pontian, Pontine, or Pontinian Islands, which lie twenty miles off the Circeian promontory (Monte Circello), the northern end of the Gulf of Gaeta, on the west coast of Italy. Ponza is five miles long and very irregular in outline; its soil is fertile, and in 1881 it had 3,828 inhabitants.

POOLE, a market town, municipal borough, county in itself, and seaport of Dorsetshire, on the south coast of England, is picturesquely situated on a peninsula between Holes Bay and Poole Harbor, 30 miles east from Dorchester and 120 southwest of London. There is a large general trade with the British colonies and the United States, and an important coasting trade, especially in grain to London, and Purbeck clay to the Staffordshire potteries. In 1883 the number of vessels that entered the harbor was 933 of 81,003 tons, the number that cleared 874 of 77,948 tons. Some ship-building is carried on, and there are manufactures of cordage, netting, and sail-cloth. The town also possesses large potteries, decorative tile works, iron-foundries, engineering works, agricultural implement works, and flour-mills. The area of the borough is 5,111 acres, with a population in 1871 of 10,129, and in 1881 of 12,310, and in 1889 estimated at about 14,000.

POOLE, MATTHEW, author of a learned though now almost wholly antiquated *Synopsis Criticorum Biblicorum*, was born at York in 1624, and died at Amsterdam in 1679.

POOLE, PAUL FALCONER, an eminent English painter, was born at Bristol in 1806. He exhibited his first work in the Royal Academy at the age of twenty-five, the subject being the *Well*—a scene in Naples. There was an interval of seven years before he again exhibited his *Farewell, Farewell*, in 1837, which was followed by the *Emigrant's Departure*, *Hermann and Dorothea*, and *By the Waters of Babylon*. This last picture attracted much attention from the fine poetic imagination which it displayed. In 1843 his position was made secure by his *Solomon Eagle*, and by his success in the Cartoon Exhibition, in which he received from the Fine Art Commissioners a prize of \$1,500. After his exhibition of the *Surrender of Syon House* he was elected an Associate of the Royal Academy in 1846, and was made an Academician in 1861. He died in 1879, in his house at Hampstead, in his seventy-third year.

POONA, a district in the Deccan, Bombay, has an area of 5,347 square miles, and is bounded on the north by the districts of Nasik and Ahmednagar, on the east by those of Ahmednagar and Sholapur, on the south by the Nira river, separating it from Satara and Phaltan, and on the west by the Bhor state and Sahyadri Hills. Toward the west the country is extremely undulating. To the east it opens out into plains; but a considerable area is now being put under forest. Poona is watered by many streams, which, rising in the Sahyadra range, flow eastward until they join the Bhima, a river which intersects the district from north to south. The Great Indian Peninsula Railway runs through it,

and affords an outlet for its produce through the Bhor Ghat to Bombay. The Khadakvasla Canal, about ten miles southwest of Poona, which it supplies with water, is one of its most important works. The climate is dry and invigorating; the average annual rainfall is about thirty inches.

The population of the district in 1881 was 900,621 (455,101 males and 445,520 females), of whom 834,843 were Hindus, 42,036 Mohammedans, 1,574 Parsis, 10,880 Jains, 9,500 Christians, and 1,788 of other religions. The only towns with a population exceeding 10,000 are POONA (*q. v.*), Poona cantonment (30,129), and Junnar (10,373).

POONA, the chief town of the above district, is situated in a treeless plain about 2,000 feet above the sea, and overlooked by the Ghats, which rise 1,000 feet above the plain.

**POOR LAWS.** Without embarking on an inquiry as to the causes of pauperism or the primary right of any persons to have their wants, however pressing, met by the state, it is sufficient to say that in Great Britain "there is no man so indigent or wretched but he may demand a supply sufficient for all the necessaries of life from the more opulent part of the community, by means of the several statutes enacted for the relief of the poor" (Blackstone). Moreover, apart from statute, by the common law of England the poor were sustainable "by parsons, rectors of the church, and the parishioners, so that none of them die for default of sustenance."

This has reference to the fact that in early days the poor of England were supported by monks, donations of land having been made the latter, conditioned upon their contributing to the support of the poor and aged. The reciprocal relation thus established continued until the reign of Henry VIII., when the monasteries were abolished, their property given to the nobles and a vast landed interest vested in a class of people who were not charged with responsibilities incident to the support of the poor and aged. The effect of this action on the part of the crown was to greatly increase the amount of vagabondage and the number of indigent, for whose relief it was necessary to make provision, which finally became so onerous as to call for immediate and defined regulation. Such was had, and in many instances the statutes specially directed against vagrancy provided for a system of compulsory labor. During the reign of Edward VI. further legislation intended to restrain vagrancy was adopted providing for the return to their own country of foreign mendicants, and authorizing any person to take children carried about by the impotent and lame, and bring them up to honest labor till such child, if a woman, attained the age of fifteen, or was married, and if a man child until eighteen, if the master so long lived. In Elizabeth's reign legislation took a more vigorous turn and penalties were provided for persons above fourteen being rogues, vagabonds, or sturdy beggars, embracing imprisonment, whipping, burning the gristle of the right ear through with a hot-iron, etc.

In 1597 considerable progress was made toward establishing a system of poor-laws, providing for the appointment of overseers of the poor from among the church-wardens of every parish in the kingdom, who with four substantial householders should attend to the care of children of parents or persons unable to support them, also of those having no means of maintenance. Competent sums for these purposes and for the procurement of a stock of flax, hemp, wool, etc., to set the poor to work were derived by a weekly tax levied upon the inhabitants of the parish according to the ability of those against whom the levy was made: the pay-

ment of which was enforced by warrants of distress. This legislation, however, was not altogether attended with favorable results, and subsequent efforts during the reigns of James I., Charles II., etc., were directed to remedying the existing evil, additional provisions being enacted. Finally, the accumulated evils of the working of the poor laws led to the passage of *Gilbert's Act* in the reign of George III. which did away with many of the evils arising from previous enactments. During the same reign so burdensome became the poor-rate, that a system of out-door relief was adopted. Still the poor-rate continued to increase until 1818, when it began to diminish. To abolish the evils which investigation of the system developed, alterations were proposed in the laws and found expression in the Poor Law Amendment Act of 1834. The objects of the act were to raise the bulk of the community from the idleness into which the maladministration of the laws for their relief had thrown them, also to arrest the progress and ultimately diminish the amount of pressure on the owners of lands and houses.

Its effect was to reduce the amount of money expended in the relief of the poor but the act had to contend with obstacles and both Houses of Parliament were inundated with petitions against the system; but by 1837 it was generally accepted—and has since obtained—notwithstanding, that from the date of its adoption, the indoor relief provided for in the amendment has been the source of a constant struggle between the pauper class and the administrators of the law. The poor are now sent to the workhouses, which are supported by the poor-rate, a tax levied and expended by the overseers of the poor, and district asylums are in some places provided for the destitute not charged with any offense under the Vagrant Act. A child found begging may be sent to a certified industrial school, and while a school is being found justices may order detention for a week in the poor-house. The number of paupers now in receipt of relief in England and Wales approaches 800,000 and the annual cost approximates \$50,000,000.

The second report of the commissioners showed that of 110 unions which had been in operation more than a year, the saving in 43 of the largest was 46 per cent.; in 24 of the smallest unions the rate of saving was not more than 29 per cent.; and in 26 unions of intermediate size a saving of 42 per cent. was effected. Even in many parishes not then included in a union the wide promulgation of the principles of the amending act gave an impulse to improvement in the administration of the poor laws, which was attended by a marked reduction in the expenditure.

The criminal liability of parents and others *in loco parentis* to provide sustenance has been considered. The purely civil liability for necessaries under implied contracts is of course outside the scope of this article, but there is an express liability created by the poor laws. The liability of the father and grandfather and the mother and grandmother, and the children of poor persons under the statute of Elizabeth has been set out in an earlier part of this article. The statute extends only to natural relations.

As to poor laws in other countries, the articles devoted to those countries must be referred to. It is to be observed that legal provision is made for paupers in every part of the United States. The poor-law system which obtains in the different States in its general features is similar to that which prevails in England so far as regards the mode of raising the fund (*viz.*, by way of rate) and the class of people to whom relief is afforded. Each district (commonly a town, county, or city) provides for its own poor. In some of the States paupers

having no legal settlement are relieved by the State Government (1834). The prevalence of slavery in the Southern States until its abolition modified the system of relief. The searching inquiry into the administration of the poor laws in 1832-34 was not confined to the United Kingdom or to the States of America. Returns were obtained through the foreign ministers, and the result as to Europe is thus comprehensively stated by Nassau Senior in 1835:—"A legal claim to relief exists in Norway, Sweden, Russia, Denmark, Mecklenburg, Prussia, Würtemberg, Bavaria, and the canton of Bern, but does not exist in the Hanseatic towns, Holland, Belgium, France, Portugal, the Sardinian states, Frankfort, Venice, Greece, or Turkey." In the north of Europe the great peculiarity of the system is stated to be "the custom of affording relief by quartering the paupers on the landholders in the country and on householders in the towns." Senior arrived at the conclusion that, in those portions of the Continent in which the English principle of acknowledging in every person a right to be supported by the public existed, the compulsory relief had not, except perhaps in the canton of Bern, produced evils resembling in either intensity or extent those then experienced in the United Kingdom, and that in the majority of the nations that had adopted it the existing system appeared to work well. The poor laws of Russia, however, if they could be called poor laws, were merely parts of her system of slavery. The absence of poor laws in France, and the charitable establishments, many of them under state management, are noticed in the article FRANCE. Senior arrived at the conclusion that the comprehensive and discriminate system of public relief established in France in relation to these institutions was not so complete as in Belgium. For the poor there see BELGIUM, where benevolent and charitable institutions and hospitals, charity workshops and depots of mendicity or workhouses, and the *bureaux de bienfaisance* are noticed. The power of expulsion *pour vagabondage* exercised as a matter of daily routine in France operates as a restraint on vagancy, although having a wider range than the English vagrancy laws. The majority of the indigent who received public relief in France are foreigners.

The beneficent, including eleemosynary, institutions of united Italy are treated of under that head in ITALY.

The "pauper colonies" of Holland, established in the first quarter of the present century (the first idea of which seems to have been derived from a colony of Chinese in Java), attracted public attention in England and Europe generally about the time the provision for the poor and the administration of the poor laws were under consideration, immediately before their reform in 1834. The object of the institutions in Holland was to remove those persons who were a burden to society to the poorest waste lands, where under judicious regulations they were enabled to the number of many thousands to provide for their own subsistence.

POPAYAN, a city of the republic of Colombia, capital of the state of Cauca, is situated in 2° 26' N. latitude and 76° 49' W. longitude, at a height of 5,948 feet (E. André, 1876), on the banks of one of the head streams of the Cauca in the great plain in the heart of the cordilleras.

POPE is the name given in England to a small freshwater perch (*Acerina cernua*), also called RUFFE, which is generally distributed in the rivers of central Europe and common in most fresh waters of England. In general structure, shape, and habits the pope resembles much the common perch, but rarely exceeds a length of seven inches, and differs in its coloration,

which is olive-brown with irregular darker spots on the body and numerous blackish dots on the dorsal and caudal fins. It is most destructive to the fry of other fish, but in many parts of the country is esteemed as food.

POPE, ALEXANDER, the most famous poet of his century, was born in London, England, on May 22, 1688, but his father's retirement to Binfield took place soon after his birth. The delicate child's book education was desultory and irregular. His father's religion excluded him from the public schools, if there was no other impediment to his being sent there. Before he was twelve he got a smattering of Latin and Greek from various masters, from a priest in Hampshire, from a schoolmaster at Twyford near Winchester, from another in Marylebone, from a third at Hyde Park Corner, and finally from another priest at home.

Nothing of Pope's was printed till 1709, when he was twenty-one. But before he was introduced to Walsh, which was in 1705, he had already written the first draft of his "Pastorals," a subject on which Walsh was an authority, having written the preface to Dryden's translation of Virgil's *Eclogues*. Trumbull's influence was earlier and more extensive. For him may fairly be claimed the credit of having been Pope's schoolmaster in poetry. It was he who turned Pope's attention to the French critics, out of the study of whom grew the *Essay on Criticism*; he suggested the subject of *Windsor Forest*, and he started the idea of translating Homer. When Trumbull first saw the precocious boy, he was hard at work on his great epic.

Precocious Pope was, but he was also industrious; and he spent some eight or nine years in arduous and enthusiastic discipline, reading, studying, experimenting, taking the advice of some and laughing in his sleeve at the advice of others, "poetry his only business," he said, "and idleness his only pleasure," before anything of his appeared in print. His first publication was his "Pastorals." Tonson the bookseller had heard these pastorals highly spoken of, and he sent a polite note to Pope asking that he might have them for one of his miscellanies. They appeared accordingly in May, 1709, at the end of a volume containing contributions from Philips, Sheffield, Garth, and Rowe, besides Pope's version of Chaucer's *Merchant's Tale*.

Pope's next publication was the *Essay on Criticism*. The youthful author said with delicious loftiness that he did not expect the sale to be quick because "not one gentleman in sixty, even of liberal education, could understand it." But he misjudged his audience. The town was fairly dazzled by it—such learning, such comprehensiveness of judgment, such felicity of expression, was indeed a marvel in one so young.

The *Rape of the Lock* in its first form appeared in 1712 in *Linton's Miscellany*; the "machinery" of sylphs and gnomes was an afterthought, and the poem was republished as we now have it early in 1714. This was his first poem written on an inspiration from real life, from nature and not from books. A gentleman had in a frolic surreptitiously cut off a lock of a young lady's hair, and the liberty had been resented; Pope heard the story from his friend Caryll, who suggested that it might be a subject for a mock-heroic poem like Boileau's *Lutrin*. Pope caught at the hint; the mock-heroic treatment of the petty frivolities of fashionable life just suited his freakish sprightliness of wit, and his studies of the grand epic at the time put him in excellent vein. The *Rape of the Lock* is almost universally admitted to be his masterpiece. English critics from his own time to the present have competed in lauding its airiness, its ingenuity, its exquisite finish.

In the interval between the first and the enlarged edition of the *Rape of the Lock*, Pope gave the finish-



ing touches to his *Windsor Forest*, and published it in March, 1713, with a flattering dedication to the secretary of war and an opportune allusion to the peace of Utrecht. This was a nearer approach to taking a political side than Pope had yet made. His principle had been to keep clear of politics, and not to attach himself to any of the sets into which literary men were divided by party. Although inclined to the Jacobite party by his religion, he was on friendly terms with the Whig coterie, so friendly indeed as to offend some of his co-religionists. When Pope showed a leaning to the Tories in *Windsor Forest*, the coterie, so far from helping him, made insidious war on him—not open war, but underhand war. Within a few weeks of the publication of the poem, and when it was the talk of the town, there began to appear in the *Guardian* a series of articles on "Pastorals." But the sting of the articles did not lie in the truth of the oblique criticisms. "The pastorals of Mr. Philips," published four years before, were again trotted out. Here was a true pastoral poet, the eldest born of Spenser, the worthy successor of Theocritus and Virgil!

Pope took an amusing revenge, which turned the laugh against his assailants. He sent Steele an anonymous paper in continuation of the articles in the *Guardian* on pastoral poetry, reviewing the poems of Mr. Pope by the light of the principles laid down. Ostensibly Pope was censured for breaking the rules, and Philips praised for conforming to them, quotations being given from both. The quotations were sufficient to dispose of the pretensions of poor Philips, and Pope did not choose his own worst passages, accusing himself of actually deviating sometimes into poetry. Although the *Guardian's* principles were also brought into ridicule by burlesque exemplifications of them after the manner of Gay's *Shepherd's Week*, Steele, misled by the opening sentences, was at first unwilling to print what appeared to be a direct attack on Pope and asked Pope's consent to the publication, which was graciously granted.

The relations between Pope and his Whig friends were further strained by one or two little incidents about the same time, and the estrangement was completed in connection with Pope's translation of Homer. This enterprise was definitively undertaken in 1713, and was Pope's chief employment for twelve years. The new pieces in the miscellanies published in 1717, his *Elegy on an Unfortunate Lady* and his *Eleoisa to Abelard*, were probably written some years before their publication. The *Iliad* was delivered to the subscribers in installments in 1715, 1717, 1718, and 1720. For the translation of the *Odyssey* he took Fenton and Broome as coadjutors, who between them translated twelve out of the twenty-four books. It was completed in 1725. The profitableness of the work was Pope's chief temptation to undertake it. He cleared more than \$40,000 by the two translations, after deducting all payments to coadjutors—a much larger sum than had ever been received by an English author before. Pope, with his economical habits, was rendered independent by it, and enabled to live nearer London.

The year 1725 may be taken as the beginning of the third period of Pope's career, when he made his fame as a moralist and a satirist. In point of sheer literary power the works then composed are his greatest, but the subjects chosen belong essentially to the lower levels of poetry.

The *Dunciad* (1728) was the first work of the new period.

The *Essay on Man* (1732-34) was intimately connected with passing controversies. It belongs to the same intellectual movement with Butler's *Analogy*—the

effort of the eighteenth century to put religion on a rational basis. But Pope was not a thinker like Butler. The subject was suggested to him by Bolingbroke, who is said also to have furnished most of the arguments. Pope's contribution to the controversy consisted in brilliant epigram and illustration. In this didactic work, as in his *Essay on Criticism*, he put together on a sufficiently simple plan a series of happy sayings, separately elaborated, picking up the thoughts as he found them in miscellaneous reading and conversation, and trying only to fit them with perfect expression.

Pope died on May 30, 1744, and was buried in the church of Twickenham.

POPEDOM. Both the ecclesiastical and the temporal authority formerly exercised and still claimed by the popes of Rome profess to be of divine appointment, appealing in the first place to the language of the New Testament, and in the next to the tradition of the church, handed down as it is asserted, in unbroken continuity from apostolic times to the present age. According to the theory thus put forth, Peter the apostle was indicated by Christ Himself as superior to the rest of the twelve in faith and spiritual discernment, and as the one of the number whom it was his design to invest with special preëminence. In like manner, the church itself which Peter was afterward to found and to preside over was predestined to a like superiority among other churches, while his personal superiority was to be vested in perpetuity in his successors. In conformity with this divine design Peter, accompanied by Paul, went to Rome after Christ's death, and founded there a church over which he presided as its bishop for twenty-five years—from the first year of the reign of Claudius, 41 A.D. to 67 A.D.—eventually suffering martyrdom in the same year and on the same day as St. Paul, in the persecution under Nero. And, if we accept the records preserved in the Roman Church, we shall believe that St. Peter's successors, so long as Christianity was the object of state persecution, continued heroically to encounter the same glorious fate, the distinction of martyrdom being assigned in the Roman calendar to all but two of the bishops of Rome from Linus to Eusebius.

The question whether or no St. Peter was designed for preëminence among the apostles resolves itself, it is evident, into one of New Testament criticism; but from the time of Origen, who visited Rome early in the third century, when the theory first began to be put forward, there has always been a certain section in the church who have distinctly repudiated the affirmative assumption. Next, as regards the evidence for St. Peter's presence in Rome and lengthened labors there, as the head of a Christian congregation, it is maintained by the great majority of Protestant scholars that there is no proof that he was ever in Rome at all.

On the other hand, it is urged that, as no known tradition assigns the martyrdom of Peter to any other place than Rome, every allusion to that event is implicitly an argument for his visit to the capital; and, generally speaking, it may be said that the most recent and authoritative research seems to point to the conclusion that he both visited Rome and taught there, but that his labors were carried on in a spirit of rivalry, not to say antagonism, to those of Paul, being bestowed exclusively on a Judaizing church, while those of his fellow-apostle were devoted to the Gentile community.

We hear very little of the Christian church during the first two centuries of its existence in Rome, though Hegesippus, who made a list of the bishops of the see, places Peter and Paul at the head. The evidence obtainable, however, shows conclusively that in the second and third centuries the church of Rome began

to put forth unprecedented claims to superiority among churches, and that later we find the bishop of Rome assuming the more extended authority of a metropolitan and the authority of a patriarch.

But no external event exercised a more potent influence on the early history of the Roman Church than the removal of the seat of imperial power to Constantinople (330). For more than a century from that event it was not a little doubtful whether the patriarch of "Nova Roma" might not succeed in asserting an authority to which even the Western pontiff might be compelled to defer. It became accordingly an object of primary importance with the latter to dissociate as far as possible in the mind of Christendom the notion of an ecclesiastical supremacy derived, like that of Constantinople, mainly from the political importance of the capital from the conception of that supremacy which he himself claimed as the representative of the inalienable authority and privileges conferred on St. Peter and his successors. For such a policy an additional motive was created by the predilection shown by Constantine for his new capital and the conviction which he is said to have entertained that the days of ancient Rome were numbered. From that time it was the key-note to the utterances of the Roman primate that his supremacy, as tradition from apostolic times, could never depart from him and his successors, and that, as representing the authority of the two chief apostles, it had claims upon the obedience and reverence of the whole Christian church such as no other *apostolica sedes* could produce. To the ultimate assertion of these pretensions the long and fierce struggle carried on between the followers of Arius and the supporters of orthodoxy materially contributed. The appeal to the arbitration of Rome preferred both by Athanasius and by the Arian party, placed JULIUS I. (337-352) in the proud position of the recognized protector of the orthodox faith. In the year 339 Athanasius himself visited the Western capital and resided there for three years. His presence and exhortation confirmed the Roman pontiff still further in his policy; and from this time we perceive the see of Rome assuming, more distinctly than before, the right to define doctrine and the function of maintaining the true standard of faith amid the numerous heresies that were then troubling the whole church. While Constantinople was conspicuous by its attachment to Arianism, Rome appeared as the champion of the orthodox belief.

During the bishopric of LIBERIUS (352-366) we meet with the first instance of a schism in the Roman Church, and, in the person of Felix, with the first representative of that maintenance of a rival claim to the see which in later history assumed such importance in connection with the antipopes.

At the council of Nicæa (325), one of the canons enacted (the sixth) had already assigned to the three sees, or patriarchates, of Rome, Alexandria, and Antioch, their honorary rank in the order of their enumeration. In the year 381 the council of Constantinople was convened; it was an assembly in which the Western Church took no share, and its notable third canon was accordingly enacted without opposition. By this it was declared that the bishop of Constantinople, or Nova Roma, was entitled, although the representative of a non-apostolic see, to the next place after Rome, and consequently to precedence of the older and apostolic sees of Alexandria and Antioch.

With the division of the empire in the year 395 the question of the Roman precedence of Constantinople was left for a time in abeyance; but in the West the authority of the bishop of Rome became more and more firmly established. In the following century the

general conditions under which he was called upon to act became so materially modified as to constitute a new period in the history of our subject. The characters of the men who filled the papal chair during this century, most of them of exemplary life, some of commanding genius, would alone suffice to constitute it a memorable era.

The successor of Boniface was CÆLESTINUS I. (422-432). The evidence afforded by the events of his pontificate is somewhat conflicting in character. On the one hand, we find the churches of Africa putting forward their latest recorded protest against the Roman pretensions, adducing the sixth canon of the council of Nicæa in support of their protest; on the other hand, the success with which Cælestinus intervened in Illyricum, and again in connection with the sees of Narbonne and Vienne, proves that the papal jurisdiction was being accepted with increasing deference in other parts of the empire.

Barbaric invasion, although resulting in the overthrow of many of the institutions of civilization, and in widespread suffering and social deterioration, served but to enhance the influence and importance of the Roman see. The apparent fulfillment of prophecy, pagan as well as Christian, when the city was taken and sacked by Alaric (410) seemed to complete the effacement of the temporal power in Rome. Neither the Western emperors nor the Gothic conquerors held their court in the ancient capital, where the pope was now at once the most important and conspicuous authority. In the African provinces, the demoralization occasioned by the fierce controversies and dissensions concerning Pelagianism and Donatism compelled the Catholic communities to exchange their former attitude of haughty independence for one of suppliant appeal, and to solicit the intervention and counsel which they had before rejected. Such was the aspect of affairs in the west when LEO THE GREAT (440-461)—by some regarded as the true founder of the mediæval popedom—succeeded to the primacy.

During the Gothic rule in Italy (493-553), its representatives manifested the utmost tolerance in relation to religious questions, and showed little disposition to impose any restraints on the policy of the popes, although each monarch, by virtue of his title of "king of the Romans," claimed the right to veto any election to the papal chair.

The substitution of the rule of the Greek emperors for that of the Gothic monarchs was inimical in almost every respect to the independence and reputation of the popedom. For a short interval before Justinian landed in Italy, AGAPETUS (535-536), appearing as the emissary of Theodotus to the Eastern court, assumed a bearing which inspired the emperor himself with respect. But, after Belisarius entered Rome and the city had been reduced to subjection, the pontiff was seen to be the mere vassal of the emperor, and not only of the emperor but of the courtesan on the imperial throne. The deposition of SILVERIUS (536-540), and his mysterious fate at Pandataria, together with the elevation of VIGILIUS (540-555), the nominee of the abandoned Theodora and her pliant slave, completed the degradation of the Roman see. So sinister, indeed, had become the relations between the Roman bishop and the Eastern court that PELAGIUS I. (555-560) is said to have besought Narses to send him to prison rather than to Constantinople.

In the year 568 the Lombards invaded Italy. Like the Goths they became converts to Arianism; but they were also far less civilized, and looked with little respect on Roman institutions and Roman habits of thought, while their arrogance, faithlessness, and cruelty gained for them the special detestation of the Roman see. From the time of Constantine the Great the church had

possessed the right of acquiring landed property by bequests from individuals, and the Roman see had thus become greatly enriched. Some of its possessions lay far beyond the confines of Italy.

Under GREGORY I. (590-604), commonly known as "the Great," this territorial wealth became largely augmented; and, although, amid the universal demoralization and widespread misery of his age, he professed to discern the unmistakable signs of the approaching end of the world, the efficient administration of the estates of the church was an object of his unceasing solicitude. Through his influence with Theudelinda, the wife of Agilulf, the Lombard monarch, he not only succeeded in averting another siege of Rome, but he also managed to bring about the establishment of amicable relations between the Lombards and the Roman population. With the Byzantine court he did his best to maintain a friendly intercourse, although in his zeal on behalf of monasticism he withdrew his *apocrisiarius* from Constantinople, when the emperor Maurice forbade his soldiers to assume the monastic life. The personal qualities and virtues of Gregory are thrown into stronger relief by the comparative insignificance of his successors in the seventh century, whose tenure of office was, for the most part, singularly brief and inglorious.

But while menaced and dishonored in Italy, the papal power was making important advances in the west. In England the resistance offered by the representatives of the British Church was soon overcome, and from the time of the council of Whitby (664) the teachings and traditions of Gregory, as enforced by Augustine, Theodorus, Wilfrid, and others, found ready acceptance. The humanizing influences which these representatives of the Roman culture diffused around them exercised a potent spell over the minds and wills of the English population. Monasteries were founded; cathedrals rose, each with its school of instruction for the young, and its charity for the needy; and a spirit of filial though far from slavish devotion to Rome was everywhere created. In Frankland, however, the Merovingian kings and the populations of Neustria and Austrasia exhibited a different spirit, and the civil power showed no disposition to welcome foreign interference even in connection with ecclesiastical institutions.

While bonds of union were being created in the West, theological differences were exercising a very different though not less important influence in the East. All the dioceses within the empire where the Roman pontiff had hitherto claimed obedience—Calabria, Sicily, and Illyricum—were absolved from their ecclesiastical allegiance, and the revenues from their rich "patrimones," which had before flowed into the papal treasury, were confiscated. Under these circumstances a compact with the Lombards, who had by this time become converts from Arianism to the Catholic faith, would have seemed the obvious policy on the part of Rome, had not the political aims of the former stood in the way. In his extremity, therefore, the Roman pontiff turned to the Frank, untainted by the heresy of Arianism, and already, as the result of the teaching of Boniface, disposed to assent to any claims of the papacy which did not involve the diminution of his own prerogatives or the restoration of alienated revenues. In the year 752 Pepin le Bref assumed the dignity and title of "king of the Franks." In the following year, during the pontificate of STEPHEN III. (753-757) Aistulf, the king of the Lombards, invaded the duchy of Rome with the avowed purpose of adding the capital itself to his dominions. He seized Ravenna and the exarchate; and Stephen, finding remonstrance and entreaty alike unavailing, fled for protection to the Frankish territory and was received by King Pepin with every mark of sympathy and pro-

found respect. Within a short time after, Pepin invaded the Lombard domain and wrested from its monarch an extensive territory, embracing Ravenna and the Pentapolis; and at a council held at Cuiercy, in the same year (754), he handed over this territory to Stephen, "to be held and enjoyed by the pontiffs of the apostolic see forever." Such appears to be the real origin of that "donatio," or gift of territory (referred back, by the invention of after times, to the age of Constantine the Great), which constituted the pope a temporal ruler over what were subsequently known as the "States of the Church."

It will thus be seen that, toward the close of the eighth century, the germs of the chief papal claims were already in existence, and only needed for their full development those favoring conditions which, with the lapse of time, were certain to occur, and for which, from its peculiar character as an institution, the popedom itself was so well able to watch and wait.

While the Western primate was growing in dignity, wealth and influence, those ecclesiastical potentates who had once claimed an equal or coördinate rank, with the sole exception of the patriarch of Constantinople, altogether ceased to exist. The Saracen conquests in Syria and Egypt had involved the loss of Jerusalem to Christendom (637), and this had been speedily followed by the extinction of the churches of Antioch and Jerusalem. The patriarch of Constantinople represented, accordingly, the only spiritual power which could compare with that of Rome; but while *he* continued to be the submissive vassal of the Byzantine court, that court was compelled to see the once no less submissive pontiff of Rome changed into a successful invader of its Italian possessions and into a determined repudiator of its articles of faith. In the year 800 Charles the Great received at the hands of Leo III., in Rome, the imperial crown, and the titles of "emperor" and "Augustus." The assumption by Charles of the imperial dignity and the consequent rise of the "Holy Roman Empire" were events on the importance of which it is unnecessary here to dwell. By the theory thus established, a temporal supremacy or "condominium" was created corresponding to the spiritual supremacy of the popedom, and the Roman emperor claimed from all other rulers in Christendom an allegiance corresponding to that which the Roman pontiff claimed from all other ecclesiastical potentates. The imperial authority and papal authority were thus complementary the one to the other. The emperor claimed to confirm the papal elections; the pope claimed to confer the imperial crown upon the emperor. During the three centuries that followed upon the creation of the Holy Roman Empire—from the year 800, that is to say, down to the Concordat of Worms (1122)—it was chiefly the former contingency that seemed the more probable. During the pontificate of NICHOLAS I. (858-867), however, the papacy again made a perceptible advance. Nicholas intervened with signal effect in the disputed succession to the Eastern patriarchate, and asserted more distinctly than it had ever been asserted before the theory of the Roman supremacy. He dared, also, to forbid the divorce of Lothair (the powerful monarch of the vast territory which stretched from the German Ocean to the Mediterranean) from his wife Theutberga, thereby establishing an important precedent for papal interference in questions of private morality. And, finally, in his arduous struggle with Hincmar, metropolitan of Rheims, he gained an important victory over the powerful prelates on the Rhine in the question of appeal. It must, however, be admitted that this last advantage was gained only by the use of forged documents—the pseudo-Isodorian decretals.

This collection embodied a complete series of letters

purporting to have been written by the popes of Rome from the time of Clemens Romanus down to that with which the collection by Dionysius Exiguus commences, thus filling up the entire blank, and affording among other data ample precedent for appeals to Rome of the kind against which Hincmar had protested. When some doubt was raised as to the genuineness of the collection, Nicholas did not scruple to assure Hincmar that the originals had been lying from time immemorial in the Roman archives. These false decretals have been described as the source to which we may trace that great revolution in the relations of church and state which now gradually supervened. The pontificate of HADRIAN II. (867-872) is especially notable for the application which he sought to make of some of the principles which they laid down. When Lothair, king of Lotharingia, died without heirs, Hadrian claimed the right to bestow the crown on the emperor Louis. Christian Europe, however, was not as yet prepared to accept this bold extension of the papal prerogatives. The kingdom was seized by Charles the Bald, and Hadrian was reminded in a manifesto drawn up by the bishops of Germany that he could not at once be "universal pope and universal king." But the weakness of Charles' claim was undeniable, and we accordingly find him, five years later, consenting to receive the imperial crown at the hands of John VIII. (872-882), not as his heritage, but as a gift from the pope. During the dark and stormy period that intervened between the death of Charles the Bald and the coronation of Otto the Great at Rome (962), the Carolingian empire broke up, and the results that followed were disastrous both for the popedom and for the empire. The Saracens occupied southern Italy; the Normans poured in successive waves over Frankland; the ravages of the Magyars were yet wider spread and not less terrible. Alike in the civil and the ecclesiastical world the elements of strife and insubordination were let loose; and, while the feudal lords defied the authority of their king, and the power of the French monarch sank to the lowest ebb, the bishops in like manner forsook their allegiance to the Roman pontiff. The archbishops of Ravenna and Milan appeared indeed as his rivals, and the political influence which they commanded more than equaled his: the tenth century has been designated "the noon-day of episcopal independence." The history of the curia at this period is marked by the deepest moral degradation and the most revolting scenes. The papal jurisdiction was limited almost entirely to the capital itself, and even the succession of the pontiffs themselves is with difficulty to be traced. The office, indeed, was sometimes disposed of by the influence of immoral women. The pontificate of STEPHEN VI. (or VII., 896-897) is remembered only for the inhuman manner in which he treated the lifeless corpse of his predecessor Formosus; that of SERGIUS III. (904-911) for the virtual reign of Theodora and her daughter, the two most notorious courtesans of the age; STEPHEN IX. (939-942) was disfigured for life by the brutal treatment which he received at the hands of the Roman mob.

With the restoration of law and order the ancient regard for the popedom regained its hold on the minds of men. Under the guidance of the celebrated Gerbert, the youthful enthusiasm of Otto III. aimed at making Rome once more the center of political dominion and the seat of the imperial power. Hugh Capet, too, professed himself the "defender of the church." The French monarchs were glad, however, to purchase the support of the papacy to aid them in their struggle with the rebellious chieftains by whom the very existence of their authority was menaced, and, until the action of the papal legates again roused the spirit of national resist-

ance, the Capetian dynasty was loyal to the Roman see. That it was so was in no small measure due to the virtues and abilities of GREGORY V. (996-999), the kinsman of Otto III., a young man of considerable attainments, austere morality, and great energy of purpose, who succeeded to the papal chair at the age of twenty-four. He was succeeded by Gerbert, Pope SILVESTER II. (999-1003), from whom Otto III. derived, as already stated, his ideas of Italian and papal regeneration.

With the disappearance of these two eminent men the popedom relapsed into its former degradation. The feudal nobility regained their ascendancy, and the popes became as completely the instruments of their will as they had once been of that of the Eastern emperor. A leading faction among this nobility was that of the counts of Tusculum, and for nearly half a century the popedom was a mere apanage in their family. As if to mark their contempt for the office, they carried the election of Theophylact, the son of Count Alberic, a lad scarcely twelve years of age, to the office. BENEDICT IX. (1033-1045), such was the title given him, soon threw off even the external decencies of his office, and his pontificate was disgraced by every conceivable excess. As he grew to manhood his rule, in conjunction with that of his brother, who was appointed the patrician or prefect of the city, resembled that of two captains of banditti. The scandal attaching to his administration culminated when it was known that, in order to win the hand of a lady for whom he had conceived a passion, he had sold the pontifical office itself to another member of the Tusculan house, John, the arch-presbyter, who took the name of GREGORY VI. (1045-46). Prior, however, to his purchase of the pontifical office, the citizens of Rome, weary of the tyranny and extortions of Benedict, had assembled of their own accord and elected another pope, John, bishop of Sabina, who took the name of SILVESTER III. (rival pope, 1044-46). In the meantime BENEDICT had been brought back to Rome by his powerful kinsmen, and now reclaimed the sacred office. For a brief period, therefore, there were to be seen three rival popes, each denouncing the others' pretensions and combating them by armed force. The degeneracy of the church at this period would seem to have been in some degree compensated by the reform of the monasteries, and from the great abbey of Cluny in Burgundy there now proceeded a line of German popes, who in a great measure restored the dignity and reputation of their office. But their tenure of office was singularly brief. Clement II. died before the close of the year of his election. DAMASUS II., his successor, held the office only twenty-three days. LEO IX., who succeeded, held it for the exceptionally lengthened period of more than five years (1049-54). This pontiff, although a kinsman and nominee of the emperor, refused to ascend the throne until his election had been ratified by the voice of the clergy and the people, and his administration of the office presented the greatest possible contrast to that of a Benedict IX. or a Sergius III. In more than one respect it constitutes a crisis in the history of the popedom. But, although his own career terminated ignominiously, the services rendered by Leo to the cause of Roman Catholicism were great and permanent; and of his different measures none contributed more effectually to the stability of his see than the formation of the College of Cardinals. According to Anselm of Lucca, it was during the pontificate of Leo, at the synod of Rheims above referred to, that the title of "apostolic bishop" (*Apostolicus*) was first declared to belong to the pope of Rome exclusively. The short pontificate of NICHOLAS II. (1059-61) is memorable chiefly for the fundamental change then introduced in the method of electing to the papal office.

The manner in which it struck at the imperial influence was soon made apparent in the choice of Nicholas' successor, the line of German popes being broken through by the election of Anselm, bishop of Lucca, who ascended the pontifical throne as ALEXANDER II. (1061-73) without having received the sanction of the emperor.

The first crusade, which may be looked upon as generated by Gregory's example and a reflex of the policy which led him to sanction the expedition of William of Normandy against England, materially favored papal pretensions. It was proclaimed as a religious war, and it was as a mode of penance that the Norman and Latin warriors were enjoined to gratify their ruling passions of plunder and adventure. It was impossible that the excommunicated emperor Henry IV. should place himself at the head of such an enterprise, and it was accordingly by URBAN II. (1088-99) that the direction was assumed, and it was under his auspices that the first crusade was proclaimed at Clermont. As the movement gathered force, the prestige of the popedom was still further enhanced by the fact that the warriors who had before appeared in the field under the banners of the empire now did so as loyal sons of the church. The new orders of chivalry—the Knights of St. John, the Templars, the Teutonic Order—each bound by religious vows, received their commissions from the pontiff, were invested by him with the sword and the cross, and acknowledged no allegiance to the emperor.

Another movement at this period, which gave effective aid in the diffusion of the papal influence and authority, was the rise of the new religious orders—the Camaldules (*c.* 1012), the Cluniacs (*c.* 1048), the Carthusians (*c.* 1084), and the Cistercians (1098).

On the death of Urban, Cardinal Rainerius, a native of Tuscany, and a man of considerable learning and capacity, succeeded as PASCHAL II. (1099-1118). During the earlier years of his pontificate he is unfavorably distinguished by the manner in which he sanctioned, if he did not instigate, the cruel and unnatural revolt of the young prince Henry (afterward the emperor Henry V.) against his father. The later years of Paschal's rule seem mainly a record of the nemesis which overtook a policy dictated by the most heartless and selfish ambition. The short rule of CALIXTUS II. (1119-24), disgraced although it was by the savage revenge which he perpetrated on his rival the antipope Gregory VIII., was characterized by wise and resolute administration. But the chief event in the pontificate of Calixtus, and one which may be looked upon as inaugurating a new era in the history of our subject, was the Concordat of Worms in the year 1122.

During the pontificate of INNOCENT II. (1130-43) the importance of the new relations established with France is to be seen in the all-commanding influence of BERNARD OF CLAIRVAUX, the unswerving supporter of the papal claims, round whose career indeed the life of the Western Church for half a century may be said mainly to revolve.

Passing by the comparatively unimportant careers of the five popes whose names stand between those of Alexander and INNOCENT III. (1198-1216), we find ourselves at the stage which marks the culmination of the papal power. It was now that the papal power may be said to have effectually impressed its theory of sacerdotal government upon Europe; that the canon law, wherein that theory was elaborated, began to be taught in the universities which rose throughout Europe—Bologna, Padua, Paris, Orleans, Oxford, and Cambridge; that ecclesiastical discipline everywhere modeled itself on the practice of Rome; that the mendicant orders, especially those of St. Dominic and St.

Francis of Assisi, with their irregular enthusiasm, skillfully converted by Innocent into a widely-diffused, untiring, and devoted propaganda, aroused a new spirit alike in the universities and among the illiterate laity, and became a powerful instrument wherewith to coerce to obedience the episcopal order and the whole body of the secular clergy.

The chief interest attaching to the pontificates of HONORIUS III. (1216-27), GREGORY IX. (1227-41), and INNOCENT IV. (1243-54) arises from their connection with the policy and career of Frederick II. (emperor 1210-50). To the whole traditions of the popedom Frederick was especially obnoxious, menacing on the one hand its standard of doctrine by his reputed skepticism, and its newly acquired possessions on the other by his schemes for the revival of imperial supremacy in Italy. In the sequel his designs were baffled by the ability and resolution of Gregory and Innocent; and at the general council of Lyons (1245) Frederick was deposed from both his imperial and his kingly dignities, and his subjects declared to be absolved from their fidelity.

The policy of GREGORY X. (1271-76), a man of ability and moderation, deserves the praise of having apparently aimed at the general good of Christendom, so far, at least, as not incompatible with the overweening pretensions which he continued to uphold. After him came Celestine (1294) and Boniface (1294-1303). In the year 1305 CLEMENT V. (1305-14), an Aquitanian by birth, was elected after long contention to the pontificate. He was invested with the tiara at Lyons, and subsequently (1309) transferred his court from Rome to Avignon where, for a period of nearly seventy years, derisively styled the "Babylonian captivity," pope after pope held his court. When JOHN XXII. (1316-34) sought to interfere in a double election to the empire, the diet at Frankfort denounced his whole policy in terms that startled Europe by their boldness. Other causes contributed effectually to lower the papacy in the estimation of Europe. Clement V. concurred in the infamous devices by which Philip procured the suppression of the Order of the Templars. The traffic in benefices was now again developing into a gigantic scandal and abuse. Annates and Peter's pence were exacted with an insatiable rapacity. The wealth thus acquired was partly devoted toward extending the territorial possessions of the see; and Avignon and the county of Venaissin, purchased in 1348 from the crown of Provence, remained papal until the French Revolution. In Germany the deep discontent to which it gave rise formed an important contributing element in the cause which brought about the Reformation. In France the luxury and gross immorality of the court at Avignon, described in graphic and scathing language by Petrarch, are assigned by other contemporary writers as conducing largely to the corruption of morals throughout the realm.

The outbreak of the great schism struck no less deeply at those sentiments of veneration and deference which had been wont to gather round the Pontiff's chair. For a period of thirty-eight years, Christian Europe was scandalized by the contentions of two rival popes, the one holding his court at Rome, the other at Geneva, each hurling anathemas, excommunication, and the foulest accusations at the other. The potentates of Europe, in declaring themselves "in the obedience," as it was termed, of one or the other pontiff, were swayed almost entirely by political considerations, in which jealousy of France was the predominant sentiment. Italy, Germany, Bohemia, England, Flanders, Hungary, and Poland, all declared themselves in the obedience of the pope at Rome; Scotland, Savoy, Lorraine, declared themselves, along with France, in that

of the pope at Avignon. The Spanish kingdoms, which at first stood aloof, ultimately also decided, though from somewhat different motives, in favor of the latter pontiff. At last, at the commencement of the fifteenth century, an endeavor was made to prevail on both the reigning popes—Gregory XII. at Rome, Benedict XIII. at Avignon—to renounce their claims, with a view to the restoration of church union. The proposal was met by both popes with persistent and unscrupulous evasion. France, indignant at the subterfuges of Benedict, withdrew her support, and he accordingly retired to Perpignan. The cardinals attached to either court met together at Leghorn, and agreed to summon a general council, to meet at Pisa on March 25, 1409. The council enunciated the dogma of its own supremacy; it deposed the rival popes; it constituted the two separate bodies of cardinals a single conclave, and by this conclave a new pope, ALEXANDER V. (1409–10) was elected. Schemes of general ecclesiastical reform were discussed; and then after a four months' session the assembly adjourned, to resume, at an interval of three years, its yet more memorable deliberations at Constance. In the intervening time, Alexander V. died, not without strong suspicion of his having been removed by poison through the machinations of his successor, the notorious Balthasar Cossa, who assumed the title of JOHN XXIII. (1410–15), and took up his residence in Rome. It is with this pontiff that the gross abuse of indulgences is said to have first arisen. In the year 1416 the council of Constance met, amid the most sanguine expectations on the part of religious Europe, but it achieved practically nothing in the direction of church reform. It deposed John XXIII., for MARTIN V. (1417–31), burned John Huss, one of the first to assert the rights of the individual conscience in opposition to the prevailing hierarchical system; crushed the party of reform in the university of Paris, and banished their great leader. The council of Basel (1431–49), although it reënnunciated the principle of the superiority of a general council over the pope, found, when it sought to proceed to the more practical reforms, that it had assumed a task beyond its powers. Under the pretext of bringing about a reconciliation with the Eastern Church, and inviting its delegates to the deliberations of the council, EUGENIUS IV. (1431–47) proposed to transfer the place of meeting from Basel to some Italian city. The council, well knowing that such a measure would be fatal to its independence, refused its assent; Eugenius retaliated by dissolving the council; the council, by suspending the pope. Thereupon Eugenius summoned another council at Ferrara, which was afterward removed to Florence. The council of Basel, as a last resource, arrogated to itself the papal functions, and then proceeded to elect Amadeus, duke of Savoy, pope, with the title of FELIX V.

Although supported at first by the electors of Germany, it was, in the sequel, completely circumvented by the machinations of the able but unscrupulous Æneas Sylvius; and Pope Eugenius, at his death, seemed almost to have regained the allegiance of Christendom. Under NICHOLAS V. (1437–55), the work of reunion was brought to a completion. The council of Basel dissolved itself; and Felix V., laying aside his empty title and dignity, retired into Savoy, and was shortly after promoted to the rank of cardinal by Nicholas himself. The popedom was not destined ever again to witness the phenomenon of a rival pontiff; and no council since the council of Basel has ever ventured to assert its authority as superior to that of the Roman chair. The history of the popedom from this point (c. 1517) to the commencement of the council of Trent

(1545) will be found in the article on the REFORMATION.

The distinctive features of the doctrinal belief formulated by the council of Trent were mainly the outcome of Jesuit influences (see JESUITS); and, enforced as these tenets were by the terrorism of the Inquisition, the freedom of thought which during the revival of learning had passed comparatively unchallenged within the pale of the church was now effectually extinguished. But it must at the same time be admitted that, concurrently with this tendency to greater rigidity of doctrine, Roman Catholicism became characterized by far greater earnestness of religious teaching, displayed a remarkable activity in the cultivation of theological learning, and abolished, or sought to abolish, many glaring abuses. In this amendment, however, Rome had at first but small share. The Reformation movement within the church took its rise in Spain; and the purely political feeling which now constituted so considerable an element in the papal policy led each pontiff to regard with no little jealousy the overweening aggrandizement of the Spanish monarchy. Political considerations, in fact, sometimes prevailed over theological sympathies.

While with respect to the acceptance of doctrine, the losses of the sixteenth century were materially retrieved, the popedom was sinking rapidly in political importance. Its influence in the Italian peninsula dwindled to within the limits of the States of the Church; and the dynastic succession in Naples and Sicily, in Parma and Piacenza, underwent a total change without the curia or the pontifical interests being in any way consulted. The results of the War of the Spanish Succession disappointed in every way the hopes of Clement XI.; and his chagrin, when he found himself compelled to recognize the pretensions of the archduke Charles to the Spanish crown, was intense. The manner in which the conclusion of the war demonstrated the growing power of England was again a sinister omen for the permanence of the papal system. The conviction had long been growing up in the chief cities of the Continent that wherever the representatives of Jesuitism obtained a footing the cause of public order and domestic peace was placed in jeopardy. And, while, in distant lands, the vaunted successes of the Jesuit missionaries too often represented the diffusion of a merely nominal Christianity, their activity as traders was a constant source of irritation to the mercantile communities. The dissensions fomented by their agency at the Bourbon courts continued, however, to increase; and in 1769 the representatives of the chief Catholic powers at the Roman court received instructions to present each a formal demand that the Jesuit order should be secularized and abolished. Clement, who had vainly appealed to the empress Maria Theresa for the exertion of her influence, died suddenly of apoplexy on the day preceding that on which a consistory was to have been held for the purpose of giving effect to the demands of the powers. It was expressly with the view that he should carry out the task which his predecessor had sought to evade that Cardinal Ganganelli, CLEMENT XIV. (1769–74), was raised to the pontifical chair, chiefly through the Bourbon interest. At length he issued the brief *Dominus et Redemptor Noster*, for the suppression of the order, which he declared to have merited its ruin by "its restlessness of spirit and audacity of action." That the suppression of the Jesuit order had been attended with no little danger to the interests of the Roman see was clearly shown by the progress which liberal opinions now began to make in Germany.

On the accession of Joseph II., in 1780, to the throne of Austria, a new era commenced throughout the empire. Half the monasteries and friaries were suppressed. The bulls *Unigenitus* and *In Cena Domini*

were declared null and void within the limits of the empire. Toleration was extended to Protestant sects and to members of the Greek Church; and the introduction of papal dispensations within the Austrian dominions was declared unlawful, unless it could be shown that they were obtained without payment. A few years later the outbreak of the French Revolution seemed to portend for the popedom a like fate to that which had overtaken the Jesuit order. The demeanor of the National Assembly toward Pius himself had not been disrespectful; but the outrages on religious sentiment and decency itself perpetrated by the Convention drove the alarmed pontiff into the arms of Austria, with whom and the several reigning Italian princes he hastily concluded an offensive league. In the Italian campaign he met accordingly with no mercy at the hands of the Directory, and of Bonaparte acting as their representative. In 1797, first of all at Bologna and subsequently at Tolentino, the most vigorous conditions were imposed. Shortly after the peace of Tolentino (February, 1797) Pius was seized with an illness which seemed likely, at his advanced time of life, to prove fatal; and Napoleon, in anticipation of his death, gave instructions that no successor to the office should be elected, and that the papal government should be abolished. The sequel, however, having disappointed these expectations, the French ambassador in Rome proceeded through his agents to foment an insurrection—a design for which the demoralized condition of the capital afforded unusual facilities. The outbreak that ensued was immediately made the pretext for abolishing the existing rule, and in its place the Roman republic was proclaimed (February 15, 1798).

It was under the protection of a schismatic power—that of the emperor of Russia—that, after a lapse of eight months, PIUS VII. (1800–23) was elected pope at Venice. Pius VII., who, as Cardinal Chiaramonte, had at one time affected to approve of democratic principles, succeeded in gaining the good will of Bonaparte, and his accession was shortly followed by the concordat of 1801. Catholicism was reestablished as the state religion of France; but the confiscated property of the church was not restored, while the pretended reintroduction of the papal authority was deprived of all real validity by appending to the concordat certain “articles organiques” which effectually debarred the pontiff from the exercise of any real jurisdiction within the realm. In the concordat made with the Italian republic in 1803 the canon law was revived as the code whereby all questions not provided for in new articles were to be decided. Notwithstanding that he warmly resented the manner in which he had been duped, Pius was ultimately prevailed upon by the consummate address of Talleyrand to crown Napoleon as emperor in Paris. The immediate result of this imprudent act, as regarded the popedom, was the assertion of imperial rights in Rome itself on the part of the new emperor, and a demand that the pontiff should henceforth make common cause with him against the enemies of France. On his refusal Pius was made a prisoner, and the temporal sovereignty of the Roman see declared to be at an end. At Fontainebleau, in 1813, a new concordat was wrung from the infirm and aged pontiff (whose position and treatment strongly recalled those of his predecessor), and he was compelled to surrender almost the last remnants of his authority in France, and to disown all claim to rank as a temporal ruler. Pius VII. survived, however, not only to witness the overthrow of his oppressor, but to regain with the Restoration both his spiritual and temporal prerogatives. His policy, however, was thenceforth altogether reactionary. On the one hand he suppressed the circulation of the Scriptures in the vernacu-

lar, on the other, by a bull of August 7, 1814, he recalled the Jesuits, who since their dispersion in Latin Christendom had transferred the scene of their labors to Prussia and Russia. In other respects Pius' administration of his office was exemplary, and the same may be said of that of his successors, LEO XII. (1823–29), PIUS VIII. (1829–30), and GREGORY XVI. (1831–46.) The adversities arising out of the Revolution had proved a salutary discipline. Nepotism ceased to disgrace the papal court. Ecclesiasticism itself assumed another tone; its morality was pure; its zeal in the performance of its duties conspicuous. In France there arose a new school, known as the *Parti Prêtre*, the school of Chateaubriand, Lamennais, and Montalembert, which rejected the ancient Gallican claims and principles, and everywhere inculcated loyalty and submission to Rome as the first duty of the Catholic. In Germany neither the enlightened and strenuous efforts of Wessenberg nor the statesmanlike policy of Metternich could produce concerted action among the several states, which were accordingly eventually reduced to the necessity of each making separate terms with the curia on an independent basis. The result, in nearly all cases, was that, in reconstructing its ecclesiastical organization, and endeavoring at the same time to establish a certain *modus vivendi* in its diplomatic relations with Rome, each state was compelled to make concessions which largely favored the reestablishment of ultramontane institutions. The signal failure of Wessenberg, in his administration of the see of Constance, to reintroduce the principles advocated by “Febronius,” may be cited as one of the most notable instances of the defeat of liberal principles. In the Netherlands and in Silesia similar reactionary movements took place. In England the Catholic Emancipation Act (1829), although conceived in a spirit of conciliation, proved, in the embittered relations then existing with Ireland, of little avail, and in reality only imparted fresh strength to the machinations of the ultramontane party. The main facts in the history of the popedom from this period will be found under the head of PIUS IX. (1846–77), and Leo XIII. (1878).

POPLAR (*Populus*), the name of a small group of arborescent amentaceous plants, belonging to the order *Salicaceæ*. The catkins of the poplars differ from those of the nearly allied willows in the presence of a rudimentary perianth, of obliquely cup-shaped form, within the toothed bracteal scales; the male flowers contain from eight to thirty stamens; the fertile bear a one-celled (nearly divided) ovary, surmounted by the deeply cleft stigmas; the two-valved capsule contains several seeds, each furnished with a long tuft of silky or cotton-like hairs. The leaves are broader than in most willows, and are generally either deltoid or ovate in shape, often cordate at the base, and frequently with slender petioles vertically flattened. Many of the species attain a large size, and all are of very rapid growth. The poplars are almost entirely confined to the north temperate zone, but a few approach or even pass its northern limit, and they are widely distributed within that area; they show, like the willows, a partiality for moist ground, and often line the river-sides in otherwise treeless districts. The number of species cannot be very accurately defined—several, usually regarded as distinct, being probably merely variable forms of the same type. All yield a soft, easily-worked timber, which, though very perishable when exposed to weather, possesses sufficient durability when kept dry to give the trees a certain economic value.

POPLIN, or TABINET, is a mixed textile fabric consisting of a silk warp with a weft of worsted yarn.

POPOCATEPETL (Aztec *popocani*, “smoking,” *tepetl*, “mountain”), a burning mountain in Mexico,

in  $18^{\circ} 59' 47''$  N. latitude and  $98^{\circ} 33' 1''$  W. longitude, which along with the neighboring and somewhat lower summit of Ixtaccihuatl (Aztec "White Woman") forms the southeastern limit of the great valley in which the capital is built. As it lies in the province of Puebla, and is the great feature in the view from that city, it is also called the Puebla Volcano. With the single exception of Mount Elias in Alaska, Popocatepetl appears to be the highest peak in North America, rising as it does in a regular snow-covered cone to an altitude of 17,853 feet. There have been only two or three moderate eruptions during the last 300 years, though smoke continually issues from the crater, and from time to time vast showers of cinders and stones are shot up.

POPPÆA SABINA. See NERO.

POPPY OIL is obtained by pressure from the minute seeds of the garden or opium poppy, *Papaver somniferum*. The white-seeded and black-seeded varieties are both used for oil-pressing; but, when the production of oil is the principal object of the culture, the black seed is usually preferred. Poppy oil is a valuable and much used medium for artistic oil painting.

POPULATION. Population *statically* considered, may be defined as "the totality of human beings existing within a given area at a given moment of time." The totality just mentioned is ascertained in modern times and by civilized nations by the statistical operation known as the CENSUS, (*q.v.*) It is usual to obtain by means of a census a good deal of information beyond the bare fact of the number of persons whose existence is, for the purpose of the census, taken cognizance of. Part of this information is obtained for purposes connected with the administration of the state, such as that contained in replies to questions as to the religion, profession, etc., of the individuals numbered. But these facts, though highly important, are not facts of population strictly speaking. There are two very important characteristics common to all considerable populations—namely, the approximate constancy of the distribution of the population as regards sex and age. A census which did not distinguish between the number of male and the number of female persons composing the population of which it takes cognizance would be seriously defective. Inquiries as to the height and the girth round the chest of individuals are usually made in countries where military service is compulsory, and the degree of prevalence of bodily defects, such as blindness and deafness, is also noted for similar reasons; but such inquiries are the work of specialists, official and other, and in any case are not included in the information obtained from a census. The age of each individual is, however, easily obtained in the course of the operations of the census.

The total population of the world is, to a large extent, an estimate, inasmuch as in some countries a proper census has never been taken, while in many the interval that has elapsed since the last operation is so long as to reduce it to the level of serving as a basis for a calculation in which estimates play a large part.

The obstacles which make it difficult to attain even an approximate statement of the population of the world prevent us from obtaining any accurate knowledge whatever as to the sexual constitution of that population. We have, however, tolerably accurate information on this subject for most of the countries of Europe, for the United States, and for Canada. From the figures available it is evident that no general proposition can be laid down on the subject of the normal proportion of females to males, except that in so-called "old" countries there is usually a slight excess of the former.

The census of England and Wales for 1881 gave 1,055 females to 1,000 males.

The 1880 census of the United States gives the proportion of females to males at 96.54 per cent., which is rather smaller than that shown in 1870 (97.2 per cent.); but immigration is still a potent factor in the growth of the population of this country.

With regard to the causes of the excess of females, as in most other social phenomena, our knowledge is very small at present. The reason for the broad distinction between Europe and North America is pretty obvious. New countries are continually receiving many male and fewer female immigrants. Probably also, life being very rough in the more unsettled portions of such countries, the rate of mortality among females is a little higher than in places where women can receive more protection from hardship. On the other hand, even in Europe, men run many risks to which women are not exposed. The subject is a very interesting one, but cannot be adequately treated except at much greater length than is possible here, and we must refer our readers to special works for further information.

The characteristics of a population from the point of view of age, which German writers term "Altersaufbau," can only be treated very generally.

This "age scale" shows us the proportion in which persons of various categories of age are found combined to form populations. The general characteristics of the groups are tolerably obvious. It must be remembered that after thirty years the periods are decennial. The difference between the age scale of Europe and that of North America is considerable. In the latter, owing mainly to the fact that emigrants are usually young, a much larger proportion of the population than in Europe are under thirty years of age. On the other hand the age scale of France presents a feature of an opposite kind, namely, a deficiency of persons under fifteen years of age, and an excess of those over forty, as compared with the average of Europe. This conformation of the age scale may be compared with that of Hungary, where the number of children is larger and the number of persons over forty less than the average. It is probable that the smaller number of children in the one case and the larger in the other directly lead respectively to a smaller infant mortality in France than in Hungary.

Careful inquiries into age scales are of very recent origin, the data required for evaluating those relating to earlier periods being absent. Moreover, erroneous statements as to their age are made by a much larger number of persons than might be supposed, sometimes from carelessness or ignorance, but also intentionally. The tendency of women over twenty-five to understate their age, combined with overstatements of age by girls and young women under twenty, always tends to make the twenty to twenty-five section of the age scale unduly large. We must regard even the age scales now in existence as merely first approximations, for it is evident that observations obtained from several censuses must be reduced and combined before we can feel certain that accidental causes of error have been eliminated. This is all the more necessary as the age scale of any given population cannot be regarded as fixed, any more than the magnitude of the population itself, both being liable to modifications arising out of the varying dynamical conditions existing at different periods. And this brings us to the second portion of our inquiry, in which we shall indicate in the most general way the nature of the proximate causes which underlie the phenomena of population considered as a fact existing at a particular moment of time.

Population, *dynamically* considered, is the result of two pairs of opposing forces, whose combined action may, for convenience, be theoretically conceived of as balancing



each other, but which never do so balance as a matter of fact. A comparison of two successive censuses invariably shows some "movement of population." In nearly all civilized countries the movement shown is one of growth when the body of population examined is large. The population of a village or a small town may, quite conceivably, show a reduction in number for the period between two censuses, but this can hardly be the case with a large town, and still less with a nation, unless as the consequence of some great calamity such as an earthquake or a pestilence or a change in the climatic or economic conditions of the country inhabited. A great war, of course, produces a certain retardation of the rate of increase.

The causes of the movement of population are internal and external. The internal arise out of the numerical relation between the births and deaths of a given period, there being an increase when there are more births than deaths, a decrease in the contrary case. Haushofer expresses this by a formula which is sometimes convenient: "There is an increase where intervals between successive births are smaller than those between successive deaths." The external are immigration and emigration. The intensity of these two forces operating on population depends on a variety of causes, into which we do not propose to enter. Generally speaking, it may be said that "new" countries, where the density of population is small, attract immigrants from countries in which the density of population is great. The density of population is expressed by the figure denoting the number of inhabitants per square mile (or square kilometer) of the territory they occupy. For a discussion of the various political, social and economic causes which determine density of population, we must refer our readers to the works of Haushofer and Bloek.

During the earlier half of the century the rate of increase in the United States ranged from  $2\frac{3}{4}$  to 3 per cent. per annum in the successive decades from census to census. The increase in the population of the United States has hitherto depended so much on immigration that at present inquiries into the normal birth and death rates of the country are very difficult, except in the eastern States. Of the total population, 50,442,066, as shown in the census of 1880, no less than 6,619,943, or over 13 per cent., were foreigners. The fact that the proportion of women to men is unusually low, serves to remind us that normal phenomena of population must not as yet be looked for in the American Union.

The birth-rate of a population is the proportion borne by the number of births in a year to the number of the population. It might seem that it is easy to obtain this rate, but as a matter of fact it is practically impossible to do so. It is not difficult to ascertain, with sufficient accuracy, the number of births; the difficulty is to ascertain what is the number of the population, for that number is never the same for two days together.

The birth-rate in different countries is influenced by various circumstances into which it is not possible to enter at length. The most important circumstance is the proportion borne by the number of women of child-bearing age to the whole population. There are other circumstances which must be kept in mind in comparing the birth-rates of different countries, such as the character of the age scale as a whole, and the density of population, besides climatic and other physical characteristics of the environment of the populations examined. The birth-rate is high in new countries, where there is always a larger proportion of young men than in old states, and where the proportion of women of

child-bearing age is also large. The latter circumstance is, we may point out, quite consistent with the statement already made, that in new countries the proportion of women to men is smaller than in old ones. For an unusually large proportion of the total number of women in new countries are young.

FORBEAGLE, the name of a shark (*Lamna cornubica*), mentioned in the works of older British authors as "Beaumaris Shark."

PORCELAIN. See POTTERY.

PORCUPINE. This word, derived from the French *porc-épic*, or "spiny pig," is applied to the members of the *Hystriidae*, a family of rodents whose most prominent peculiarity is their covering of long stout spines, which form a highly efficient protection against enemies, and which are better developed in this family than in any other mammal. Zoologically the porcupines are allied to the cavies, chinchillas, agoutis, etc., and with them form the great section *Hystriomorpha* or porcupine-like rodents.

The old world porcupines or *Hystriina* range over the south of Europe, the whole of Africa, India, and the Malay Archipelago as far eastward as Borneo. They are all stout heavily-built animals, with blunt rounded heads, fleshy mobile snouts, and coats of thick cylindrical or flattened spines, which form the whole covering of their body, and are not intermingled with ordinary hairs. Their habits are strictly terrestrial.

The New-World porcupines, the *Synetherina*, have rooted molars, complete collar-bones, uncleft upper lips, tuberculated soles, no trace of a pollex, and four mammae only. Their spines are to a great extent mixed with long soft hairs; they are less strictly nocturnal in their habits; and, with one exception, they live entirely in trees, having in correspondence with this long and powerful prehensile tails. They consist of three genera, of which the first is formed by the common Canadian porcupine (*Erethizon dorsatus*), a stout heavy-built animal, with long hairs almost or quite hiding its spines, four anterior and five posterior toes, and a short stumpy tail. It is a native of the greater part of Canada and the United States, wherever there is any remnant of the original forest left. *Synetheres*, the second genus, contains some eight or ten species, known as tree porcupines, and found throughout the tropical parts of South America, one of them extending northward into Mexico.

PORDENONE, IL, whose correct name was GIOVANNI ANTONIO LICINIO, or LICINO, was an eminent painter of the Venetian school. He was commonly named Il Pordenone from having been born in 1481 at Corticelli, a village near Pordenone—a city of Italy, in the province of Udine (Friuli).

As a painter, Licinio was a scholar of Pellegrino da S. Daniele, but the leading influence which governed his style was that of Giorgione; the popular story that he was a fellow-pupil with Titian under Giovanni Bellini is incorrect. He died in 1539.

PORIFERA. See SPONGES.

PORISM. The subject of porisms is perplexed by the multitude of different views which have been held by famous geometers as to what a porism really was and is.

The treatise which has given rise to the controversies on this subject is the *Porisms* of Euclid, the author of the *Elements*. For as much as we know of this lost treatise we are indebted to the *Collection* of Pappus of Alexandria, who mentions it along with other geometrical treatises, and gives a number of lemmas necessary for understanding it. Pappus states that the porisms of Euclid are neither theorems nor problems, but are in some sort intermediate, so that they may be presented either as theorems or as problems; and they were re-

garded accordingly by many geometers, who looked merely at the form of the enunciation, as being actually theorems or problems, though the definitions given by the older writers showed that they better understood the distinction between the three classes of propositions.

Pappus gives a complete enunciation of a porism derived from Euclid, and an extension of it to a more general case. This porism, expressed in modern language, asserts that *Given four straight lines of which three turn about the points in which they meet the fourth, if two of the points of intersection of these lines lie each on a fixed straight line, the remaining point of intersection will also lie on another straight line; or, If the sides of a triangle are made to turn each about one of the three fixed points in a straight line, and if two of the vertices are made to move on two fixed straight lines, taken arbitrarily, the third vertex describes a third straight line.*

The *Porisms* of Euclid are not the only representatives of this class of propositions. We know of a treatise of Diophantus which was entitled *Porisms*. But it is uncertain whether these lost *Porisms* formed part of the *Arithmetics* or were an independent treatise.

POROS, or PORO ("The Ford"), an island off the east coast of the Morea, separated at its western extremity by only a narrow channel from the mainland at Trœzen, and consisting of a mass of limestone rock and of a mass of trachyte connected by a slight sandy isthmus. Population, 6,000.

PORPHYRY, a name originally applied to a reddish or purple rock found in Upper Egypt, principally at Jebel Dokhan, and much used by the ancients as a decorative stone. This porphyry, the *porfido rosso antico* of Italian antiquaries, consists of a dark crimson or chocolate-colored felsitic base, with disseminated crystals of white feldspar, probably oligoclase. It was a favorite material with Roman sculptors under the lower empire, and notwithstanding its excessive hardness was worked into large sarcophagi and other objects, ornamented in some cases in elaborate relief. This porphyry was also ingeniously used for the lower part of the busts of Roman emperors, the head being executed in another material, while the porphyry was used for the drapery, the color of the stone suggesting that of the imperial purple. The antique red porphyry is often confounded with the *rosso antico*, which being merely a red marble, is a much softer stone.

PORPHYRY, a philosopher and pupil of Plotinus, was born in the year 205 A. D. in Egypt and died in Lower Italy in 270 A. D. He wrote on NEO-PLATONISM (*q. v.*).

PORPOISE (sometimes spelled PORPUS and PORPESSE). "Porpoise" is commonly used by sailors to designate all the smaller cetaceans, especially those numerous species which naturalists call "dolphins;" but in scientific language it is restricted to a particular form constituting the genus *Phocæna* of Cuvier, of which the Common Porpoise of the British seas *Phocæna communis*, Cuvier (*Delphinus phocæna*, Linnaeus), is the type.

The common porpoise, when full grown, attains a length of five feet or a little more.

The porpoise is sociable and gregarious in its habits, being usually seen in small herds, and frequents coasts, bays, and estuaries rather than the open ocean. It is the commonest cetacean in the seas around the British Isles, and not infrequently ascends the river Thames, having been seen as high up as Richmond; it has also been observed in the Seine at Neuilly, near Paris. It frequents the Scandinavian coasts, entering the Baltic in the summer; and it is found as far north as Baffin's

Bay, and as far west as the coasts of the United States. Southward its range is more limited than that of the common dolphin, as, though very common on the Atlantic coasts of France, it is not known to enter the Mediterranean.

PORPORA, NICCOLA (or NICCOLO) ANTONIO, operatic composer and teacher of singing, was born in Naples on August 19, 1686, and died in 1767.

PORSENA or PORSENNIA, king of Clusium. See ETRURIA and ROME.

PORSON, RICHARD, in some respects the greatest of modern Greek scholars, was born on Christmas Day, 1759, at East Ruston, near North Walsham, in Norfolk, England, and died in 1808. In 1792 the Greek professorship at Cambridge became vacant by the resignation of Mr. Cooke. To this Porson was elected without opposition, and he continued to hold it till his death. He was a voluminous author, and his works are standards of their class.

PORTA, BACCIO DELLA. See BACCIO DELLA PORTA.

PORTA, GIAMBATTISTA DELLA, natural philosopher, was born of a noble and ancient family at Naples about the year 1543, and died in 1615.

PORTADOWN, a market-town of Armagh, Ireland, is situated on the river Bann, and on the Great Northern Railway, twenty-five miles west-southwest of Belfast and ten north-northeast of Armagh. The Bann, which is connected with the Newry Canal and falls into Lough Neagh about five miles north of the town, is navigable for vessels of ninety tons burden. Population (1890), 8,000.

PORTAGE CITY, the county seat of Columbia county, Wis., is situated on the Wisconsin river at the head of navigation and on the ship canal which connects the Wisconsin and Fox rivers. It is located on the Wisconsin Central, and is the junction of the several branches of the Chicago, Milwaukee and St. Paul railroads, which cross the State from this point in several directions. It is the center of a rich agricultural country, also in close proximity to some of the most romantic scenery to be found in Wisconsin. The city was called Winnebago Portage in early days, and the communication by steamboat with Green Bay, established about that period, has since been maintained. Portage contains a court house and county buildings, nine churches, complete school facilities, two banks, three papers, two elevators, and, besides the Portage iron works, has manufactories of sash and blinds, furniture, clothing and other industrial enterprises. It is 104 miles east-northeast of La Crosse, 47 miles west-northwest of Watertown, and 30 miles north of Madison, and has at present (1890) a population of 5,130.

PORTALIS, JEAN ÉTIENNE MARIE, French jurist and the principal author of the *Code Civil*, which as the *Code Napoléon* has been declared the greatest monument of the reign of the emperor, came of a bourgeois family, and was born at Bausset in Provence on April 1, 1745. Bonaparte knew his value, and made him a conseiller d'état in 1800, and then charged him, with Tronchet, Biggot de Prémeneu, and Jacques de Malville, to draw up the *Code Civil*. Of this commission he was the most industrious member, and many of the most important titles, notably those on marriage and heirship, are his work. In 1801 he was placed in charge of the department of cultes, or public worship, and in that capacity had the chief share in drawing up the provisions of the Concordat. In 1803 he became a member of the Institute, in 1804 minister of public worship, and in 1805 a knight grand cross of the Legion of Honor. He soon after became totally blind; and after undergoing an unsuccessful operation he died at Paris on August 23, 1807.

**PORT AU PRINCE** (originally L'HÔPITAL, and for brief periods PORT HENRI and PORT RÉPUBLICAIN), the capital of the republic of Hayti (western portion of the island HAYTI, *q.v.*), lies in 18° 34' N. latitude and 72° 20' W. longitude at the apex of the vast triangular bay which strikes inland for about 100 miles between the two great peninsulas of the west coast, and has its upper recesses protected by the beautiful island of Gonaives (thirty miles long by two broad). The city is admirably situated on ground that soon begins to rise rapidly toward the hills; and it was originally laid out by the French on a regular plan with streets of good width running north and south and intersected by others at right angles. Everything has been allowed to fall into disorder and disrepair, and to this its public buildings—a state-house, a national bank, a hospital, a lyceum, a custom-house, etc.—form no exception. The national palace remains as the flames of revolution left it in 1869, and the president lives in an ordinary house. The principal church is an “overgrown wooden shed.” Every few years whole quarters of the town are burned down, but the people go on building the same slight wooden houses, with only here and there a more substantial warehouse in brick. The state of the streets is deplorable in the extreme, and, in spite of the old French aqueduct, the water-supply is defective; while the harbor is rapidly being filled by fetid deposits. From June to September the heat is excessive, reaching 95° to 99° in the shade. The population, mostly negroes and mulattoes, is estimated at 20,000. Port au Prince was first laid out by M. de la Cuza in 1749. In 1751 and again in 1770 it was destroyed by earthquakes. During the late revolution the city was the scene of some of the operations of the opposing factions.

**PORT ELIZABETH**, a seaport town of Cape Colony, at the head of an electoral division of the southeastern province, lies in 33° 55' S. latitude on Algoa Bay, about seven miles south of the mouth of the Zwartkop river. Population (1890), 15,000.

**PORTER, JANE**, a novelist whose life and reputation are closely linked with those of her sister ANNA MARIA PORTER (1780–1832) and her brother Sir ROBERT KER PORTER (1775–1842) was born in 1776. The ability of Anna Maria Porter was the first to manifest itself in the premature publication of her *Artless Tales* (1793–95), these being followed by a long series of works. Jane Porter, whose intellectual power, though slower in development and in expression, was of a stronger nature than that of her sister, had in the meantime gained an immediate and wide popularity by her first work, *Thaddeus of Warsaw* (1803), which was translated into several languages and procured her election as canoness of the Teutonic order of St. Joachim. Seven years later her *Scottish Chiefs* anticipated in some measure the works of Sir Walter Scott in the field of national romance, though it is wanting in the higher qualities of the historic novel.

While his sisters had been winning esteem in literature, Robert Kerr Porter had in his own way been scarcely less successful. After two years of study at the Royal Academy he had gained reputation as a painter of altar-pieces and battle scenes of imposing magnitude. He went to Russia as historical painter to the emperor in 1804, accompanied Sir John Moore's expedition in 1808, married the princess Mary de Sherbatoff in 1811, was created knight commander of the order of Hanover in 1832, and became British consul at Venezuela. Accounts of his wanderings are to be found in his *Travelling Sketches in Russia and Sweden* (1808), *Letters from Portugal and Spain* (1809), *Narrative of the late Campaign in Russia* (1813), and *Travels in Georgia, Persia, Armenia, Ancient Babylonia, etc., during the years 1817–20* (1821–22). After

leaving Venezuela he again visited St. Petersburg, but died there suddenly on May 4, 1842. Jane Porter, who had joined him in Russia, then returned to England and took up her residence with her eldest brother at Bristol, where she died May 24, 1850.

**PORT GLASGOW**, a seaport, market-town, burgh of barony, and parliamentary burgh of Renfrewshire, Scotland, is situated on the south side of the Clyde, two and one-half miles east of Greenock and twenty west of Glasgow. Population (1890), 12,000.

**PORT HOPE**, a town and port of entry of Canada, in Durham county, Ontario, on the north shore of Lake Ontario, lies sixty-three miles northeast of Toronto by the Grand Trunk Railway (which is there met by the Midland branch of the Grand Trunk Railway), and is connected with Charlotte, the port of Rochester, N. Y., by a daily steamboat service. The town is picturesquely situated on the side and foot of hills overlooking the lake; and Smith's Creek, by which it is traversed, supplies abundant water-power. Flour, plaster, woolen goods, leather, beer, carriages, agricultural implements, and steam-engines and boilers are among the products of the local industries, and trade is carried on in lumber, grain, and flour. The population in 1890 was 6,000.

**PORT HURON**, a city and port of entry of the United States, county seat of St. Clair county, Mich., lies fifty-eight miles by rail northeast of Detroit, at the southern extremity of Lake Huron and on the west bank of the St. Clair river, which is there joined by the Black river. Port Huron is a point of great importance in the railway system, being the terminus of the Chicago and Grand Trunk and the Port Huron and North-Western Railways (lines to East Saginaw, Sand Beach, Almont, and Port Austin), and connected by ferry to Sarnia with the Great Western of Canada and the Grand Trunk Railways. It is also the terminus and a stopping-place of several lines of lake steamers. It has a large lumber trade, ship-yards, dry docks, saw-mills, flour-mills, planing-mills. The population was 5,973 in 1870, 8,883 in 1880, and 13,543 in 1890. Commenced in 1819, Port Huron was incorporated as a village in 1835, and as a city in 1857.

**PORTICI**, a town of Italy five miles south of Naples, on the shores of the bay and at the foot of Vesuvius, a little to the north of the site of Herculaneum. Population (1889), 11,000.

**PORT JERVIS**, a large village of the United States, in Deerpark township, Orange county, N. Y., situated at the intersection of the boundaries of New Jersey, New York, and Pennsylvania, at the junction of the Neversink with the Delaware. It is the terminus of the eastern division of the New York, Lake Erie and Western Railroad, and it has extensive repair-shops. The beauty of the surrounding scenery attracts summer visitors. Port Jervis was named after John B. Jervis, engineer of the Delaware and Hudson Canal, which connects the Pennsylvanian coal-fields with the tidal waters of the Hudson. In 1875 the Erie Railway bridge, the Barrett bridge, and many buildings were carried away by an icegorge. The population of the village was 6,377 in 1870, and 9,327 in 1890 (township, 11,420).

**PORTLAND**, a city and port of entry of the United States, capital of Cumberland county, Me., lies on Casco Bay, in 43° 39' N. latitude and 70° 13' W. longitude. By rail it is 108 miles north-northeast of Boston and 297 southeast of Montreal. The peninsula on which it is mainly built runs out for about 3 miles, has a breadth of about  $\frac{3}{4}$  mile, and rises in the west to 175 feet in Bramhall's Hill and in the east to 161 in Munjoy's Hill, which is crowned by an observatory. As

seen from the harbor, the whole city has a pleasant and picturesque appearance, and the streets are in many parts so umbrageous with trees that Portland has obtained the sobriquet of the *Forest City*. A large number of the houses are built of brick. Congress street, the principal thoroughfare, runs along the whole ridge of the peninsula, from the western promenade, which looks down over the suburbs from Bramhall's Hill to the eastern promenade, which commands the bay; it passes Lincoln Park (two and one-half acres) and the eastern cemetery, which contains the graves of Commodore Preble and Captains Burroughs and Blythe, of Revolutionary fame. On Bramhall's Hill is the reservoir (12,000,000 gallons) of the water company, which was established in 1867 to supply the city from Lake Sebago, whose beautiful expanse (fourteen miles long by eleven wide) was the favorite haunt of Nathaniel Hawthorne's boyhood. The more conspicuous buildings of Portland are the city hall (1859), with a front in olive-colored freestone, 150 feet long; the post-office (1872), constructed of Vermont white marble in the mediæval Italian style; the custom-house (1872), in granite, with rich marble ornamentation in the interior; the marine hospital (1855), a large brick erection; the Maine general hospital, 1868; the Roman Catholic cathedral; the Roman Catholic episcopal palace; and several fine churches. The Portland Society of Natural History, established in 1843 and incorporated in 1850, though it has twice lost its property by fire (1854 and 1866), has again acquired very valuable collections. The Portland institute and public library, dating from 1867, had 33,000 volumes in 1890. A medical school was founded in 1858. Portland is in the main a commercial city, with an extensive transit trade, drawing largely from Canada and the Far West. Connected with Boston by rail in 1842, and with Montreal in 1853, it has now become a terminus of six different railroads; and, since the gauge of the Grand Trunk Railroad was altered, it can import direct from San Francisco. As the harbor (which lies along the south side of the city) is seldom closed by ice, it has been long used as the winter port for the great ocean steamers between Great Britain (Liverpool and Glasgow) and Canada, which in summer ascend the St. Lawrence to Montreal and Quebec. At low water vessels drawing twenty-two feet and at high water vessels drawing thirty feet can come up to the wharves with safety in any season; and there is secure anchorage within a mile of the shore. The dry dock is one of the deepest in the United States.

	Imports.	Exports.
Average 1876-80.....	\$9,368,044	\$11,044,389
1881.....	11,078,612	12,476,389
1882.....	11,748,183	11,955,787
1883.....	10,235,991	13,847,574

Among the staple imports are wood, coal, potatoes (from Europe), salt, sugar and molasses, fish, earthenware, and textile manufactures; and among the staple exports to foreign countries fresh and preserved provisions of all kinds, grain, hay, cattle, wood, copper ore, tallow, shoes, potash, cotton, lumber (mainly to South America), and ice. Fish-curing (cod, mackerel, and sardines), preserving meat, Indian corn, and other kinds of provisions, boot and shoe-making, furniture-making, carriage-building, machinery-making, engine-building, and sugar-refining are all prosecuted on a considerable scale for the size of the town; and a large number of minor industries are also represented. In 1880 the capital invested in manufacturing was \$4,659,375, the value of the annual production \$9,569,523, and

the amount of wages paid \$1,547,375. Portland is divided into seven wards, and is governed by a mayor, a board of aldermen, and a common council. It is the seat of the sessions of the United States Courts for the District of Maine. The population of the city, in 1890, was 36,425. Its financial condition may be seen from the following figures:

Bonded debt, \$1,466,500; total debt, \$3,087,500; total valuation of property, \$34,072,405; tax rate, \$20.20 per \$1,000.

School population, 11,989; number of school buildings, 18; 1 high-school, 7 grammar schools, 15 primary schools, 1 school for deaf; 161 teachers; total enrollment, 6,211; cost of maintenance of schools, \$101,482.18 yearly.

Police force consists of 39 men, at a yearly cost of \$37,700.

Fire department apparatus consists of 5 steamers and hose, 3 hook and ladder companies, 2 fire-boats, 1 hose company, 15 horses, and is maintained at a cost of \$37,150.

Public library contains 33,000 books, and 150,000 pamphlets.

The city charities are the almshouse, Greely Hospital, insane hospital, out-door relief, reform school, and city farm; expenditure yearly, \$23,700.

The city has water-works, and is lighted by gas and electric light.

The name of Portland, as applied to this city, dates only from 1786; the Indians knew the place as Machigonne. The first European settlers (1632) called it Casco Neck, and after it passed to Massachusetts, in 1658, it was denominated Falmouth. During the rest of the seventeenth century and the early days of the eighteenth hostilities on the part of the French and the Indians prevented the growth of the town, which, by 1764, however, had increased to about 2,000 inhabitants. In 1775 it was bombarded by four British vessels, under Captain Mowatt, but it was rebuilt in 1783, and formally incorporated in 1786. A city charter was obtained in 1832. The great fire of 1866 swept over a third of the city, and caused a loss of from \$6,000,000 to \$10,000,000. Portland is the birthplace of Henry W. Longfellow, N. P. Willis, Sara P. Parton ("Fanny Fern"), Erastus and James Brooks, Commodore Preble, John Neal, and Neal Dow.

PORTLAND, a city of the United States, the second in importance and population on the Pacific coast, is also a port of entry and the capital of Multnomah county, Ore. It is located on the west bank of the Willamette river, twelve miles from its mouth, 100 miles from the ocean, 640 miles north of San Francisco, and 55 miles east of Salem. It is at the headwaters of ship navigation, the northern terminus of the Oregon and California railroad, the Pacific Coast terminus of the Union Pacific, and the headquarters of the Portland and Willamette Valley road, a narrow gauge system with upward of 200 miles in the Willamette Valley. Portland being also the center of interior water-transportation in the northwest, possesses facilities enabling shippers and travelers to reach every portion of the country for miles in nearly every direction. Up to the year 1883, the growth of the city was slow. From that year until 1886 the population was doubled. In 1887 the increase was 8,000; in 1888 over 10,000; in 1889, 15,000; and in 1890 the increase was estimated at 25,000. It has upward of seventy miles of paved streets, forty miles of sewer, forty miles of street-car lines, is lighted by gas and electricity, maintains a system of water supply, with a capacity of 9,000,000 gallons daily, supports an educational system embracing high-school, grammar school, intermediate and primary departments,

a fire and police force adequate to the needs of the service, and banking, commercial, and manufacturing facilities equal to the largest requirements. It contains a courthouse and the usual complement of county buildings, a customhouse, one high-school, five grammar schools, a number of graded schools, fourteen churches, fourteen banks, with a paid-up capital and surplus of \$8,868,750, over 100 jobbing houses with a total capital of \$65,000,000, and stores and smaller enterprises in proportion. The lines of manufacture embrace foundries and machine-shops, engine and boilerworks, flour, lumber, and planing-mills, breweries, carriage, leather, clothing, brush, furniture factories, etc., which gave employment in 1889 to 7,268 men, and turned out stock valued at more than \$20,000,000, based on actual returns. There are four daily and thirteen weekly papers published in the city, in addition to three periodicals issued monthly. The population in 1890 was 46,385.

PORTLAND, ISLE OF, a small island or peninsula of England, in the English Channel, four and one-half miles south of Weymouth, Dorsetshire, connected with the mainland by a long narrow ridge of shingle called the Chesil Bank. Population (1889), 12,000.

PORTLAND, WILLIAM BENTINCK, FIRST EARL OF, was descended from an ancient and noble family of Guelderland, and became page of honor to William, prince of Orange, from which he was advanced to be gentleman of the bedchamber. On April 9, 1689, he was created Baron Cirencester, Viscount Woodstock, and earl of Portland. With the rank of lieutenant-general he distinguished himself in command of the Dutch cavalry at the battle of the Boyne in 1690, and he was also present at the battle of Landen in 1693, and at the siege of Namur in 1695. Along with marshal de Boufflers he prepared the terms of the peace of Ryswick in 1697, and shortly afterward was appointed ambassador-extraordinary to Paris. For receiving grants of land in Ireland, and for his share in the partition treaty, he was impeached by parliament, but the prosecution did not succeed. He died November 23, 1709, and was buried in Westminster Abbey.

PORTLAND, WILLIAM HENRY CAVENDISH BENTINCK, THIRD DUKE OF, prime minister of England, was the grandson of Henry, second earl and first duke of Portland, who was son of William, first earl. He was born April 14, 1738, and was educated at Oxford university, where he graduated M.A. in 1757. He held the premiership from April 5, 1783, until the defeat of the bill for "the just and efficient government of British India" caused his dismissal from office on December 17th. In 1792 he succeeded the earl of Guildford as chancellor of the university of Oxford. Under Pitt he was, from 1794 to 1801, secretary of state for the home department, after which he was, from 1801 to 1805, president of the council. In 1807 he was appointed a second time first lord of the treasury. Ill-health caused him to resign in September, 1809, and he died October 30th following.

PORTLAND CEMENT. See BUILDING.

PORTLAND VASE. A magnificent work of art, now in the National Gallery of London.

PORT LOUIS. See MAURITIUS.

PORT LYTTTELTON, a municipal borough of New Zealand, formerly called Port Cooper and Port Victoria, lies on the northwest side of Banks Peninsula, on the east coast of South Island. Population 10,000.

PORT MAHON, or MAHON, a city and seaport in the Mediterranean, on the east coast of the Spanish island of Minorca (see BALEARIC ISLANDS), lies on a height near the head of an inlet of the sea three and one-half miles long by from 400 to 1,200 yards wide.

which, though of less importance than formerly, is still an admirable harbor of refuge. Population, 18,000.

PORTO ALEGRE, a city and seaport of Brazil, the capital of the province of Rio Grande do Sul, lies in  $30^{\circ} 2'$  S. latitude and  $51^{\circ} 12'$  W. longitude at the northern extremity of the Lagõa dos Patos (Duck Lagoon), where it receives the waters of the Jacuhi, Sino, Cahi, and Gravatahi, whose confluence opposite the city is sometimes distinguished by the name of Lagõa Viamão. Like the other towns on this lagoon, Rio Grande do Sul and Peletos, Porto Alegre is the seat of a very considerable trade, but it is impossible to say precisely what share belongs to each of the three. (See RIO GRANDE DO SUL.) The population is about 25,000.

PORTO BELLO (Span., *Puerto Bello*), a town in the republic of Colombia and state of Panamá, situated on the coast of the Caribbean Sea, about twenty-three miles east of Colon in  $9^{\circ} 32'$  N. latitude and  $78^{\circ} 38'$  W. longitude. As the name (bestowed by Columbus in 1502) implies, it possesses a fine natural harbor, the bay between Drake's Point in the north and Buenaventura Island in the south being easy of entrance and having a depth of eight to sixteen fathoms. Founded in 1584, the city rapidly grew in importance, becoming the great depot for the gold and silver from Peru, which were brought across the isthmus from Panamá, and here conveyed on board the royal galleons. From the last years of the previous century the town has steadily declined till at present it is almost entirely extinct.

PORTOBELLO, a municipal burgh of Scotland, in the county of Midlothian, lies on slightly sloping ground on the south shore of the Firth of Forth, three miles by rail east of Edinburgh. Population (1890) 7,500.

PORT OF SPAIN. See TRINIDAD.

PORTO MAURIZIO, a city of Italy, chief town of a province and center of a maritime district, lies on the coast of the Ligurian Sea, forty-six miles by rail east of Nice, and seventy miles west of Genoa, and consists of a picturesque old town situated on the heights, and a modern town of villas on the lower slopes. Population, 7,000.

PORTO RICO (Span., *Puerto Rico*), one of the Spanish West India Islands, lies seventy miles east of Hayti, between  $17^{\circ} 50'$  and  $18^{\circ} 30'$  N. latitude and  $65^{\circ} 35'$  and  $67^{\circ} 10'$  W. longitude. It forms an irregular parallelogram, 108 miles long and 37 broad, and has an area of 3,530 square miles, or rather less than that of Jamaica. From east to west it is traversed by a range of hills so situated that the streams flowing northward are much longer than those flowing south. The highest district, however, and the highest peak—El Yunque (3,600 feet)—are situated in the Sierra de Loquillo, near the northeast corner. As the hills intercept the northeast trade-winds with their rain-clouds, there is sometimes almost a superabundance of moisture in the northern lowlands, while in the south severe droughts occur, and the land demands artificial irrigation, as yet carried out with too little coöperation and system. The island is, however, exceptionally well watered, 1,300 streams being enumerated, of which forty-seven are considerable rivers; and its general appearance is very beautiful. Forests still cover all the higher parts of the hills, and differ from those of the other West Indian Islands, mainly in the comparative absence of epiphytes. Among the noteworthy trees, Baron Eggers (see *Nature*, December 6, 1883,) mentions the *Coccoloba macrophylla*, or "ortegon" of the natives, which forms extensive woods in some places, chiefly near the coast, and is conspicuous by its immense yard-long purple spikes; a beautiful *Talauma*, with white, odorous flowers, and yielding a timber called "sabino"; an unknown tree with purple flowers like those of *Scavola Plumieri*;

a large *Heliconia*; and several tree-ferns (*Cyathea Serra*, and an *Alsophila*). Besides the two staples—sugar and coffee—tobacco, cotton, rice, maize, *Caladium esculentum*, yams, and plantains, as well as oranges, coconuts, and other tropical fruits, are commonly cultivated. The rice, which is the principal food of the laborers, is a mountain variety grown without flooding. On the lowland pastures, covered mainly with *Hymenachne striatum*, large herds of excellent cattle are reared to supply butcher-meat for St. Thomas, the French islands, etc. In general, Porto Rico may be described as extremely fertile; and its exports more than double in value those of Jamaica. The great want of the island is still roads and bridges, though the government has done good work in this department in recent years; the journey across the hills can only be performed on horseback, and even along the coast-route wheeled traffic is at times interrupted. Gold, iron, copper, coal, and salt are all found in Porto Rico, but the last alone is worked.

The total population of Porto Rico was not more than 319,000 in 1830; by 1860 it reached 583,308; and by 1888, 813,937. The chief towns are St. John's the capital, Mayaguery (population 27,000), and Ponce (population 140,000).

PORT ROYAL, a town and naval station of Jamaica, occupies the outer end of a narrow strip of land called the "Palisades," which, projecting westward for about nine miles, forms the natural breakwater of the noble bay on which Kingston, the present capital of the island, is built. As a town Port Royal (though in the seventeenth century it was reputed the finest in the West Indies) is now a wretched place of 1,205 inhabitants (1881), with narrow and extremely dirty streets, and contains no buildings of note except a hospital (200 patients) and the spacious admiralty house, which is surrounded by beautiful gardens; but as a naval station it is still of very considerable importance, has well-equipped machine-shops, and is defended by a number of forts and batteries partly of quite modern erection.

PORT ROYAL, a celebrated Cistercian abbey, occupied a low and marshy site in the thickly-wooded valley of the Yvette, at what is known as Les Hameaux near Marly, about eight miles to the southwest of Versailles. It was founded in 1204 by Mathilde de Garlande, wife of Matthieu de Montmorenci-Marli, during his absence on the fourth crusade, and in its early years it received a variety of papal privileges, including (1223) that of affording a retreat to lay persons who desired to withdraw from the world for a season without binding themselves by permanent vows.

PORT SAID, a town and seaport of Lower Egypt, which owes its existence to the Suez Canal (1859-69), and was named after Sa'id Pasha, patron of the enterprise. It lies on the west side of the canal, on the low, narrow, treeless, and desolate strip of land which separates the Mediterranean from Lake Menzaleh; the supply of fresh water brought from the sweet-water canal at Ismailia by a conduit is barely sufficient for the wants of the town, which is regularly laid out, and has some streets of substantial houses. The population rose to 17,000 in 1890.

PORT ST. MARY. See PUERTO DE SANTA MARIA.

PORT TOWNSEND is an enterprising and growing town in the recently admitted State created out of Washington territory. It is available located on Puget Sound, seventy-four miles north of Olympia, forty-four miles northwest of Seattle, and within a short distance of the straits of Juan de Fuca. Within the past three years, or since the completion of the railway lines in the northwest, Port Townsend has grown rapidly in

prominence, and promises to become at an early day a city conspicuous as a trade center and shipping point. It contains several churches, school-houses, and banks, a large number of stores and manufacturing enterprises, the latter including machine shops, sash factories, wagon works, saw and grist mills, foundries, etc., and half a dozen hotels. The population, 593 in 1870, increased to 1,000 in 1880, and to 4,498 in 1890.

PORTSMOUTH, a municipal and parliamentary borough, seaport, and naval station of Hampshire, England, consists of an aggregate of towns situated in the southwestern corner of Portsea Island, opposite the Isle of Wight, eighteen miles south-by-east of Southampton and seventy-four southwest of London by the London and South-Western Railway. The original town is not now nearly so populous as the suburbs comprised in the general name of Portsea (including Portsea proper) on the north and west, Landport on the north, and Southsea on the east. Portsmouth proper is the barrack and garrison town; at Portsea is situated the great naval dockyard; Landport is occupied chiefly by the houses of artisans; and Southsea, as possessing facilities for bathing, is resided in by the wealthier classes. Population (1891) 159,255.

The port of Portsmouth extends eastward nine miles to Emsworth, and westward five miles to Hill Head at the entrance to Southampton Water. About three miles to the south of the harbor is the well-known anchorage of Spithead, protected by the Isle of Wight. The harbor, one of the best in the kingdom, stretches four miles inward to the northwest of the town with an entrance 220 yards in breadth, permitting access to vessels of the largest tonnage at low tide. There is an anchorage within the basin at low tide of 380 acres, and a portion of the harbor is permanently occupied by dismantled vessels and the reserved fleet of the navy. There is a graving-dock built by the corporation, with eighteen feet of water on the blocks, and a patent slip. Extending along the eastern shore are the ordnance gun wharf between Portsmouth and Portsea and to the north of it the great naval Government dockyard, which has lately been much enlarged. At Gosport are the royal Clarence victualing yard and the Haslar hospital. Portsmouth has a considerable trade in coal, timber, fruits, and agricultural produce.

PORTSMOUTH, a city and port of entry of the United States, one of the two county towns of Rockingham county, N. H., and alternately with Concord the seat of the sessions of the United States courts for the district of New Hampshire, lies on a peninsula on the right bank of the Piscataqua, three miles from its mouth, in 43° 4' N. latitude and 70° 45' W. longitude. By rail it is fifty-seven miles north-northeast of Boston. Quiet and old-fashioned beyond most of the New England cities, with shaded streets and many quaint antique houses, survivals from colonial times, Portsmouth is a favorite summer resort. Notwithstanding the excellence of its harbor—which is from thirty-five to seventy-five feet deep, safe, free from ice at all seasons, and capable of containing 2,000 vessels—it has very little foreign trade. There are cotton mills (Kearsarge), breweries, boot and shoe factories, and some other industrial establishments in the city; and shipbuilding, which is the principal industry, has long been extensively prosecuted. The United States navy yard, though situated on Continental or Navy Island, on the north side of the river, in the township of Kittery (Maine), is generally known as Portsmouth yard. It contains a fine Balance dry dock, 350 feet by 105. Among the more conspicuous buildings in Portsmouth are the old church of St. John, the athenæum (23,000 volumes), and the custom-house. There is a

public library of 12,000 volumes. At Little Harbor, two miles distant, is Governor Wentworth's mansion, dating from 1750. The entrance to the harbor is defended by earthworks at Jaffrey's Point and Gerrish's Island. The population was 9,738 in 1850, 9,211 in 1870, and 9,827 in 1890.

PORTSMOUTH, a city of the United States, capital of Scioto county, Ohio, lies at the confluence of the Scioto with the Ohio, and is the southern terminus of the Ohio and Erie Canal, and of a branch line of the Cincinnati, Washington, and Baltimore Railroad (Hamden to Portsmouth, fifty-six miles), as well as an important station on the Scioto Valley Railway. As the entrepôt for the rich mineral regions of southern Ohio and northeastern Kentucky, and for the productive valley of the Scioto, Portsmouth has a large and growing trade both by rail and by river; and it also contains iron-furnaces, rolling-mills, shoe-factories, hub and spoke factories, etc. Among the public buildings are an opera-house and a masonic temple. The charitable institutions include a hospital, a children's home, and a home for destitute aged women. The city has also two libraries, water-works, and tramways. The population was 6,268 in 1860, 10,592 in 1870, and 12,394 in 1890. Portsmouth was laid out in 1803, and the charter of the city dates from 1814.

PORTSMOUTH, a city of the United States, capital of Norfolk county, Va., lies on the west bank of Elizabeth river, opposite Norfolk. It is the eastern terminus of the Seaboard and Roanoke Railway (part of a great passenger route between Boston and New Orleans), has one of the best harbors on the Atlantic coast, is the seat of the United States Gosport navy yard (with a dry dock built of granite at a cost of \$974,536, and a large naval hospital), and exports cotton, lumber, pig-iron, and early vegetables. The population was 9,496 in 1860, 11,390 in 1880, and 13,268 in 1890. Portsmouth was founded in 1752. On April 20, 1861, the navy yard—then employing 1,000 men—was destroyed by fire, the loss being estimated at several million dollars.

PORTUGAL. *Geography and Statistics.*—The kingdom of Portugal, which is geographically a province of the Iberian Peninsula on its west coast, is bounded on the north by the Spanish province of Galicia, on the east by the Spanish provinces of Leon, Estremadura, and Andalusia, and on the south and west by the Atlantic Ocean. It lies between 36° 56' and 42° 10' north latitude and 6° 15' and 9° 30' west longitude. It is 362 miles in length by 140 in breadth, and contained by the latest (1878) computation 34,419½ square miles. Its coast-line is nearly 500 miles in length, and only one province, Tras-os-Montes, is not washed by the sea.

The mountain-systems of Portugal can only be adequately treated under SPAIN, as they are in every instance continuous to the west or southwest of the great Spanish ranges.

The river system of Portugal is also merely a portion of that of Spain.

The climate of Portugal is particularly equable and temperate, and its salubrious qualities were recognized by the doctors of the eighteenth century, who used to send many patients to winter there; and, though Portugal has been superseded as a winter resort by the Riviera and Algiers, there are signs that it may again become a European health-resort of the first importance.

The geology, flora, and fauna of Portugal are essentially the same as those of Spain, and will be studied under SPAIN.

*Population.*—The population of Portugal, according

to the census of January 1, 1878, was 4,160,315, and in 1881 it was calculated to be 4,306,554, or 125 persons to the square mile.

The ethnological composition of the population is most mixed: in the two northern provinces the population is essentially Galician, but farther south the mixture becomes obvious; not only did the conquering Portuguese largely intermarry with the Arabs, but in the places where they exterminated them they replaced them by colonies of crusaders of all nations, chiefly French, English, Dutch, and Frisian, who have left their mark on the features and character of the nation, and they also largely intermarried with the Jews. No Jews were so wealthy or so cultivated as those of Portugal, who, though for many centuries keeping strictly apart from the Christians, yet after their forced conversion or expulsion by King Emmanuel largely intermarried, especially with the people of Lisbon. Farther south an African physiognomy appears, derived from the thousands of negro slaves imported to till the Alentejo and Algarves, from the days of Dom Henry till the decline of the Portuguese power.

*Commerce.*—The commerce of Portugal has not rapidly, though it has steadily, increased during the last thirty years; the chief countries with which it trades are, in order of value, England and her colonies, Brazil, the United States, France, and Spain, but it is hardly fair to mention commerce with Spain, because the large amount of smuggling which takes place makes it impossible to estimate the real amount of trade between the two countries.

*Agriculture.*—The state of agriculture in Portugal is still deplorable; the wealth and energy of the country have been thrown into the wine trade, and the production and cultivation of cereals have been so much neglected that, in spite of its being eminently adapted for such cultivation, nearly all its cereals are imported from the United States, to the annual value of over \$5,000,000. The wine production, on which Portugal has so long depended, was the work of the Methuen treaty of 1703, for it was not until after that treaty that the barren rocks of the Alto Douro were covered with vines. But now, though the returns show slight alteration, there must soon be a great change. The phylloxera has utterly destroyed thousands of vineyards in Entre Minho e Douro and in Beiria.

*Manufactures.*—Nothing proves more decidedly the agricultural character of the Portuguese than the repeated failures to establish manufactures among them. This has often been ascribed to the provision respecting the importation of English goods in the Methuen treaty; but not all the efforts of Pombal or of the modern protectionist cabinets have been able to establish any important manufactures.

*Finance.*—The revenue of Portugal has for many years ceased to balance its expenditure, and the deficit has had to be met by borrowing, but it is only fair to remark that vigorous attempts have been made to reduce the expenditure of recent years. The national debt is now more than \$200 per head of population, or about \$870,000,000.

*Government.*—The government of Portugal is an hereditary and constitutional monarchy, exercised under the charter of 1826, as modified in 1852 and 1878, under which the king is charged with the executive and shares the power of making laws with two chambers. His civil list amounts to \$700,000 a year, and he is advised in all matters of administration and assisted in nominating peers by a council of state appointed for life, but depends for advice in legislative and executive matters on a cabinet of seven members selected from the chambers by a premier, summoned by the king. The

House of Peers consists of 150 members nominated by the king for life, and contains many of the most eminent professors and authors, as well as men of wealth, and additions may be made to its number by the king on the advice of the premier, with the consent of the council of state. All the members of the house of Peers do not possess titles, nor do all titled persons belong to the house of Peers; legislation and the titular and hereditary aristocracy are kept quite apart. The House of Deputies consists of 173 members, elected directly by all male citizens of twenty-five years of age, either paying in direct taxes \$1.10 a year, or deriving an annual income of \$5.50 from real estate, while all graduates, priests, officers, and certified teachers have votes without further qualification. The president of the chamber is selected by the king out of five elected candidates, and the deputies are paid. The Azores and Madeira elect members to the house at Lisbon. For administrative purposes Portugal is divided into seventeen districts, for judicial purposes into twenty-six districts or "comarcas," with appeal courts at Lisbon and Oporto, and a supreme court at Lisbon, and for military purposes into four divisions. The Roman Catholic is the state religion, but others are tolerated, and the power of the priests has been greatly checked by the wholesale suppression of monasteries in 1834. The church in Portugal is governed by a patriarch at Lisbon, two archbishops at Braga and Evora, and fourteen bishops, of whom the most important is the bishop of Oporto. For purposes of local government the districts are under the rule of civil governors, who have much the same powers as prefects in France, while in the 292 "concelhos," or administrative councils, there are elected councillors, and in the 3,960 "freguezias" or parishes the villagers elect a magistrate, who has the same powers as an English justice of the peace.

*Army and Navy.*—Under a decree dated May 19, 1884, the Portuguese army has been reorganized. The effective war strength is to be maintained at not less than 120,000 men. The term of service is for twelve years, of which three are to be with the colors, five in the first reserve, and four in the second reserve. The force is divided into thirty-six regiments of infantry, ten regiments of cavalry, four regiments, one brigade, and four companies of artillery, and one regiment of engineers. In 1889 its effective strength in time of peace was 33,231 men with 1,643 officers.

*Public Instruction.*—The public instruction of Portugal is regulated by the law of 1844, which enacted that all children should be bound to attend a primary school, if there was one within a mile, from the age of seven to fifteen, under penalty to the parents of a fine and deprivation of civil rights. Under this law there were in Portugal, in 1874, 2,649 primary schools with 122,004 pupils of both sexes. Secondary education is not neglected, and under the same law of 1844 seventeen lycées have been established in the seventeen continental districts, and from them it is possible for a pupil to enter either the university of Coimbra, which during the present century has recovered some of its ancient luster, or the special schools. These special schools are very ably conducted, and modern Portuguese policy gives, as we have seen, a higher status to teachers and professors of all grades than they obtain in most other countries.

*Public Works.*—On January 1, 1889, there were 1,245 miles of railway open (1,000) and in course of construction (245), also fifty miles of tramways were open, and 2,900 miles of telegraph were in operation, and every recent loan has been raised for the purpose of extending these important public works.

The history of Portugal really begins with the gift of the fief of the Terra Portucalensis or the county of Porto Cale to Count Henry of Burgundy in 1094. In common with the rest of the Peninsula, it was overrun by the Vandals, Alans, and Visigoths, and eventually conquered by the Arabs in the eighth century.

For two centuries Portugal remained subject to the Omayyad caliphs, and under their wise rule the old Roman colonizæ and municipia, such as Lisbon, Lamego, Viseu, and Oporto, maintained their Roman self-government and increased in wealth and importance. In 1055 Ferdinand the Great, king of Leon, Castile, and Galicia, invaded Beira; in 1057 he took Lamego and Viseu, and in 1064 Coimbra; and his son Garcia, who succeeded him as king of Galicia in 1065, maintained Nuno Mendes, count of Oporto, and Sesnando, a renegade Arab wazir, count of Coimbra, as feudal vassals of his court. In 1073 Alphonso VI., the second son of Ferdinand the Great, united once more his father's three kingdoms, and for a time rivaled his father's successes, until a fresh outburst of Mohammedan fanaticism ended in the rise of the Almoravide dynasty, and the defeat of the Christian king at Zalaca in 1086 by Yúsuf ibn Teshufin. To resist this revival of the Mohammedan power, Alphonso VI. summoned the chivalry of Christendom to his aid, and among the knights who came to his assistance were the Counts Raymond and Henry of Burgundy. In the days of his success Alphonso had compelled Motawakkil of Badajoz to cede to him both Lisbon and Santarem, but the fortune of war had changed, and Sir, the general of the Almoravide caliph Yúsuf, retook both cities. Alphonso felt the need of a valiant warrior on his Galician frontier, and in 1094 he combined the fiefs of Coimbra and Oporto into one great county and conferred it upon Henry of Burgundy with the hand of his illegitimate daughter Theresa, while to Raymond he gave Galicia and his legitimate daughter and heiress Urraca.

Count Henry of Burgundy, the first count of Portugal, was the second son of Henry, third son of Robert, first duke of Burgundy, and was in every way a typical knight of his country, a brave restless warrior, and a crusader; but when once firmly established in his county he thought much more about his chances of succeeding his father-in-law as king than of trying to carve a kingdom for himself out of the dominions of the Mohammedan caliphs. When, therefore, Alphonso VI. died in 1109 and left his thrones to his daughter Urraca, and nothing to Henry, the Burgundian at once invaded Leon. For five years the Christian princes, Henry of Burgundy, Alphonso Raimundes (the son of Count Raymond), Alphonso of Aragon, and Queen Urraca, fought together, while Sir was consolidating the Almoravide power, until Count Henry died suddenly at Astorga in 1112, leaving his wife Theresa to rule the county of Portugal during the minority of his infant son, Affonso Henriques.

Theresa, who ruled at Guimarãens during her son's minority, was a beautiful and accomplished woman, who devoted all her energies to building up Affonso's dominions into an independent state, and under her rule, while the Christian states of Spain were torn by civil wars, the Portuguese nobles were prevented from interfering, and began to recognize Portugal as their country, and to cease from calling themselves Galicians. Her regency was a stormy one in spite of all her efforts to maintain peace.

Affonso Henriques, who at the age of seventeen assumed the government, was one of the heroes of the Middle Ages; he succeeded to the rule of the county of Portugal when it was still regarded as a fief of Galicia, and after nearly sixty years' incessant fighting he



bequeathed to his son a powerful little kingdom, whose independence was unquestioned, and whose fame was spread abroad throughout Christendom by the reports of the victories of its first king over the Mohammedans. This triumph worthily closed the reign of the great crusader king, Affonso Henriques, who died on December 6, 1185.

The fame of Dom Sancho I., "the Povoador" or "City-builder," rests more on his internal administration than on his early exploits as a soldier.

The reign of Affonso II. "the Fat" is chiefly important in the constitutional history of Portugal, and for one memorable feat of arms, the recapture of Alcácer do Sal.

He was succeeded by Sancho II. who was only thirteen, and, as might have been expected during a minority, the turbulent nobility and intriguing bishops tried to undo the late king's labors to consolidate the royal power. He was deposed by the pope and was succeeded by his brother Affonso, who had led the revolt against him.

With such a commencement it might have been expected that the reign of Affonso III. would have been a period of civil war and internal dissension, or at least of complete submission to the church and the feudal nobility, but, on the contrary, it was from a constitutional point of view the most important of all the early reigns, and also that in which Portugal concluded its warfare with the Mohammedans and attained to its European limits. After a prosperous and successful reign Nemesis came upon Affonso in the rebellion of his eldest son Diniz in 1277; which continued until 1279, in which year the king died.

The period of war and of territorial extension in the Peninsula was now over, and the period of civilization was to dawn. Territorially and constitutionally Portugal was now an established kingdom; it remained for it to become civilized and thoroughly homogeneous before the great heroic period of exploration and Asiatic conquest should begin. No better man for such work than the new king, Dom Diniz, could have been found. At the end of this reign war broke out between the king and the heir-apparent, and a pitched battle was only prevented in 1323 by Queen Isabel riding between the armies and making a peace between her husband and her son which lasted until the death of the great peacemonarch, the Ré Lavrador, in 1325.

Affonso IV. pursued his father's policy of making family alliances with the kings of Aragon and Castile, and in 1328 married his daughter, Donna Maria, to Alphonso XI. of Castile, who neglected her, and for her sake Affonso IV. declared war against Castile. Peace was made through the intervention of St. Isabel in 1340, when Dom Pedro, son of Affonso, married Constance Manuel, daughter of the duke of Penafiel, and Affonso IV. himself promised to bring a strong Portuguese army to the help of Alphonso XI. against the emir of Morocco, Abú Hamen, who had crossed the straits to assist the sultan of Granada. The united Christian armies won a decisive victory at the river Salado, in which Affonso especially distinguished himself, and earned the title of "the Brave;" from that time he remained at peace with Castile, and further strengthened his position in Spain in 1347 by marrying his daughter, Donna Leonora, to Pedro IV. of Aragon. The later years of the reign of Affonso IV. were stained by the tragedy of Donna Ines de Castro.

The first act of Dom Pedro on ascending the throne in 1357 was to punish the murderers of Ines; and further, to show his love for her, he had her dead body disinterred and crowned, and afterward solemnly buried with the kings and queens of Portugal in the convent of

Alcobaça. The spirit of stern, revengeful justice which had marked the commencement of his reign continued to show itself in all matters of administration; he punished priest and noble with equal severity, and the people gave him the title of "Pedro the Severe."

The accession in 1367 of Ferdinand, the only son of Pedro by Constance, marks a crisis in the history of the Portuguese monarchy. On April 6, 1385 a cortes assembled at Coimbra, and declared the crown of Portugal to be elective, choosing, at the instance of the chancellor, Dom John to be king of Portugal. Portuguese discoveries made illustrious the closing years of the reign of King John, who died in 1433. He was succeeded by his son Edward.

Contrary to expectation, the reign of King Edward (so called after Edward III. of England) proved, in spite of his own great qualities, but short, and was marked by one signal disaster. He died in 1438.

The new king, Affonso V., was a minor, and his reign began with a struggle for the regency between his mother, Donna Leonora, and his uncle, Dom Pedro, duke of Coimbra. He was a weak, romantic king, and died in 1481.

His successor, John II., was a monarch of a very different type: though he had proved himself a brave and valiant soldier at the battle of Toro, he pursued the old policy of the house of Aviz, that of peace and family alliances with Castile and of commercial intimacy with England. A great sorrow darkened the later years of John II. in the death of his only son Alfonso, who in 1490 had married Isabella, eldest daughter of Ferdinand and Isabella of Spain; and he himself died in the flower of his age in 1495.

The reign of Emmanuel "the Fortunate" is the heroic period of Portuguese history. The reign of John III., who succeeded Emmanuel in 1521, is one of rapid decline. It was in India that the decline of the Portuguese was most perceptible. Nuno da Cunha, son of the discoverer Tristan da Cunha, governed the Indian settlements worthily till 1536, and then corruption undermined all prosperity until the arrival of Dom João de Castro in 1545. He was a Portuguese hero of the noblest type; and for three years the friend of St. Francis Xavier revived the glories of Albuquerque by winning the battle of Diu, and then died in the missionary's arms. Everything went afterward from bad to worse, till even observers like the Dutchman Cleynaerts saw that, in spite of all its wealth and seeming prosperity, the kingdom of Portugal was rotten at the core and could not last. King John III., satisfied with peace and the establishment of the Inquisition in his kingdom, did nothing to check the decline; and he endeavored to secure his aims by the marriage of his only surviving son John to his niece Joanna, a daughter of Charles V., but he had the misfortune to outlive his son, who died in 1554. When he himself died in 1557 he left the crown to his grandson, a child of three years old, the ill-fated Dom Sebastian.

Nothing could be more disastrous for Portugal than the succession of a minor at this juncture. The young king was smitten with the crusading fever, and himself was slain and his army cut to pieces at Alcácer Quibir. The sad news was brought to Lisbon by the admiral of the fleet, Dom Diogo de Sousa, and the cardinal Henry was proclaimed king of Portugal as King Henry I.

Hardly had the new king been crowned when intrigues began about his successor. He could not live long; but he determined not to examine the question himself, and so summoned a cortes at Lisbon at once to decide it. Philip II. of Spain was declared king at his death, and the kingdom was in organic union with Spain for sixty years.

At last a blow was struck against this supremacy of Spain in the revolution of 1640 and the elevation of the house of Braganza to the throne of Portugal. The whole of Portugal at once rose and expelled the Spaniards, and on January 19th a full cortes met at Lisbon, which recognized King John as king of Portugal, and his son Theodosius as heir-apparent. John IV. died in 1656.

As the prince of Brazil, Dom Theodosio, the eldest son of the late king, had predeceased him, his second son Affonso, a boy of thirteen, succeeded to the throne as Affonso VI. under the regency of his mother. He was dethroned by his brother, who also took from him his queen:

As long as Affonso VI. lived, Dom Pedro's power was not thoroughly established, but in 1683 he was proclaimed king as Pedro II. His reign was marked by good internal administration, the breaking out of the War of the Spanish Succession, and the Methuen treaty. He died at Alcantara on December 9, 1706.

The long reign of John V., who assumed the royal state at once from the regent Catherine, resembles the reign of John III.

Joseph, who succeeded his father in 1750, had the merit of perceiving the preëminent powers of Sebastião de Carvalho, who governed Portugal throughout this reign, and who, under his title of the Marquis of Pombal (see POMBAL), ranks among the very greatest of eighteenth century statesmen. Joseph died on February 20, 1777, leaving four daughters, of whom the eldest, Donna Maria Francisca, had married the king's brother, Dom Pedro.

The accession of Donna Maria was the signal for the overthrow of the great marquis and the reversal of his policy. The new queen was a weak woman. Her brain failed in 1788, and Dom John found it necessary to take the management of affairs into his own hands, though he was not actually declared regent until 1799. About the time that Dom John became regent the wish to check the spread of the principles of the French Revolution, which were as much feared in Portugal as in all other Continental states, led to the great activity of Dom Diogo Ignacio de Pina Manique, the intendant-general of police. He eagerly hunted down all Portuguese gentlemen suspected of encouraging French principles or of being freemasons, expelled all Frenchmen from the kingdom, and kept a jealous eye on the American consul, Edward Church, and a merchant named Jacome Ratton, whom he declared to be at the head of a republican conspiracy. Moreover, the Portuguese ministers not only combated the dreaded French principles at home, they also believed it a holy duty to join in the general war against France, and therefore a corps of 5,000 men was sent into the eastern Pyrenees to serve under General John Forbes Skelater, and four ships under the marquis of Niza joined the English fleet in the Mediterranean. The Spanish Government, then under the influence of Godoy, the Prince of the Peace, did not hesitate to desert Portugal and make a separate peace with the French republic at Basel in July, 1795. In 1800 Lucien Bonaparte was sent to Madrid with instructions from his brother to insist on the abandonment of the English alliance, on the opening of Portuguese ports to France and the closing of them to England. The Portuguese ministers rejected these terms, and immediately Leclerc's corps entered Spain. The campaign lasted but a few days. Olivenza and Campo Mayor fell into the hands of the Spaniards, who also won bloodless victories at Arronches and Flor da Rosa. Peace was made at Badajoz with Spain, by which Portugal ceded Olivenza, and at Paris with France, by which it consented to the extension of

French Guiana to the Amazons, and promised a large indemnity. Napoleon Bonaparte was anything but satisfied with the treaty of Badajoz, and received Lucien on his return with but little favor, for his aim was utterly to destroy Portugal as a nation; and it was with a full intention to excite her to war that he sent one of the roughest and least educated of his generals, Lannes, as ambassador to Lisbon. At length, in 1807, having beaten Austria, Prussia, and Russia, Napoleon again turned his thoughts to his project for the annihilation of Portugal, which had become more than ever a thorn in his side since it refused to cooperate in his continental schemes for ruining England. With amazing rapidity Junot accomplished the march, and the Portuguese hardly knew that war was imminent until on November 27th Colonel Lecor rushed into Lisbon with the news that the French were in possession of Abrantes. This alarming intelligence unnerved the regent, who listened to the strongly-worded advice of Sir Sidney Smith, commander of the English ships in the Tagus, to abandon his kingdom for the Brazils, and leave the English to defend Portugal; and on November 27th Dom John, after naming a council of regency, went on board the English fleet with his whole family, including the queen Maria I. The English ships had hardly left the Tagus when a small force of wearied French soldiers, who were all that remained from the terrible fatigues of the march, entered Lisbon on November 30th.

Shortly after the conclusion of the war, in 1816, the mad queen Maria I. died, and the regent succeeded to the throne as King John VI. The English Government earnestly pressed him to return to Lisbon, where dissensions in the regency and the universal discontent urgently summoned him. He accordingly left the Brazils to the government of his elder son Pedro, and set out for Portugal, where in 1822, at the earnest request of that son, he solemnly swore to obey the new constitution. He was at once met by the opposition of the queen and his younger son Dom Miguel, who refused to recognize the constitution; in consequence they were expelled from Lisbon. This event, with the invasion of Spain by the French to put down the rebellion of 1823, encouraged Francisco da Silveira, count of Amarante, to raise a pronunciamento in Tras-os-Montes; but the king at Lisbon declared, amid loud applause, that the constitution of 1822 was abrogated and his own absolutism restored, and he appointed the count of Palmella, the head of the English or constitutional party, to be his minister. But the absolutist party did not aim at a new form of constitutional government; they were desirous to reinstate the old absolutism. The queen and Dom Miguel headed a new plot; the king's friend, the marquis of Loulé, was assassinated; Palmella was imprisoned and the king himself shut up in his palace. The united action of the foreign ministers who had remained in Lisbon freed the king; the new insurrection was suppressed; Palmella was again appointed minister; and the king, with the two chief conspirators, the queen and Dom Miguel, left Portugal once more for the Brazils. In the following year (1826) John VI. died, leaving by his will his daughter, the infanta Isabel Maria, as regent, to the great disappointment of Dom Miguel, who had returned to Portugal with the expectation of receiving it as his inheritance, while his brother Dom Pedro ruled in Brazil.

The next twenty-five years are the darkest in the whole history of Portugal and the most complicated to analyze, for the establishment of parliamentary government was no easy task; it is almost impossible to follow the rapid changes which succeeded each other, and quite impossible to understand the varying motives of the different

statesmen and generals. On ascending the united thrones Dom Pedro IV. proceeded to draw up a charter containing the bases of a moderate parliamentary government and sent it over to Portugal by the English minister, Sir Charles Stuart, and then abdicated the crown of Portugal in favor of his daughter, Donna Maria da Gloria, a child only seven years old, on condition that she married his brother Dom Miguel, who was to recognize the new constitution. The charter was received with joy by the parliamentary party, and Palmella became prime minister; but in 1827 the king foolishly appointed Dom Miguel to be regent in Portugal. This ambitious prince was exceedingly popular with the old nobility, the army, and the poor; and, having declared himself absolute king, he drove the whole constitutional or chartist party—Palmella, Saldanha, Villa Flor, Sampaio, and their adherents—into exile. They fled to England, where the young queen then was, but, although they found popular opinion strongly in their favor, they found also that the duke of Wellington and his Tory ministry highly approved of Dom Miguel's behavior, and that they persisted in confounding the moderate and the radical parties, and in believing that Palmella was a democrat. Meanwhile the reign of Dom Miguel had become a reign of terror, and a new movement was begun by the conjoined chartist and radical parties, who respectively advocated the charter of 1826 and the constitution of 1822, but who sank their differences to oppose Dom Miguel. The island of Terceira (Azores) had never submitted to this prince, and there in 1829 the marquis of Palmella, the count of Villa Flor, and José Antonio Guerreiro declared themselves regents for the young queen; and on August 11, 1830, they defeated in Praia Bay the fleet sent against them by Dom Miguel. The struggle continued till May, 1834, when Dom Miguel capitulated and Queen Maria ascended the throne which she held till November, 1853. Queen Maria da Gloria died on November 15, 1853, and her husband, the king-consort, Dom Ferdinand II., assumed the regency until his eldest son Dom Pedro V. came of age.

Pedro died of cholera in 1861, and was succeeded by Dom Luis, under whom the kingdom prospered greatly. Luis died in 1889, and was succeeded by Dom Carlos, the present king.

PORUS, the name of the Indian king who withstood Alexander the Great on the banks of the Hydaspes (Jhelum). He was afterward confirmed in his kingdom by the conqueror, and still held the position of a Macedonian satrap when assassinated some time between 321 and 315 B.C.

POSEIDON, the ancient Greek god of the sea and of water generally, was fabled to be the son of Cronus and Rhea, and brother of Zeus and Pluto. In modern Greece St. Nicholas has taken the place of Poseidon as patron of sailors. But the Zachynthians have a special sea-god, half man, half fish, who dwells under the sea, rides on dolphins or in a car drawn by dolphins, and wields a trident. He seems to combine the attributes of Poseidon and Nereus. For the Roman sea-god, see NEPTUNE.

POSEN, a province in the east of Prussia, with an area (11,180 square miles) nearly equal to that of Belgium, is bounded on the north by the province of Prussia, on the east by Russian Poland, on the south by Silesia, and on the west by Brandenburg. It belongs physically to the great north German plain, and consists of a low plateau intersected by the beds of the Netze, the Warthe, and the Obra. Pop. 1,715,618.

POSEN (Polish, *Poznań*), capital of the above province, the seat of a Roman Catholic archbishop, and the headquarters of a corps of the German army, is situ-

ated at the confluence of the Cybina and Warthe, 150 miles to the east of Berlin and 90 miles to the north of Breslau. Population, 68,315.

POSIDONIUS, a distinguished Stoic philosopher, the most learned man of his time (c. 130–50 B. C.) and perhaps of all the school; by birth a Syrian from Apamea, a pupil of Panætius, he spent after his teacher's death many years in travel and scientific researches in Spain (particularly at Gades), Africa, Italy, Gaul, Liguria, Sicily, and on the eastern shores of the Adriatic.

POSITIVISM, or POSITIVE PHILOSOPHY. See COMTE.

POSSESSION is a legal term derived from Roman law. The Roman conception of possession has been generally adopted, but the Roman deductions from the conception have not been universally followed. The subject of possession, in itself a difficult one, has become more difficult owing to the various senses in which the term has been interpreted. Thus it has been said to be either a right or a fact conferring a right, or both together.

It has been already stated that there is both a physical and a mental element in the conception of possession. This does not necessarily mean that corporal contact is in all cases requisite, or that the intention to hold the thing possessed as one's own may not be abandoned for a time. The control may be potential as well as actual. An estate may be possessed without the possessor going upon the land at all, and the possession of goods may be given by delivering the key of the warehouse in which they are stored. In international law the possession of part as giving the right to the whole has been of great importance.

In both Roman and English law the possessory tended to supersede the proprietary remedies from their greater convenience—that is to say, the plaintiff based his claim or the defendant his right upon possession rather than property. The English possessory action may have been directly suggested by the interdict.

POSTOFFICE. The germ of the modern postal systems of the world is to be looked for, obviously, in the earliest organized establishment of a staff of government couriers. When, or under what precise circumstances, such an establishment was first made available by a state for the carriage of the letters of private persons there is no satisfactory evidence to show. That there must have been, even in early times, a connection, more or less authorized, between the transmission of public and of private correspondence is highly probable. Even financial reasons would soon dictate a formal permission to government couriers to carry letters for individuals. In the postal system of Spain and the German empire there is express record of such a permission in the month of April, 1544; and within fifteen or sixteen years that permission had grown into a legalized and regulated monopoly, whence the counts of Taxis drew part of their profits as postmasters-general. For the purposes of this article, however, it is enough to note that in Great Britain existing private letters of the fifteenth century—some, perhaps, of the fourteenth—bear indorsements which show that they were conveyed by relays of men and horses maintained under the control of the government, and primarily intended for its special service. In several continental states the universities had inland postal establishments of a rudimentary sort at an early date. The university of Paris, for example, organized a postal service almost at the beginning of the thirteenth century, and it lasted in a measure until the year 1719. As early as the middle of the thirteenth century entries occur in the wardrobe accounts of the kings of England of payments to

royal messengers for the conveyance of letters to various parts of the country. In the supervision of these royal messengers lies the germ of the office of postmaster-general. The first English postmaster of whom a distinct account can be given is Sir Brian Tuke, who is described (1533) in the records as "Magister Nunciorum, Cursorum, sive Postarum," "both in England and in other parts of the king's dominions beyond the seas."

The accession of James I. to the English throne, by necessitating a more frequent communication between London and Scotland, led to improvements in the postal service.

In 1607 the king granted to James Stanhope, first Lord Stanhope of Harrington, and to his son Charles Stanhope, afterward second Lord Stanhope, jointly and to the survivor of them, the postmastership of England under the title of "Master of the Posts and Messengers," with a fee of 100 marks a year, together with all "avails and profits" belonging to the office. In 1619 a separate office of "postmaster-general of England for foreign parts" was created, by new letters patent, in favor of Matthew de Quester and Matthew de Quester the younger, and in 1626 by an order in council liberty was granted to all companies of merchants, including the Merchants Adventurers, to send their letters and dispatches by messengers of their own choosing. A year afterward this liberty was revoked, except for the Company of Merchants Adventurers. Lord Stanhope, however, continued to carry letters abroad by his agents, and obtained a warrant prohibiting De Quester from interfering.

The English postoffice system continued upon conditions similar to those stated for many years. Measures of partial but valuable reform were improvised and adopted from time to time, which improved the service and paved the way for the complete and comprehensive system which such service has since become in all portions of the world. Among those instituted was that of John Hill, who undertook the conveyance of letters, packages, etc., from York to London at half the rates previously charged, the establishment of the penny post of London by Robert Murray, and William Dockevra who located sorting and distributing offices, made collections and distributions at regular intervals, and otherwise furnished a precedent for the system now in vogue. At this period the postal service of Scotland, though distinct from that of England, was similar in its operations, while that of the colonies was even more rudimentary. In fact it may be said that the postal communication of the British empire and her dependencies was of the most primitive character, inconspicuous, uncertain, and poorly conducted. Reforms, however, continued to be made, and in the reign of Queen Anne the various systems were consolidated into one establishment, which as to organization remained the great charter of the postoffice until the date of the important reforms of 1838-50, mainly introduced by the energy, skill, and characteristic pertinacity of Sir Rowland Hill.

In 1837 he issued a pamphlet (*Post-Office Reform*) citing facts and figures to support his claim that while the postal revenue for the previous twenty years had shown an actual diminution, it ought to have shown a positive increase in order to have kept pace with the growth of the population and the amount derived from the duties imposed upon stage coaches. According to the estimates made by Hill, and predicated upon data obtained from reliable sources of information, he argued that the expense incurred in the receipt, transit, and delivery of a letter between post-towns should be made uniform, and the charge precisely the same for every

packet of moderate weight, without reference to the number of its inclosures. At this time the rate of postage imposed varied from 8 to 40 cents for a single letter, which meant a single piece of paper not exceeding an ounce in weight, a second piece of paper, however small, constituted a double letter, and if a single sheet of paper weighed over an ounce it was charged with four-fold postage. He proposed to enact that the charge for primary distribution should be at the uniform rate of one penny for each half ounce, heavier packets to any convenient limit being charged an additional penny for each additional half ounce. He also proposed the sale of stamped envelopes to the public, and the removal of other embargoes upon the service. His plans were received with favor by the trading public, but denounced as ruinous and ridiculed as visionary by the postoffice functionaries. In 1838 a committee of the House of Commons reported in favor of the plan.

The measure was carried in the House of Commons by a majority of 100, and became law on August 17, 1839, and was a success from the start; the system of cheap postal service having been universally adopted.

The money-order branch of the postoffice was for forty years the private enterprise of three postoffice clerks known as "Stow and Company." It was commenced in 1792, with the special object of facilitating the safe conveyance of small sums to soldiers and sailors, but was soon extended to all classes of small remitters. The postmaster-general sanctioned the scheme without interposing in the management. On December 6, 1838, the office was converted into an official department under the postmaster-general, where it has since remained, with annually increased results advantageous to the public and the service.

The establishment of postoffice savings banks was practically suggested in the year 1860 by Mr. Charles William Sykes of Huddersfield, whose suggestion was cordially received by Mr. Gladstone, then chancellor of the exchequer, to whose conspicuous exertions in parliament the effectual working out of the measure and also many and great improvements in its details are substantially and unquestionably due.

In May, 1861, the latter introduced a bill providing for the establishment of postal banks for the deposit of small savings, upon which interest was to be paid, and the payment thereof secured by the government. The bill became a law in September following. The act was extended to Scotland and Ireland in 1862, and at present all the money order offices of the United Kingdom are savings banks. The benefits derived are reciprocal, the laboring classes being thus afforded a reliable depository for their earnings, and the government the use of an immense sum upon which only a nominal interest is paid. The deposits at present have reached more than £60,000,000 (\$300,000,000).

To the chamber of commerce of Edinburgh belongs the honor of effectually originating that public demand for the transfer of the telegraphic service of the United Kingdom from commercial companies to the state which led to the passing of the Acts of Parliament of 1868 and 1869.

The Electric Telegraph Act of 1868 (31 and 32 Vict. c. 110) authorized the postmaster-general, with consent of the treasury, to purchase for the purposes of the act the whole, or such parts as he should think fit, of any telegraphic company.

The Act of 1869 (32 and 33 Vict. c. 73), entitled "An Act to alter and amend the Telegraphic act, 1869," gives to the postoffice the exclusive privilege of transmission—withheld in the previous act—empowers the purchase of telegraphic undertakings other than those included in that act, and enables certain companies to

require the postmaster-general to make such purchase. It also directs the raising by the treasury of a sum of \$35,000,000 for the purposes of the acts. The Act 33 and 34 Vict. c. 88 (1870) extended the postoffice telegraphic system to the Channel Islands and to the Isle of Man; and that of the 34 and 35 Vict. c. 75 (1871) authorized the raising of an additional million. These sums collectively proved to be quite insufficient, and eventually the capital sum so raised exceeded \$50,000,000. From the beginning the work of improving the service has been pursued continually and indefatigably. The number of miles of road and railway wires have been increased, as also have the number of offices, while the superintendence and management have contributed substantially to its present superior condition. During 1889 the system produced \$10,649,800 and cost \$10,211,970 in addition to about \$1,632,085 interest on the original cost.

In conclusion it may be said that the postoffice is the most satisfactory of all the money-producing items in the kingdom. The result of the year's work, ending January 1, 1890, showed a gross income of \$45,500,000. The number of letters delivered in the United Kingdom aggregated 1,558,100,000 in addition to 151,900,000 newspapers, 412,000,000 book packets, 201,400,000 postal cards, and 39,590,000 parcels.

Benjamin Franklin was removed by the home department from his office of postmaster-general in America in 1774. On July 26, 1775, the American Congress assumed direction of the postoffices, reappointing Franklin to his former post. Shortly afterward, when Franklin was sent as ambassador to France, his son-in-law, Richard Bache, was made postmaster-general in November, 1775.

In 1789 the number of postoffices was 75, in 1800, 903, in 1825, 5,677, in 1875, 35,734, in 1884, 50,017, and in 1899, 58,999. In 1789 the gross revenues of the postal service were \$30,000, in 1800 \$280,804. In 1860 the gross revenues had increased to \$8,518,067, and in 1875 to \$26,671,218. In 1884 they amounted to \$43,338,127.08, in 1889 to \$56,175,611. In 1860 there was a deficit in the postal income of \$10,652,542.59, occasioned through lavish expenditure and then existing abuses. Annual deficiencies had occurred for nine years previous to 1860, and continued for twenty-one years thereafter. In 1882 a surplus of \$1,394,388.92 was shown, and in 1883 a profit of \$1,001,281.83. Since the latter date annual deficiencies have again occurred, that of 1889 being over \$5,000,000.

Until 1863 the rates of postage were based upon the distances over which the mails were conveyed. In 1846 these rates were—not exceeding 300 miles, 3 cents; exceeding 300 miles, 10 cents. In 1851 the rates were reduced to 3 cents for distances not exceeding 3,000 miles and 10 cents for distances exceeding 3,000 miles. The use of adhesive postage stamps was first authorized by Act of Congress, approved March 3, 1847, and on June 1, 1856 prepayment by stamps was made compulsory. In 1863 a uniform rate of postage without regard to distance was fixed at 3 cents; and on October 1, 1883, excepting, however, lottery matter, coins, jewelry, merchandise, etc., the rate was further reduced to 2 cents, the equivalent of the British penny postage.

The franking privilege, which had grown to be an intolerable abuse, was finally abolished in 1873, and the postoffice now carries free under official "penalty" labels or envelopes nothing but matter which is of a strictly official character, with the single exception of newspapers circulated within the county of publication. As late as 1860 the mails conveyed nothing but written and printed matter. They now admit nearly every known substance which does not exceed four pounds in

weight, and which from its nature is not liable to injure the mails or the persons of postal employes.

The railway mail service, including the "fast mail," was inaugurated in 1864 after a successful experiment upon a few of the large railroad lines with important termini. The service was reorganized in 1874 with eight territorial divisions, each in charge of a superintendent subordinate to a general superintendent at the seat of government. This service was one of the earliest exponents of a classified civil service in the more recent acceptance of that term in the United States, appointment of railway postal clerks having always been made for a probationary period, permanent appointment conditioned upon satisfactory conduct and service, and removal based upon good cause only. The service has been steadily increased from year to year, now consisting of eleven divisions, employing thousands of persons, and operated on nearly every railroad in the country. The penny post existed in a number of cities of the Union in 1862, the carriers remunerating themselves by the collection of a voluntary fee of from one to two cents on each piece of mail delivered. A uniform free delivery system was first authorized by law on March 3, 1863, and was established on the succeeding 1st of July in forty-nine cities. June 30, 1888, the total number of free delivery offices was 358, the number of carriers 6,346, and number of pieces for the year ending on that date 2,630,861,758.

The registry system, in which great improvements have been made within the last few years, did not attain any degree of excellence until after 1860; and the money-order system was first established in 1864. The aggregate number of money orders, domestic and foreign, issued during the fiscal year 1888 was 13,677,169. Postal notes for small sums, payable to bearer, and resembling the British postal orders except in that they are not drawn for fixed amounts, were first issued to the public in September, 1883, and the money orders are exchanged, in pursuance of postal conventions for the purpose, with most of the important countries of the world which have money-order systems of their own. The total staff of the post office in 1888 numbered 94,790, of whom 54,774 were postmasters.

Very many improvements of the postal service have been perfected within the past ten years besides those mentioned, and many equally important, not to say indispensable, are in contemplation. Among these are the organization of telegraph and postal savings departments, the reduction of expenses now incurred in several branches of the service, the extension of the civil service to every department, the extension of the free delivery system, adoption of the pneumatic tube system, for the special delivery of letters in large cities, together with other reforms that other nations have adopted and successfully conducted.

The regulation of international postal intercourse is reached through the Universal Postal Union, an association proposed by the United States in August, 1862, and organized at Paris in May, 1863. In September, 1874, another convention assembled at Berne, Switzerland, when the defects of the agreement entered into at Paris were remedied, and provision made for the continuance of the same for a period of not less than three years. Conventions have since been held, at Paris in May, 1878, and at Lisbon in February, 1885, and the fourth will be convened at Vienna during the current year (1890). At present the union is composed of the Argentine Republic, Austria-Hungary, Belgium, Bolivia, Brazil, British-India, Bulgaria, Canada, Chili, Colombia, the Independent State of Congo, Costa-Rica, Denmark and Danish colonies, Dominican Republic, Ecuador, Egypt, France and French colonies, Germany, Great Britain

and the British colonies (except the Australian and Oceanian colonies), Greece, Guatemala, Hayti, Hawaiian Islands, Honduras, Italy, Japan, Liberia, Luxembourg, Mexico, Montenegro, Netherlands and Netherland colonies, Nicaragua, Norway, Paraguay, Persia, Peru, Portugal and Portuguese colonies, Roumania, Russia, Salvador, Servia, Siam, Southwest Africa, Spain and Spanish colonies, Sweden, Switzerland, Tunis, Turkey, Uruguay and Venezuela.

For the postal service in other European countries, find same under appropriate headings.

**POTASSIUM METALS.** Under this heading we treat of potassium, rubidium, and caesium; **SODIUM** and **LITHIUM**, being less closely allied to potassium, have special articles devoted to them.

The three metals under consideration are all very widely diffused throughout nature; but only potassium is at all abundant, and therefore we begin with it. The richest natural store is in the ocean, which, according to Boguslawski's calculation (in his *Oceanographie*) of its total volume and the present writer's analysis of sea water, contains potassium equal to 1,141 times  $10^{12}$  tons of sulphate,  $K_2SO_4$ . This inexhaustible store, however, is not much drawn upon at present; the "salt-gardens" on the coast of France have lost their industrial importance as potash-producers, if not otherwise, since the rich deposits at Stassfurt in Germany have come to be so largely worked. The potassium minerals named are not confined to Stassfurt; far larger quantities of sylvine and kainite are met with in the salt-mines of Kalusz in the eastern Carpathian Mountains, but they have not yet come to be worked so extensively. The Stassfurt potassiferous minerals owe their industrial importance to their solubility in water and consequent ready amenability to chemical operations.

Carbonate of Potash ( $K_2CO_3$ ) in former times used to be made exclusively from wood-ashes, and even now the industry survives in Canada, Russia, Hungary, and other countries, where wood is used as the general fuel. In some places—for instance, in certain districts of Hungary—wood is burned expressly for the purpose; as a rule, however, the ashes produced in households form the raw material. The ashes are lixiviated with water, which dissolves all the carbonate of potash along with more or less of chloride, sulphate, and a little silicate, while the earthy phosphates and carbonates and other insoluble matters remain as a residue. The clarified solution is evaporated to dryness in iron basins and the residue calcined to burn away particles of charcoal and half-burned organic matter. In former times this calcination used to be effected in iron pots, whence the name "potashes" was given to the product; at present it is generally conducted in reverberatory furnaces on soles of cast-iron. The calcined product goes into commerce as crude potashes which is used for the manufacture of glass, and after being causticized for the making of soft soap. For many other purposes it is too impure and must be refined, which is done by treating the crude product with the minimum of cold water required to dissolve the carbonate, removing the undissolved part (which consists chiefly of sulphate), and evaporating the clear liquor to dryness in an iron pan. The purified carbonate (which still contains most of the chloride of the raw material and other impurities) is known as "pearl ashes."

Bicarbonate of Potash ( $K_2OCO_2 + H_2OCO_2 = 2KHCO_3$ ) is obtained when carbonic acid is passed through a cold solution of the ordinary carbonate as long as it is absorbed. If silicate is present, it likewise is converted into bicarbonate with elimination of silica, which must be filtered off. The filtrate is evaporated at a temperature not exceeding  $60^\circ$  or at most  $70^\circ$  C.:

after sufficient concentration it deposits on cooling anhydrous crystals of the salt, while the chloride of potassium, which may be present as an impurity, remains mostly in the mother-liquor. Bicarbonate of potash forms large monoclinic prisms, permanent in the air.

Caustic Potash (Hydrate of Potassium),  $KHO$ . It has been known for a long time that a solution of carbonate of potash becomes more intensely alkaline, acts more strongly on the epidermis; and dissolves fats more promptly after it has been treated with slaked lime. It used to be supposed that the latent fire in the quick-lime went into the "mild" alkali and made it "caustic," until Black, about the middle of last century, showed that the chemical difference between the two preparations is that the mild is a compound of carbonic acid and the caustic one of water with the same base (potash)—the causticizing action of the lime consisting in this, that it withdraws the carbonic acid from the alkali and substitutes its own water. A good concentration is twelve parts of water for one of carbonate of potash; the lime is best employed in the shape of a semi-fluid paste, made by slaking quick-lime with three parts of water poured on at a time. The alkali solution is heated to boiling in a cast-iron vessel and the lime paste added in installments until a sample of the filtered mixture no longer effervesces on addition of an excess of acid. The mixture is then allowed to settle in the iron vessel, access of air being prevented, and the clear liquor drawn off by means of a syphon. The remaining mud of carbonate and hydrate of lime is washed, by decantation, with small installments of hot water to recover at least part of the alkali diffused throughout it, but this process must not be continued too long or else some of the lime passes into solution. The united liquors are boiled down in an iron vessel until the desired degree of concentration is reached.

Frozen caustic potash forms an opaque, white, stone-like mass of dense granular fracture, and is perceptibly volatile at a red heat. It is extremely soluble in even cold water, and in any proportion of water on boiling. All commercial caustic potash is contaminated with excess of water and with carbonate and chloride of potassium; sulphate, as a rule, is absent. Absolutely pure potash has perhaps never been seen; a preparation sufficing for most purposes of the analyst is obtained by digesting the commercial article in strong *pure* alcohol.

Pure potassium is a bluish-white metal; but on exposure to ordinary air it at once draws a film of oxide, and on prolonged exposure deliquesces into a solution of hydrate and carbonate. At temperatures below  $0^\circ$  C. it is pretty hard and brittle; at the ordinary temperature it is so soft that it can be kneaded between the fingers and cut with a blunt knife. Most remarkable, and characteristic for the group it represents, is its action on water. A pellet of potassium when thrown on water at once bursts out into a violent flame, and the burning metal fizzes about on the surface, its extremely high temperature precluding absolute contact with the liquid, except at the very end, when the last remnant, through loss of temperature, is wetted by the water and bursts with explosive violence.

The salt has been recommended as a substitute for chlorate in pyrotechnic mixtures, because it contains more oxygen, and yet, on account of its greater stability, is a less dangerous ingredient.

**Bromide**,  $KBr$ .—This salt is formed when bromine is dissolved in caustic potash-lye. It is used in photography.

**Iodide**,  $KI$ .—Of the very numerous methods which have been recommended for the preparation of this important salt the simplest (and probably the best) is to dissolve in a caustic-potash lye (which is dilute enough

to hold the rather difficultly soluble iodate  $KIO_3$  in solution) enough iodine to produce a permanent yellow color (the iodine passes at once into  $5KI + KIO_3$ ; the hypo body  $KIO$  has no existence practically) and to deoxidize the iodate, which is done most conveniently by adding a sufficiency of powdered charcoal to the solution, evaporating to dryness in an iron vessel, and heating the residue.

*Sulphate* ( $K_2SO_4$ ) used to be extracted from kainite, but the process is now given up because the salt can be produced cheaply enough from the muriate by decomposing it with its exact equivalent of oil of vitriol and calcining the residue.

*Bisulphate* ( $KHSO_4$ ) is readily produced by fusing thirteen parts of the powdered normal salt with eight parts of oil of vitriol. It dissolves in three parts of water of  $0^\circ C$ .

*Rubidium and Cæsium.*—When Bunsen and Kirchhoff in 1860 applied their method of spectrum analysis to the alkali salts which they had extracted analytically from Dürkheim mineral water, they obtained a spectrum which, in addition to the lines characteristic for sodium, potassium, and lithium, exhibited two blue lines which were foreign to any other spectrum they had ever seen. They accordingly concluded that these lines must be owing to the presence of a new alkali metal, which they called "cæsium." Bunsen at once resumed the preparation of the mixed alkaline salt with 44,000 litres of Dürkheim water, with the view of isolating the cæsium in the form of a pure salt; and he was more than successful—for the new alkali salt, after elimination of all the ordinary alkali metals, proved to be a mixture of the salts of two new alkali metals, which he succeeded in separating from each other. For one he retained the name already chosen; the other he called "rubidium," on account of the presence in his spectrum of certain characteristic red lines. Since Bunsen's time these two metals have been discovered in a great many native potassiferous materials—minerals, mineral waters, plant ashes, etc.—but in all cases they form only a small fraction of the alkali, the cæsium in general amounting to only a fraction of even the rubidium.

**POTATO.** The potato (*Solanum tuberosum*) is too well known to need detailed description. It owes its value to the peculiar habit of developing underground slender leafless shoots or branches which differ in character and office from the true roots, and which gradually swell at the free end and thus produce the tubers with which we are so familiar. The nature of these tubers is further rendered evident by the presence of "eyes" or leaf-buds, which in due time lengthen into shoots and form the haulm or stems of the plant. Such buds are not, under ordinary circumstances, formed on roots. What the determining cause of the formation of the tubers may be is not known; the object evidently is to secure a method of propagation independently of the seed. Starch and other matters are stored up in the tubers, as in the perisperm of a seed, and in due season are rendered available for the nutrition of the young shoots when they begin to grow. When grown under natural circumstances tubers are relatively small and close to the surface of the soil, or even lie upon it. In the latter case they become green and have an acrid taste, which would probably render them objectionable to predatory animals or insects. They consist mainly of a mass of cells filled with starch and encircled by a thin corky rind. A few vessels and woody fibers traverse the tubers. The chief value of the potato as an article of diet consists in the starch it contains, and to a less extent in the potash and other salts. The quantity of nitrogen in its composition is small, and hence it should not be relied on to constitute

the staple article of diet, unless in admixture with milk or some other substance containing nitrogen. Where, as in some parts of northern Germany, the potato is grown for the purpose of manufacturing spirit great attention is necessarily paid to the quantitative analysis of the starchy and saccharine matters, which are found to vary much in particular varieties, irrespective of the conditions under which they are grown.

The origin and history of the potato are better known than in the case of many long-cultivated plants. At the discovery of America, we are told by Humboldt, the plant was cultivated in all the temperate parts of the continent from Chili to New Granada, but not in Mexico. Nearly a hundred years afterward, in 1585, or 1586, potato tubers were brought from North Carolina and Virginia to Ireland on the return of the colonists sent out by Sir Walter Raleigh, and were first cultivated on Sir Walter's estate near Cork. The tubers introduced under the auspices of Raleigh were thus imported a few years later than those mentioned by Clusius in 1588, which must have been in cultivation in Italy and Spain for some years prior to that time. Be this as it may, the earliest representation of the plant is to be found in Gerard's *Herbal*, published in 1597.

There are few agricultural subjects of greater importance than the culture of the potato and the losses entailed by potato disease. The disease of potatoes is caused by the growth of a fungus named *Peronospora infestans*, Mont., within the tissues of the host plant, and this fungus has a peculiar property of piercing and breaking up the cellular tissues, and setting up putrescence in the course of its growth.

In England the disease is generally first seen during the last ten days of July; its extension is greatly favored by the warm and showery weather peculiar to that period of the year, and according as the warm and humid weather of autumn is late or early the murrain varies a little in its time of appearance. To the unaided eye the disease is seen as purplish brown or blackish blotches of various sizes, at first on the tips and edges of the leaves, and ultimately upon the leaf-stalks and the larger stems. On gathering the foliage for examination, especially in humid weather, these dark blotches are seen to be putrid, and when the disease takes a bad form the dying leaves give out a highly offensive odor.

**POTATO, SWEET.** This plant (the *Convolvulus batatas*, or *Ipomoea batatas* of some authors) is generally cultivated in the West Indies and most tropical countries for the sake of its tuberous root, which is an article of diet greatly in request. It is a climbing perennial with cordate, entire, or palmately-lobed leaves borne on slender twining stems. The flowers are borne on long stalks in loose clusters or cymes, and have a white or rosy funnel-shaped corolla like that of the common bindweed of English hedges. The edible portion is the root, which dilates into large club-shaped masses filled with starch. The plant is not known in a truly wild state, nor has its origin been ascertained. A. de Candolle concludes that it is in all probability of American origin, though dispersed in Japan, China, the South Sea Islands, Australia, etc. It is grown largely in the southern part of the United States where it forms a staple article of diet.

**POTATO BEETLE or COLORADO BEETLE.** See COLEOPTERA (*Doryphora decemlineata*).

**POTEMKIN, GREGORY ALEXANDROVICH,** Russian soldier and statesman, was born in 1739 in the village of Domnovo, in the government of Smolensk. His father was a poor nobleman of Polish extraction, but the family had been settled for some time in Russia. Owing to the slender means of his parents, Potemkin's

first plan seems to have been to devote himself to the church; but he did not show much inclination for this profession, and eventually embraced the calling of a soldier. His fortunes rose from the time when he assisted the empress Catharine in her conspiracy against her husband on July 10, 1762.

In March, 1791, Potemkin made his triumphal entry into St. Petersburg. The description of the banquet which he gave in honor of the empress at his Taurian palace rivals any scene of Oriental magnificence. But his constitution was now breaking; his body at a comparatively early age was worn out by his labors and excesses. He died October 15, 1791.

POTENZA, a city of Italy, the chief town of Potenza (Basilicata), lies in the heart of the country, on an isolated hill in the valley of the Basento or Busento (Casuentus or Masuentum), sixty-nine miles by rail east of Salerno and fifty-one west-northwest of Metapontum, where the Basento reaches the Gulf of Taranto and the railway joins the line between Taranto and Reggio. The buildings of chief note are the cathedral, the seminary, and the hospital of San Carlo (1869). The population was 18,295 in 1871, 16,968 in 1881, and estimated at about 18,500 in 1889.

POTI, a seaport town of Trans-Caucasia in the government of Kutais (Mingrelia), lies at the mouth of the Rhion (Phasis) on the coast of the Black Sea, 193 miles west-northwest of Tiflis, with which it is connected by a railway opened in 1872. The population of the town is given as 3,112 in the Russian *Calendar* for 1882.

POTOMAC, a river of the United States, which joins Chesapeake Bay by a considerable estuary after a course of about 400 miles. The northern branch of the upper river rises in the Alleghanies, West Virginia, the southern in the Shenandoah Mountains. Affluents are received from Pennsylvania, Maryland, Virginia, and West Virginia—the most important of all being the Shenandoah, which joins it at Harper's Ferry, below which the united stream breaks through the line of the Blue Ridge. Ships ascend for a short distance above Washington (the capital of the United States), or a total distance from the sea of 125 miles.

POTOSI (not to be confounded with San Luis Potosi, the state and state capital in Mexico) is a town of Bolivia, at the head of the department of Potosi. Situated at the height of about 13,280 feet above the sea, it is one of the highest inhabited places in the world. The city is still the seat of the national mint. It consists of nine streets about thirty feet broad, running north and south and crossed at right angles by others of varying breadth. In 1611 its inhabitants are said to have numbered 160,000; at present they are probably not more than 11,000.

POTSDAM, the seat of government for the Prussian province of Brandenburg, and the summer residence of the emperor of Germany, lies sixteen miles to the southwest of Berlin, on the river Havel, which here expands into a series of small lakes. The town is handsomely built, though with a monotonous regularity that betrays its artificial origin, and is situated amid the prettiest scenery of the Mark of Brandenburg, consisting of an oasis of wood and hill and lake in the center of a sandy and unattractive plain. In spite of its somewhat sleepy appearance, Potsdam is the seat of varied if not very extensive industry, of which sugar, cotton and woolen goods, chocolate, and tobacco are the chief products. Market-gardening affords occupation to many of the inhabitants, and the cultivation of winter violets is important enough to be mentioned as a specialty. The Havel is well stocked with fish. In 1880 Potsdam contained 48,447 inhabitants, mainly Prot-

estant. The population is now estimated at upward of 50,000. The garrison consists of about 7,000 men.

POTTER, JOHN, archbishop of Canterbury, was the son of a linen-draper at Wakefield, Yorkshire, and was born about 1674. At the age of fourteen he entered University College, Oxford, and in January, 1737, was unexpectedly appointed to succeed Wake in the see of Canterbury. He died on October 10, 1747. His *Theological Works*, consisting of sermons, charges, divinity lectures, and the *Discourse on Church Government*, were published in three vols., 8vo, in 1753.

POTTER, PAUL, animal painter, was born at Enkhuizen, Holland, in 1625. He died in 1654 at the early age of twenty-nine.

POTTERY AND PORCELAIN. The word "pottery" (Fr. *poterie*) in its widest sense includes all objects made of clay, molded into form while in a moist plastic state, and then hardened by fire. Clay, the most widely spread and abundant of all mineral substances, consists essentially of a hydrated silicate of alumina, admixed, however, in almost all cases with various impurities. Thus it usually contains a considerable proportion of free silica, lime, and oxides of iron, its color chiefly depending on the last ingredient. The white kaolin clays (see KAOLIN) used in the manufacture of porcelain are the purest; they consist of silicate of alumina, with 5 to 7 per cent. of potash, and only traces of lime, iron, and magnesia. The making of pottery depends on the chemical change that takes place when clay is heated in the fire. In preparing clay for the potter it is above all things necessary that it should be worked and beaten, with sufficient water to make it plastic, into a perfectly homogeneous mass.

During the process of firing all clays shrink in volume, partly through the loss of water and partly on account of increase of density. What are called "fat" clays—those, that is to say, which are very plastic and unctuous—shrink very much, losing from one-third to one-fourth of their bulk; they are also very liable to crack or twist during the firing. "Lean" clays—those that have a large percentage of free silica—shrink but little, and keep their form unaltered under the heat of the kiln; they are not, however, so easy to mold into the required shape, and thus a certain compromise is frequently required. Lean and fat clays are mixed together, or silica (sand or ground and calcined flints) is added to a fat clay in sufficient quantity to enable it to stand the firing.

Porcelain differs from pottery in being whiter, harder, less fusible, and (most essential difference) in being slightly translucent. The paste of which it is formed is a purer silicate of alumina than the clay of which the pottery is made.

The art of making pottery is one of the most extreme antiquity; with the exception of the cave-dwellers of the Drift or Paleolithic period it was practiced by all known prehistoric races from the Neolithic age downward. The sepulchral barrows of Britain and other European countries have supplied vast stores of this earliest kind of pottery. It is mostly formed of coarse clay, generally brown in color, though sometimes gray or reddish; some few specimens are fine in texture and have a slightly glossy surface. The clay, while moist, has been kneaded with some care, and is often mixed with a proportion of gravel, coarse sand, quartz crystals, or pounded pottery. The more carefully made specimens, chiefly those of the bronze and iron ages, are frequently covered with a smooth slip, made of the same clay as the body, but finely pounded and thoroughly mixed. All are alike "hand-made," some of the smaller ones are scooped out of a solid ball of clay, while in some cases



great skill has been shown in the building up, by the unaided hand, of the thin walls of larger vessels, some of which are so round and neatly formed as to appear at first sight to be wheel-made. This, however, is never the case with the pottery of the three great prehistoric periods. But few examples remain which date from the time of the earlier dynasties of Egypt, though from the XVIIIth Dynasty downward a great quantity of specimens exist.

Egypt is rich in materials for pottery, both glazed and enameled. The finest of clays is washed down and deposited by the Nile; the sandy deserts supply pure silica; and a great part of the soil is saturated with the alkali necessary for the composition of vitreous enamels and glazes. In spite, however, of this abundance of materials the Egyptians never learned to apply either their enamels or their glazes, both of great beauty, to their larger works in pottery made of the fine Nile clay. The term "Egyptian porcelain" has sometimes been given to the small mummy-figures in brilliant blues and greens. This is a misnomer.

During the XVIIIth and XIXth Dynasties and later pottery was used in many ways for wall-decoration. A number of brilliant wall-tiles covered with deep blue glaze, and painted in black outline with figures and hieroglyphs, have been found in many places in Lower Egypt; the painting is very simple and decorative in effect, drawn with much skill and precision of touch. The Canopic vases are an important class and great quantities have been found in Egyptian tombs. They are generally made of plain brown-red clay, and have a lid in the shape of a human head.

But little remains to us of the pottery of the primitive Accadian races of Babylonia and Assyria. It was all extremely simple and undecorated, partly hand-made and partly wheel-made, mostly graceful and natural in form, owing its beauty chiefly to the simple elegance of its shape and the fine material of which it was made—the close-grained light yellow and brown clays in which the country between the Tigris and the Euphrates is so rich.

The ruined palaces of Babylon and Nineveh have supplied great quantities of bricks painted in various colors, some as early as the twelfth century B.C. The finest examples of pictured bricks were found in the great palace at Nimrúd; they appear, judging from the imperfect fragments that remain, to illustrate a victorious expedition by the Assyrians against a foreign nation.

In addition to figure subjects and ornaments, large wall surfaces were covered with cuneiform inscriptions, having letters about an inch and a half high painted in white and yellow on blue or green grounds; these are executed on large slabs of coarse brown clay, to which a smooth surface, fit for painting, has been given by a thin coating or slip of fine-ground yellowish clay. Large slabs with pendants for ceilings, painted in the same way with very graceful patterns, have been found, all in simple earth colors.

The most remarkable application of pottery in Assyria and Babylonia was its use for literary records. Tablets, cylinders, and polygonal prisms were impressed with cuneiform characters in the moist clay, and then baked, thus forming the most imperishable of all kinds of MSS. (cp. BABYLONIA).

The discoveries of recent years have opened out a new field in the history of the origin and growth of Hellenic art, especially as relating to pottery. Excavations in Cyprus, Rhodes, Thera (Santorin), the plains of Troy, Mycenæ, Attica, and the coasts of southern Italy, have revealed the existence of an abundant class of pottery of great antiquity, a large part of which, in

its forms and decoration, appears to have been due, directly or indirectly, to the Phœnicians.

The islands of Thera, Rhodes, and Cyprus, which were colonized by the Phœnicians at a very early period (see PHŒNICIA), have supplied large quantities of archaic pottery, ornamented with characteristically Phœnician patterns and figures. The equally rich finds of pottery from Mycenæ and the Troad, though not free from Phœnician influence, have mostly a more native style of decoration.

Among the earlier pottery from Mycenæ and the Troad are several very strange vases in coarse clay rudely modeled to indicate a human form. Some have the upper part formed like a head, very like the Egyptian Canopic vases. A great number of "pithi" (*πίθοι*), enormous vases shaped something like amphoræ, have been discovered in Rhodes, the Troad, and other places, some as much as seven feet high. Such vessels are often decorated with patterns in relief, chiefly combinations of spirals and the like, some closely resembling the designs on the sculptured architrave from the "Treasury of Atreus" at Mycenæ.

The manner in which the styles of ornament on early pottery merge almost insensibly one into another makes it difficult to arrange it in distinct classes, and it is not easy to say at what precise stage the term "Hellenic" can be given to the archaic vessels. The presence of Greek inscriptions makes, however, a convenient starting-point.

Probably the earliest known Greek ceramic inscription occurs on the Rhodian pinax. The painting on this, though rudely executed in brown and red ochers on a pale yellow slip-covered clay, the same in method as the earlier non-Hellenic paintings, shows a marked artistic advance by the fact that it represents a definite historical scene taken from the *Iliad*. No incised lines are used except for the feathers of the heraldic eagle on Hector's shield. A large number of other pinaces were found at Camirus, of the same date, but without inscriptions, and with purely decorative paintings, such as geometrical lotus patterns, and spirited figures of bulls, sheep, and other animals, or sphinxes and gorgons' heads. Some large clay coffins, also found at Camirus, and others at Clazomenæ, belong to this class of pottery. The "Burgon Amphora," so called from its finder, now in the British Museum, and the "François Crater," now in the Etruscan Museum, at Florence, are specimens of this class.

*Places Where Greek Vases Have Been Found.*—Till within the last twenty years most were discovered in the tombs of Magna Græcia, Sicily, and Etruria. Capua, Nola, and Vulci supplied a very large quantity of vases of the finest sort with the most rich and brilliant enamel. Special characteristics of style and technique can be traced in the production of special localities, but these differences are not very important. Of late years Attica, the isthmus of Corinth, and other places on Hellenic soil, have yielded a great many fine vases; the islands of the Ægean Sea and the western shores of Asia Minor are rich in sepulchral stores of these and all branches of Greek art. Athens possesses a fine and rapidly-increasing collection, chiefly from Attica. The British Museum collection is on the whole the finest for Greek vases of all periods, though it is very poor in Etruscan pottery. The other chief collections of Europe are in the Louvre, at Naples, in the Vatican, at Florence, and Turin; Munich, Vienna, Berlin, and St. Petersburg also have very fine collections; and there is a small one in the Bibliothèque, Paris.

Very many of the numerous vases discovered in the tombs of ETRURIA (*q.v.*) are imports either from Greece and its islands or from the neighboring country

of Magna Græcia. Nevertheless, there is a large class of pottery which is distinctly native, extending over a very long period from quite prehistoric ages down to the time when the Roman rule extended throughout the peninsula.

Some specimens of very peculiar glazed pottery have been found at Cyrene, Cyme, Pergamum, Smyrna, Tarsus, and other Roman colonies in Asia Minor. It is very delicate and often graceful in shape, with very thin handles, fashioned more like glass than pottery. It is remarkable for being covered with a thick vitreous glaze, usually colored either green, orange, or purple-brown, with oxide of copper, antimoniate of lead, or manganese, quite unlike the thin, almost imperceptible, glaze of Greek vases. The Louvre and the British Museum have the best specimens of this rare ware, which probably dates from the first century B.C. downwards.

In the numerous varieties of Persian and Moslem pottery, with the exception of that included under the head "Hispano-Moorish," there is a great similarity in character of design and in methods of execution, both of which appear to a great extent to have been originated and brought to highest perfection under the Persians, who seem to have inherited, through the Sasanians, much of the skill in manipulating clay and manufacturing enamels and glazes which was possessed by the people of ancient Assyria. The Persians of the tenth to the seventeenth century, perfect masters of all the decorative arts to a degree possessed probably by no other race or age, excelled in pottery as in other handicrafts.

The following were the chief varieties of Persian pottery: Lustered ware, Sgraffiato ware, Damascus and Rhodian wares.

The South Kensington Museum and the Hôtel Cluny in Paris have the finest collections of Rhodian wares, the most magnificent class of Oriental pottery; some very choice specimens are in the British Museum and the Louvre.

To the earlier or Arab period of oriental rule in southwest Europe no existing specimens of pottery can be attributed. The Teutonic, Saxon, and Gaulish types that have been discovered show traces of Roman influence, and mediæval pottery made in England and France from the eleventh to the fifteenth century was coarse and without artistic beauty. The opposite was the rule in Italy, but Spanish pottery was for the most part a coarse imitation of Italian majolica, chiefly made at Valencia, Triana, and Talavera. In Portugal there was no enameled pottery of Portuguese workmanship known to exist prior to the seventeenth century, but in France during the previous century two different though equally remarkable sorts of pottery, one the invention of Bernard Palissy, (see PALISSY), and the other of François Cherpentier, and known as Oiron pottery, were made. At the latter end of the century Dutch potters started in London the making of stoneware, and radical improvements were made in all the departments of the ceramic art during the succeeding century. John Dwight spent many years to improve the manufacture of pottery, also to discover the secret of true transparent porcelain, and to promote these objects set up kilns at Fulham. The Lambeth potteries began to produce ware superior to the lead-glazed varieties and imitated successfully Pallissy ware.

Toward the end of the eighteenth century many imitations were made of the Wedgwood cameo ware by different English manufacturers, and even at Sèvres it was copied in porcelain, though with original French designs. None, however, are equal to Wedgwood's work, either in beauty of design or in delicacy of execution.

Until quite recently little or no pottery of any artistic

merit has been produced in England during the present century, partly owing to the absurd notion that pottery is a sort of inferior porcelain, and should be made to resemble it as much as possible, and also very largely on account of the invention in the eighteenth century of a process for *printing* patterns under the glaze, so as to avoid the labor of painting them by hand. Other modern so-called improvements of manufacture have done much to destroy all true art in English pottery; such are the too finely ground and artificial mixtures of different materials, the great use of the mold in preference to the potter's wheel, and, most fatal of all, the fact that, when the pottery is thrown on the wheel, it is afterward handed over to a workman who turns it on a lathe and rubs it down with glass-paper, as if it were a block of wood, thus removing all the surface put on the vessel by the touch of the thrower's hand.

The pottery of ancient Mexico and Peru, certainly older than the Spanish conquests in America, and possibly dating from a much more remote age, has many points of interest. Large quantities in good preservation have been discovered in the tombs of chiefs and other important persons of those once powerful and (in a somewhat barbaric way) artistic races. Much of their pottery is grotesque and even hideous in shape, modeled in the forms of semi-human monsters; it is often made of a hard black clay, well burned, something like the early black wares of Etruria. Another kind is graceful and natural in shape, formed with great taste and skill on the potter's wheel. The clay is fine in texture and has a slight surface-gloss, apparently the result of mechanical polishing.

In the methods of treatment employed in China and Japan the usual distinctions between pottery (earthenware) and porcelain (kaolinic ware) are not always observed. In many cases these two different materials are treated in exactly the same way and decorated after the same fashion. The chronological arrangement of Chinese wares is a matter of great difficulty. Many of the professedly historical records of the Chinese themselves are quite untrustworthy; as with all other arts, they have claimed for the manufacture of porcelain an antiquity far beyond the actual facts of the case. This exaggerated estimate of the antiquity of Chinese porcelain was for a long time supported by the supposed discovery in Egypt of certain small bottles made of real porcelain, and inscribed with Chinese characters, which were said to have been found in tombs at Thebes dating as early as 1800 B.C. According to a history of the art compiled from earlier records, the manufacture of pottery is said to have commenced in 2697 B.C., and that of porcelain during the Han dynasty, 206 B.C. to 25 A.D. The Tsin dynasty (265-419 A.D.) was remarkable for its blue porcelain, and the Suy dynasty (581-618 A.D.) for its fine green ware. One of the most celebrated kinds of porcelain was that made about 954 A.D., deep sky-blue in color, very glossy in texture, extremely thin, and sounding musically when struck. Even small fragments of it are treasured up by the Chinese, and set like jewels. Most dynasties seem to have been famed for a special variety of porcelain. The earlier sorts appear not to have been decorated with painting, but were all of one rich color. Decorative painting did not apparently come into general use before the Yuen dynasty of Mongols (1260-1368), and was brought to great perfection under the Mings (1368-1644). The porcelain of the last-named dynasty is classified in periods, four of which (from 1426 to 1567) were greatly esteemed. Probably few specimens of Chinese porcelain known in Europe are earlier in date than the time of Kang-he, the second emperor of the Tsing dynasty (1661-1722). Porcelain is made from two substances, "pe-tun-tse" and

"kao-ling;" the latter is a white pasty substance derived from the decomposition of feldspathic rocks such as granite. The precise nature of pe-tun-tse is not exactly known, but it appears to resemble kaolin, with the addition of a considerable proportion of free silica. The white pastes of which the porcelain is made are very carefully washed, finely ground, and mixed in due proportion. The paste is "thrown" on the potter's wheel in the usual way and set to dry; its colored decoration is then applied, and over that the transparent glaze is laid. The porcelain is next packed in clay boxes or "saggers," piled one above another in the kiln, in order to protect it from discoloration from the smoke. After the kiln has been heated for a considerable time to a very high temperature, the fire is withdrawn; and the porcelain is allowed to cool slowly in the clay saggers before the kiln is opened and its contents removed. Additional decoration is frequently added *over* the glaze, generally in enamel colors, applied thickly so as to stand out in perceptible relief; gilding is also added over the glaze. The porcelain is afterward fired a second time in a more open kiln, and at a lower temperature.

The methods of decorations on Chinese porcelain are extremely varied, and are applied with the most skillful hand and wonderful fertility of design; but they are always dainty and feebly pretty rather than artistic, except when there is a Persian element present. The general forms of the porcelain are mostly feeble, and often of extreme ugliness, while the skill in drawing is mostly confined to representations of flowers, some of which, especially the chrysanthemum and the peony, are painted with great truth and enjoyment. With the beauties of the human form the Chinaman has no acquaintance or sympathy, and he never possessed the wonderful skill of the Japanese in the delineation of animals and birds.

In the main the technical methods used in Japan and the styles of painted ornament were introduced from China, and also to a less extent from the adjacent peninsula of Corea. Glazed pottery was first made at Seto about 1230 A. D. by a potter who had visited China. Porcelain manufacture was introduced in a similar way into the province of Hizen about 1513. On the whole, the Japanese are more remarkable for their skill and almost endless methods in the production of pottery than of porcelain. No people ever approached them for marvelous fertility of invention and skill in the manipulation of all sorts of clay, pastes, enamels and pigments.

A great deal of Japanese ceramic ware is simply copied from Chinese porcelain, and often has forged Chinese marks. It is very difficult to find out what notions the Japanese themselves really have as to what is admirable in pottery. A purely archæological interest in old sorts of ware appears to affect them strongly, and they often put the highest value on what appears a very ordinary and rudely-made kind of pottery. Within the present century a new and elaborate method of decorating porcelain has been practiced in Japan, the chief object of which seems to be to make a porcelain vessel look like a metal one. Brass cloisonné enamel is applied to the outer surface of porcelain vases or bowls; the strips of brass set on edge which form the outline of the design, instead of being soldered to a metal plate, are fixed in some almost incomprehensible fashion to the surface of the porcelain, and then the compartments are filled in with colored enamels and fired in the usual way—a marvel of technical skill and wasted ingenuity. In various places in Europe, especially in Italy and France, attempts to produce translucent porcelain like that produced by the Chinese were almost continually being made from the end of the fifteenth century down to the

beginning of the eighteenth. From the thirteenth to the fifteenth century Chinese porcelain was very sparingly brought into Europe, and generally occurs among royal possessions or gifts as an object of great value. The name "china," from the country where porcelain was made, was given to it not later than the sixteenth century, and perhaps earlier, having been used by the Arabs long before; "china dishes" are mentioned by Shakespeare (*Measure for Measure*, act ii., scene i.) as being things of value. The main reason of the very slight success gained for so many years in the attempts to make porcelain in Europe, was the fact that it was regarded as a highly artificial substance, something between pottery and glass; the many beds of kaolinic clays which exist in Europe were never thought of as being the true material of which to make it, or, if used at all, were only employed partially and in an accidental way. The earliest attempts at the production of translucent porcelain which had any practical success took place at Venice about 1470. An alchemist named Antonio succeeded in making and firing in a kiln at San Simone, near Venice, "porcelane trasparente e vaghissime," described, in a document dated 1470, as being as beautiful in glaze and color as "the porcelain from barbarous countries."

After the Medici ware ceased to be made there is a blank of nearly a century in the history of European porcelain. In 1664 a patent was granted to Claude Reverend, a citizen of Paris, which gave him the privilege of making "imitation porcelain, as fine as that from the East Indies." In 1673 another patent was conceded to Louis Poterat, who certainly did produce artificial porcelain at Rouen. Saint Cloud was the next place in France where porcelain was produced, and from 1700 to 1745 at Lille, Chantilly and Mennecey-Villeroy.

The increasing success and popularity of the porcelain produced in Germany and England induced Louis XV. to establish a private royal manufactory of porcelain, which was first started at Vincennes, with a privilege granted to Charles Adam and others in 1745. In 1753 the king himself became a partner in the works, with a third share in the property. The seat of the manufactory was then transferred to Sèvres, and the official title was assumed of "manufacture royale de porcelaine de France." Before 1753 the royal porcelain was simply marked with two crossed L's for Louis, but from that year a date-letter was made compulsory—A for 1753, B for 1754, and so on till 1777, after which a new doubled alphabet was started AA, BB, etc.; this lasted down to RR (1793), and then a less regular series of marks came into use. Till 1792 the date-letter was put between the crossed L's, but in that year the republic substituted the letter R. Later various royal monograms and marks were used. Till about 1770 all French porcelain was artificial or "soft" (*pâte tendre*); the discovery of kaolinic clays in France then brought about the manufacture of natural hard porcelain (*pâte dure*) like that made in China and Japan. This gradually superseded the soft kind, which ceased to be made at the end of the eighteenth century. Its manufacture has recently been revived at Sèvres to some slight extent. M. Brongniart, the director of the Sèvres porcelain works from 1800 to 1847, in his *Traité des Arts Céramiques* (1854), gives a full account of the materials and methods used at Sèvres during all periods.

The porcelain of Germany was, from the first, composed of a hard natural paste, a true kaolinic clay. Its successful production was the result of a single, almost accidental, act of discovery, and not, like that of the French, of a long series of experiments with different materials, ending in the invention of a highly artificial imitation of true porcelain. In the year 1700

young chemist, or rather alchemist, of great ability, called Frederick Böttger (1682-1719), a native of Saxony, fled to Dresden under the accusation of practicing magical arts and searching for the "philosopher's stone." He was there taken under the protection of Augustus II., elector of Saxony, who employed him to make experiments, at first connected with medical chemistry, and afterward with the composition of pastes and clays for ceramic ware; but in 1710 he seems to have been in some way set on the track of the secret of porcelain manufacture. His first attempts were unsuccessful: the paste is gray and defective, and there is little or no glaze. So far no real progress had been made toward the discovery of true porcelain. But in 1710 a lucky accident, combined with the young chemist's ready powers of observation, revealed the true nature of the required paste. Having noticed the unusual weight of some new hair-powder with which his wig was dressed, he inquired what it was made of, and finding that it was a finely-powdered white clay from Aue, near Schneeberg in Saxony, he procured some of the clay. He made vessels of it and fired them, and found that he had discovered the material of true hard porcelain, like that from China and Japan. When Augustus II. learned the importance of the discovery he established the porcelain manufactory at Meissen with Böttger as its director. The earliest productions of the Meissen (Dresden) porcelain-works are copies from the Chinese and Japanese.

After about 1725 the Eastern style of design was superseded by elaborate miniature paintings of flowers and insects, or copies from Dutch and Flemish painters. All notion of true ceramic decoration was gone, and the porcelain was only regarded as a ground on which to paint an imitation of an oil-painting.

The manufacture of pottery, stoneware, and china has been established in the United States for many years, and is now conducted on the most extensive scale both at the East and in some portions of the West—notably at a pottery in Cincinnati, Ohio, where a very superior quality of ornamental china is included in the output. The principal depots for the manufacture of this commodity are at Trenton, N. J., and at East Liverpool, Ohio, where, it is said, fully nine-tenths of the capital employed in the production of pottery in the United States are invested. There are potteries also at East Boston, Mass.; Geddes, N. Y.; Green Point, L. I.; Peoria, Ill., and at various points in West Virginia, their lines of production grading from the ordinary descriptions of pottery to the best qualities of vitrified china. The trade catered to is domestic, and for some portions of Canada, South America, and Mexico.

**POTTSTOWN**, a borough of Montgomery county, Penn., is picturesquely situated on the Schuylkill river, in a plain surrounded by hills. It is eighteen miles east-southeast of Reading and forty miles west-northwest of Philadelphia, at the junction of the Philadelphia and Reading (main line) and the Colebrookdale Railroads, and has communication also by the Schuylkill Valley branch of the Pennsylvania Railroad. There are in and near Pottstown six rolling-mills, two blast-furnaces, three iron and brass foundries, two nail-factories, and large bridge works, besides minor industries. The population of Pottstown was 4,125 in 1870, and 13,285 in 1890.

**POTTSVILLE**, a city of the United States, capital of Schuylkill county, Penn., lies thirty-five miles northwest of Reading, on the north side of the Schuylkill river, in the gap by which it breaks through Sharp Mountain. It is the terminus of the main line of the Philadelphia and Reading Railroad, and the great emporium of the Schuylkill coal region, which extends

north and east and west, and has an annual yield of about 6,000,000 tons. Furnaces, rolling-mills, machine-shops, planing-mills, a spike-mill, a pottery, etc., are among the industrial establishments; and the public institutions include a court-house, a jail, a town-hall, a union hall, an opera-house, a children's home, a lyceum, and a free reading-room. The German and Welsh elements in the population are strong enough to be represented each by several churches. Pottsville as a city dates from 1825. In 1850 it had 7,515 inhabitants, 12,384 in 1870, 13,253 in 1880, and 14,117 in 1890.

**POUGHKEEPSIE**, a city of the United States, capital of Dutchess county, N. Y., lies on the east bank of the Hudson river, seventy-three miles north of New York. It is on the New York Central and Hudson River Railroad, and communicates with the New York, West Shore and Buffalo Railway by ferry from Highland, and with the Hartford and Connecticut Western Railroad by the Poughkeepsie, Hartford and Boston Railroad (thirty-seven miles). The site consists for the most part of a tableland which rises from 150 to 200 feet above the river, and is backed toward the east by College Hill, 300 feet in height. Well laid out, with regular and shaded streets and abundantly supplied with water (pumped from the river to a reservoir on College Hill), Poughkeepsie is a pleasant place of residence, and it enjoys a special reputation for its educational institutions. Vassar College (two miles east of the city), the earliest and one of the greatest women's colleges in the world, was founded and endowed in 1865 by Matthew Vassar, a wealthy Poughkeepsie brewer. It has a full corps of teachers and a library of 20,000 volumes, together with collections of water-colors and of American birds, both of great value, an astronomical observatory, and a chemical laboratory. Two miles north of the city, on an eminence above the Hudson, stands the Hudson River State Hospital for the Insane, an immense building erected between 1867 and 1871, with 300 acres of ground attached, and costing \$750,000. Within the city are an opera-house, a free public library, a Young Men's Christian Association building with a free reading-room, St. Barnabas and Vassar Brothers Hospital, and homes for aged men and women. It also contains iron-furnaces, breweries, and manufactories of shoes, glass, mowing machines, pottery, hardware, and various minor industries. The population was 14,726 in 1860, 20,080 in 1870, 20,207 in 1880, and 22,206 in 1890.

Poughkeepsie (forty-two different spellings of the name are said to be found in old records) was settled by the Dutch about 1698-1700. Two sessions of the State legislature were held in the place in 1777 and 1778; the former gave assent to the articles of confederation, and the latter ratified the national constitution. The city charter dates from 1854.

**POULPE**, or **OCTOPUS**. See **CUTTLE-FISH**.

**POULTRY**. The term "poultry" (Fr. *oiseaux de basse cour*) is usually regarded as including the whole of the domesticated birds reclaimed by man for the sake of their flesh and their eggs. The most important are the common fowl, which is remarkable as having no distinctive English name, the Turkey, and the Guinea-fowl, all members of the family of birds known as *Phasianidæ*. The pheasants themselves, belonging to the restricted genus *Phasianus*, are not capable of being domesticated, and the peacock is to be regarded rather as an ornamental than as a poultry bird. The aquatic birds which are strictly entitled to be considered domesticated poultry are the duck and the goose, two species of the latter having been perfectly reclaimed.

The origin of the domesticated breeds is ascribed by

Darwin, Blyth, and other naturalists to the Bankiva fowl, and the number of distinctive breeds of the domesticated fowl has very greatly increased of late years, owing to the emulation excited by poultry shows. Darwin, in his *Variations of Animals, Etc., Under Domestication*, enumerated thirteen principal breeds with numerous sub-varieties, but several very distinctive races have come into notice during the last ten years, varieties having been formed by careful selection that may be relied on for reproducing their own distinctive peculiarities in the descendants, and hence constituting what are regarded by fanciers as pure breeds. The classification of the known varieties is not an easy task; each is capable of interbreeding with every other, and so great an intermixture of local races has taken place that the arrangement of the breeds is as difficult in poultry as in dogs. Game fowls differ less from the wild Bankiva than any other variety; they are, however, considerably larger, and carry the tail more erect than the wild birds. The comb is single, the beak massive, the spurs strong and very sharp. There is a tendency toward the assumption of the female plumage by the males, and distinct breeds of "henney" Game are known. Economically considered, Game are highly esteemed for the table on account of their plumpness, the amount of the breast-meat, owing to the size of the pectoral muscles, being very great, from which cause, combined with their hardihood, they are most valuable for crossing with other breeds, as the Dorking. The Malayan type has been long recognized as of Eastern origin. The birds are of large size, close and scant in plumage, with very long legs and necks.

The Cochin type must be regarded as including not only the birds generally so called but also the Brahmas and Langshans; it is of very large size, some of the males reaching the great weight of sixteen or seventeen pounds. They are distinguished by a profusion of downy plumage, with small wings and tails; they are incapable of long flight, and the pectoral muscles are consequently but feebly developed. The Langshans are a more recent importation; since their introduction they have been bred by careful selection for eating, and have fuller breasts and less abundant plumage than the older known Cochins and Brahmas. Recently a sub-variety of Cochin has been raised in America by crossing with a cuckoo-colored breed long known as Dominiques. These have become fashionable under the name of Plymouth Rocks.

The Spanish or Mediterranean birds are of moderate size, with large single erect combs and white ear lobes.

The Hamburgs, erroneously so called from a name given them in the classification adopted at the early Birmingham shows, are chiefly breeds of English origin. They have double combs and small white ear lobes, and are non-sitters and lay a remarkably large number of eggs.

The crested breeds have long been cultivated on the continent and are admirably delineated in the pictures by Hondekoeter and other early Dutch artists. In Great Britain they are erroneously termed Polish. The best-known breeds in England are the spangled, with a dark mark at the end of each feather. The Crève-cœur is a crested breed of uniform black color; it is of large size and of great value for the table and for egg-production. The Houdan is a black and white breed of very similar character. In some breeds there is an absence of the feathered crest, the crescent-shaped comb becoming more largely developed; such are those known as Guelders, Bredas, and La Flèche, the latter being the best French fowl for eating. A small white-crested variety, profusely feathered on the legs is known as Sultan. The crested breeds are all non-incubating.

In breeding the domestic fowl for useful purposes it is desirable to follow to a greater extent than is usual the natural habits and instincts of the bird. The wild fowl is a resident in forests, coming out to feed in the open; in addition to green vegetables and fruit it lives on grain, seeds, worms, grubs, and insects, which it obtains by scratching in the soil; it roosts in the higher branches of trees, and the hen deposits her eggs on the ground, usually in a concealed situation, laying one egg every other day until the number is completed, when she sits for twenty-one days. On the chickens being hatched they do not leave the nest for twenty-four or thirty hours, being nourished by the absorption of the yolk into the intestinal canal. When they are sufficiently strong to run after the hen she takes them in search of food, which she obtains by scratching in the ground or among decaying vegetable matter.

Poultry-rearing is an industry adapted to the small holder, to the rearer for home consumption, or as an adjunct to the work of a large farm, but as an industry of its own it is never likely to be worked to advantage.

Artificial Incubation, or the process of hatching by artificial heat, was known to the Egyptians, by whom it was carried on, employing the concentrated rays of the sun for that purpose. Within the past twenty years artificial incubation has been extensively engaged in, especially in the United States, England and in portions of Continental Europe. Briefly, the process is as follows: The eggs are placed on wire shelves, arranged in a close box, into which the hot air is introduced through coiled pipe. The temperature within the box is maintained at from 92° to 96°, rendered moist by the presence there of hot water, and at the expiration of from eighteen to twenty-one days the shells break, the chicks are delivered, and the process is completed. The chickens are then fed with worms, larvæ, etc., and are soon able to take care of themselves.

The origin of the domesticated turkey is probably of a composite character; by Mr. Gould and other naturalists this bird is generally regarded as having been derived from the Mexican species *Meleagris mexicana*; but this has recently been crossed with the North American *M. gallo-pavo*, with great advantage as to size and hardihood. The varieties of the turkey differ chiefly as to color. The principal English breeds are the bronze or Cambridgeshire, the black or Norfolk, the fawn, and the white. Of these the first, especially when crossed with the American, is the largest and most desirable.

The Common Guinea-fowl (*Numida meleagris*) is a native of eastern Africa, whence it has been carried to many parts of the world, in some of which, as the West India Islands, it has become wild. It has also been reared in a half-wild state in many English preserves. The birds are useful as furnishing a supply of poultry for the table in the interval that ensues between the time when game is out of season and that before chickens arrive at maturity.

All the varieties of the domesticated duck are descended from the Common Mallard or Wild Duck, *Anas boschas*, a species which, though timid in its wild state, is easily domesticated, and suffers changes of form and color in a few generations. The most important breeds are—the Rouen, which, retaining the color of the original species, grows to a large size; the Aylesbury, a large white breed with an expanded lemon-colored bill; the Pekin, a white breed with a pale yellowish tint in the plumage, and a very bright orange bill; two breeds which are entirely black. For table and market purposes no breed surpasses the Aylesbury; its large size, great fecundity, early maturity, and white skin and plumage cause it to be reared in immense numbers for

the London markets. Duck-rearing is a very profitable industry, very high prices being paid for ducklings in the early months of the year. The so-called Muscovy duck is a Brazilian species *Cairina moschata*, which is not reared for the market, although the young birds are edible.

The domestic goose of Europe is undoubtedly the descendant of the migratory gray lag Goose, *Anser cinereus*, from which it differs chiefly in its increased size. Although domesticated since the time of the Romans, it has not been subject to much variation. The most important breeds are the large gray variety known as the Toulouse, the white breed known as the Embden, and the common variety. There has also been introduced from the Crimea since the Russian war a variety of this breed which is termed the Sebastopol. In some countries a second species is domesticated; it is usually termed the Chinese, knob-fronted, or swan goose, *Anser cygnoides*. Geese are readily fattened, and the young, when brought rapidly forward for the markets, afford a very good profit.

All the different breeds of pigeons which are known to the fancier, have descended from the wild blue rock-dove *Columba livia*, and return to the coloration and form of the wild original if allowed to interbreed without interference. When reared as articles of food with due care and proper management six or seven couples of young can be raised from each old pair during the year, and a continuous supply of young birds for the table can be depended on.

POUND, an inclosure in which cattle or other animals found straying are retained until they are redeemed by the owners, or when taken in distraint until replevined, such retention being in the nature of a pledge or security to compel the performance of satisfaction for debt or damage done. A pound belongs to the township or village, and should be kept in repair by the county. The pound-keeper is obliged to receive everything offered to his custody, and is not answerable if the thing offered be illegally impounded.

POUSHKIN, ALEXANDER, the most celebrated of Russian poets, was born at Moscow, June 7, 1799. In 1837 the poet, who had been long growing in literary reputation, fell mortally wounded in a duel with Baron George Heckeren d'Anthès, the adopted son of the Dutch minister then resident at the court of St. Petersburg. Poushkin remains as yet the greatest poet whom Russia has produced.

POUSSIN, NICOLAS, French painter, was born at Les Andelys (Eure) in June, 1594, and died in 1665.

POUT, also WHITING-POUT or BIB (*Gadus luscus*), a small species of cod-fish locally abundant on the coasts of northern and western Europe, but less so in the Mediterranean. It is distinguished from other species of the genus *Gadus* by having a deep short body; a short and obtuse snout, not longer than the eye; the upper jaw the longer; and a long barbel at the chin.

POWAN, or POWEN (*Coregonus clupeioides*), a species of the Salmonoid genus *Coregonus*, which seems to be peculiar to Loch Lomond in Scotland, the great lakes of Cumberland, where it is called "schelly," and Lake Bala in Wales, the Welsh name of the fish being "gwyniad."

POWERS, HIRAM, American sculptor, was the son of a farmer, and was born at Woodstock, Vt., on June 29, 1807. In 1826 he began to frequent the studio of Mr. Eckstein, and at once conceived a strong passion for the art of sculpture. After studying thoroughly the art of modeling and casting, he in the end of 1834 went to Washington, and a friend having secured for him as sitters the president and some of the leading statesmen his remarkable gifts soon awakened

general attention. In 1837 he settled in Florence, where he remained till his death. While from pecuniary considerations he found it necessary to devote the greater part of his time to busts, his best efforts were bestowed on ideal work. In 1838 his statue of Eve excited the warm admiration of Thorwaldsen, and in 1839 he produced his celebrated Greek Slave, which at once gave him a place among the greatest sculptors of his time. Among the best known of his other ideal statues are the *Fisher Boy*, *Il Penseroso*, *Proserpine*, *California*, *America* (modeled for the Crystal Palace, Sydenham), and the *Last of his Tribe*. He died on June 27, 1873.

POZZO DI BORGO, CARLO ANDREA, Russian diplomatist, was descended from an old Corsican family, and was born at Alata near Ajaccio on March 8, 1764. He died in 1842.

POZZUOLI, the ancient PUTEOLI, a city of Italy, on the northern shore of the Bay of Pozzuoli (Sinus Puteolanus or Cumanus)—the western portion of the Gulf of Naples, separated from the larger eastern portion by the promontory of Posillipo and from the open sea on the west by the peninsula which terminates in Cape Miseno. Population (1890), 12,000.

PRADIER, JAMES, French sculptor, was born at Geneva in 1790 and died in Paris on June 5, 1852.

PRAED, WINTHROP MACKWORTH, one of the most illustrious English writers of *vers de société*, was born at 35 John Street, Bedford Row, London, July 26, 1802. He died at Chester Square, London, on July 15, 1839, and was buried at Kensal Green on July 23d.

PRÆFECT (*præfectus*) was the title of various Roman officials, both civil and military. A præfect was not one of the magistrates proper; he was, strictly speaking, only the deputy or lieutenant of a superior magistrate or commander.

1. The city præfect (*præfectus urbi*) acted at Rome as the deputy of the chief magistrate or magistrates during his or their absence from the city.

Under the empire there was introduced a city præfecture which differed essentially from the above. Augustus occasionally appointed a city præfect to represent him in his absence from Italy, although the prætors or even one of the consuls remained in the capital.

2. Under the republic judicial præfects (*præfecti juri dicundo*) were sent annually from Rome as deputies of the prætors to administer justice in certain towns of the Italian allies.

3. Under the empire the prætorians or imperial guards were commanded by one, two, or even three præfects (*præfecti prætorio*), who were chosen by the emperor from among the knights and held office at his pleasure.

PRÆMONSTRATIENSIS. See ABBEY, and MONACHISM.

PRÆMUNIRE, the name given to a writ originating in the fourteenth century in the attempt to put restraint on the action of the papal authority in regard to the disposal of ecclesiastical benefices in England before the same became vacant, and subsequently, to the prejudice of the rightful patron, and also in the encouragement of resort to the Roman curia rather than to the courts of the country, in disregard of the authority of the crown, leading thereby to the creation of an *imperium in imperio* and the paying of that obedience to papal process which constitutionally belonged to the king alone. The word "præmunire" is applied also to the offense for which the writ is granted, and furthermore to the penalty it incurs.

PRÆNESTE (now PALESTRINA), a very ancient city of Latium, lies twenty-two miles east of Rome, on a spur of the Apennines facing the Alban Hills. The modern

town of Palestrina, a collection of narrow and filthy alleys, stands on the terrace once occupied by the temple of Fortune.

PRÆTOR (*præ-itor*, "he who goes before," "a leader"), originally a military title, was in classical times the designation of the highest magistrates in the Latin towns. The Roman consuls were at first called "prætors"; in the early code of the Twelve Tables (450 B.C.) they appear to have had no other title. By the Licinian law of 367 B.C., which abolished the military tribunes with consular power and enacted that the supreme executive should henceforward be in the hands of the two consuls, a new magistrate was at the same time created who was to be a colleague of the consuls, though with lower rank and lesser powers. This new magistrate was intrusted with the exclusive jurisdiction in civil cases; in other respects his powers resembled those of the consuls. His distinctive title was the "city prætor" (*prætor urbanus*), and in after time, when the number of prætors was increased, the city prætor always ranked first. The prætors were elected, like the consuls, by the people assembled in the *comitia centuriata* and with the same formalities. (See CONSUL.)

PRÆTORIANS (*prætoriani*) was the name borne by the body-guards of the Roman emperors. The name was derived from the prætorian cohort, a picked body of troops who in the time of the republic formed the guard of a general in command of an army, the old Latin name for a general being *prætor* and his quarters in the camp being known as the *prætorium*. As the emperor was commander-in-chief the headquarters (*prætorium*) were established at Rome, and one of the earliest measures of Augustus was the new organization of the guard. The command of the prætorians rested legally with the emperor, but after 2 B.C. it was practically exercised by one or more colonels chosen by the emperor with the title of "prætorian præfects" (*præfecti prætorio*, see PRÆFECT).

PRÆTORIUS, MICHAEL, German musical historian, theorist, and composer, was born at Kreuzberg in Thuringia, February 15, 1571. He died in 1621.

PRAGMATIC SANCTION, the technical name given to some decrees which have been issued as fundamental laws. There is a famous document known as the Pragmatic Sanction of St. Louis, which contains six articles directed against the assumptions of the papacy; but there are reasons for doubting its genuineness. In 1438 Charles VII. of France issued at Bourges a pragmatic sanction which embodied the most important decisions of the council of Basel. The most famous of all pragmatic sanctions was that of the emperor Charles VI. In 1713 it was issued as a family statute, but, as the emperor proposed that it should become a fundamental law of the state, it was afterward submitted to the diets of the lands ruled by the house of Austria by hereditary right. Having been accepted by the estates of Lower Austria and Bohemia in 1720, by the Hungarian diet in 1722, and by the remaining diets between 1720 and 1724, it was proclaimed as a fundamental law on December 6th, 1724. By this edict it was decreed that the Austrian lands should always be united; that they should be ruled by Charles VI.'s male descendants; that, if he had no male descendants, his territories should pass to his female descendants; and that, if his female descendants died without issue, the right of succession should belong to the daughters of his brother Joseph and to their male and female offspring in accordance with the law of primogeniture. In the interest of his daughter Maria Theresa the emperor spared no pains to secure from the empire and from the other powers guarantees for the execution of this law; and, when his nieces, who as the daughters of his elder

brother might prove to be dangerous rivals of Maria Theresa, were married, one to the electoral prince of Saxony, the other to the electoral prince of Bavaria, he caused them to declare on oath that they abandoned their claims. Nevertheless after his death the pragmatic sanction led to the War of the Austrian Succession. In 1759 a pragmatic sanction was issued by Charles III. of Spain granting the throne of the Two Sicilies to his third son and his descendants.

PRAGUE (German, *Prag*; Bohemian, *Praha*), the capital of Bohemia, the seat of an archbishop, and the third largest town of the Austrian-Hungarian monarchy, lies on both banks of the Moldau in 50° 5' N. latitude and 14° 25' E. longitude, 150 miles to the northwest of Vienna and 75 miles to the south-southwest of Dresden. Population (1890), (with suburbs) 304,000.

The foundation of Prague is ascribed to the princess Libussa, who appears at the beginning of the eighth century of our era as ruling the Bohemians from her stronghold of Wyscherad on the right bank of the Moldau. It is at least certain that the town made rapid progress under the fostering care of the early Bohemian sovereigns, and in the thirteenth century it was able to bid defiance to the Tartar hordes that then overran the country. Its chief period of prosperity was the reign of Charles IV. (1346-1378), who by founding the university, establishing fairs, and investing the town with valuable privileges attracted to it numerous strangers. At this time Prague was perhaps the most important town in Germany, and could even boast of an independent school of art. Afterward, however, Prague became the center of the agitation that culminated in the Hussite wars, and thus brought upon itself a long train of misfortunes. The Hussites took possession of the city soon after defeating the emperor Sigismund, and allowed their religious zeal to carry them so far as to destroy many of the most interesting old churches in the city—a fact that accounts for the want of venerable ecclesiastical edifices in Prague. The town was, however, afterward rebuilt by the imperialists upon an improved scale. Under Rudolf II. (1576-1612) a second season of prosperity was enjoyed; Copernicus, Tycho Brahe, and other men eminent in science, art, or letters flocked to the court of this enlightened monarch and contributed to the importance of his capital. Prague suffered its full share of the evils of the Thirty Years' War, which may be said to have begun here with the precipitation of the councilors from the window of the Hradschin (1618), and to have ended here with the occupation of the Kleinseite by the Swedes in 1648. The town was occupied by the imperialists after the defeat of the Protestants at the White Hill in 1620, and its Protestant sympathies caused it to find scant grace in the eyes of the victors. It was taken by Swedes in 1631, by Wallenstein in 1632, by the French and Bavarians in 1741, and by Frederick the Great in 1744. In 1757 it narrowly escaped a second capture by Frederick, who held it closely invested after defeating the Austrians at the battle of Prague, but was compelled to raise the siege by the disaster of Kolin. This was the last time Prague underwent a siege, though it was occupied by the Prussians in 1866. During the present century its material advance has been unbroken, but its harmonious social development has been hampered by the disunion between the Czechish and German elements of its population. The revolutionary ideas of 1848 found a warm response in the nationalist party of Bohemia, and a Pan-Slavonic congress was opened at Prague in May of that year. Unfortunately, however, a collision took place between the military and the populace, and Prince Windischgrätz forcibly dissolved the congress and

bombarded the town for two days. In 1862 a new impetus was given to the Slavonic agitation by the formation of a Bohemian diet, and since then the fissure between the warring races has grown wider rather than diminished. The Slavs seem to be steadily gaining ground at the expense of the Germans in both numbers and influence. Among the celebrated natives of Prague the most eminent in public interest are John Huss (1369-1415) and Jerome of Prague (c. 1365-1416). A fragment of the house of the former is still shown in the Altstadt.

PRAHRAN, a city of Victoria, Australia, is situated about three and a half miles southeast of Melbourne, with which it is connected by the Melbourne and Brighton Railway, and by road over a fine iron girder bridge which crosses the Yarra. The area of the city is 2,320 acres, with a population in 1881 of 21,169.

PRAIRIE DOG. See MARMOT.

PRAKRIT (*prākṛta*, "common," as contrasted with *sanskṛta*, "perfect") is the term applied to the vernacular languages of India derived from Sanskrit. (See SANSKRIT.)

PRAM, CHRISTEN HENRIKSEN, Scandinavian poet, was born in Gudbrandsdal, Norway, in 1756, and died in the West Indies in 1821.

PRATINCOLE, a word apparently invented by Latham, being the English rendering of *Pratincola*, applied in 1756 by Kramer to a bird which had hitherto received no definite name, though it had long before been described and even recognizably figured by Aldrovandus under the vague designation of "*hirundo marina*." It is the *Glareola pratincola* of modern ornithologists, forming the type of a genus *Glareola*, founded by Brisson in 1760, and unquestionably belonging (as is now generally admitted) to the group *Limicola*, being either placed in the family *Charadriidae* or regarded as constituting a separate family *Glareolidae*. The pratincoles, of which some eight or nine species have been described, are all small birds, slenderly built and most delicately colored, with a short stout bill, a wide gape, long pointed wings, and a tail more or less forked.

PRATO, a city and bishop's see of Italy, in the province of Florence, on the north edge of the alluvial plain which extends between Florence and Pistoia. By rail it is distant from the former city eleven and one-fourth miles, and from the latter nine and three-fourths.

PRATT, CHARLES. See CAMDEN, EARL.

PRAXITELES, a Greek sculptor, son and apparently also pupil of the Athenian Cephisodotus. There has been found at Olympia, where it still remains, a marble statue from his hand, *Hermes carrying the infant Dionysus*.

PRECEDENCE. This word in the sense in which it is here employed means priority of place, or superiority of rank, in the conventional system of arrangement under which the more eminent and dignified orders of the community are classified on occasions of public ceremony and in the intercourse of private life. In the United States in the very nature of things there can be no precedence save that allowed by common consent to persons of distinguished merit. An exception to this remark is, of course, found in the officers of the army and navy.

PREDESTINATION is a theological term, sometimes used with greater latitude to denote the decree or purpose of God by which He has from eternity immutably determined whatever comes to pass; sometimes more strictly to denote the decree by which men are destined to everlasting happiness or misery; and sometimes with excessive strictness to denote only predestination to life or election.

The question to which the theory of predestination supplies an answer, although it has a special interest to Christian thought, yet arises in all minds which are occupied with the problems of human existence. That question is, To what cause can we refer the diversities in human character, fortunes, and destiny? The Greek tragedians made it their business to exhibit the helplessness of man in his strife against fate. Sometimes, indeed, they explicitly distinguish fate from a mere pitiless and non-moral sovereignty and identify it with the Nemesis which pursues hereditary or individual guilt; and sometimes—as in the case of *Œdipus*—they follow the history of the sufferer for the sake of showing how the predestined and inevitable transgression and punishment educate the character. But the idea which fascinates and pursues them is that man cannot escape his destiny; that his life is woven with a "shuttle of adamant," and that when God means to destroy a man He makes evil seem good to him. The Greek philosophy tended in the same direction; and the Stoic doctrine of necessity or providence, though based on a broad and thoroughly philosophical view of nature and of man's place in it, was entangled in the very difficulties which attach to Calvinism.

The doctrine of predestination was first formulated in the church by Augustine. The Pelagian idea that man is competent to determine his own character, conduct, and destiny was repugnant to him, and he strove to show that the initial and determining element in the salvation of the individual is not the human, but the divine, will. He based his position upon the doctrine of original sin and the consequent depravity of the will. This doctrine represents the whole human race as involved in moral ruin, guilty and sinful, incapable of self-regeneration or of willing what is good. By God alone, therefore, can regeneration and deliverance be accomplished. The salvation designed by God must not be allowed to depend for its efficacy on the depraved and incapable will of man; it must be an absolute act of power on God's part. Provision must be made not only for the offer but for the acceptance of grace. In a word, grace must be effectual or irresistible.

At the Reformation the discussion was drawn back from the endeavor initiated by the schoolmen to find for the doctrine of predestination a scientific basis in the nature of God and His connection with the world. The more circumscribed method of Augustine was reverted to, and it was deemed sufficient to show that predestination was indispensable to the ideas of grace which found a response in the devout Christian consciousness, and that it was in harmony with Scripture. Not only Calvin, but much more unguardedly Luther, and even Melancthon in the earliest (1521) edition of his *Loci Communes*, taught the most rigid Augustinian doctrine. In the later editions (1535, 1543) Melancthon greatly modified his opinions and inclined more to the synergistic view, though even in this he was not thoroughgoing. But the attempt to terminate the synergistic controversy saddled the Lutherans with a symbol—the *formula concordie*—which, awkwardly enough, rejected both the Semipelagian theory of coöperation and the Augustinian doctrine of predestination. The consequence has been that later Lutheran theologians, in their efforts to purge their church of this inconsistency, have devised the theory that man, unable as he is to will any good thing, can yet use the means of grace, and that these means of grace, carrying in themselves a divine power, produce a saving effect on all who do not voluntarily oppose their influence. Baptism, *e.g.*, confers grace which, if not resisted, is saving. And God, foreseeing who will and who will not resist the



grace offered, predestinates to life all who are foreseen as believers.

PREÈMPTION. See SALE.

PRELATE. See ABBOT and BISHOP.

PRELLER, FRIEDRICH, German landscape-painter, was born at Eisenach April 24, 1804. He was also a successful etcher, and died at Wiemar April 23, 1878.

PRELLER, LUDWIG, author of well-known works on Greek and Roman mythology, was born at Hamburg, September 15, 1809, and died in 1861.

PRENZLAU, or PRENZLOW, a town of Prussia, in the province of Brandenburg, lies on the lower Ucker See, sixty miles north-by-east of Berlin and thirty miles west-by-south of Stettin. In 1880 Prenzlau contained 16,933 inhabitants, nearly all Protestants and many of French descent. The garrison consists of about 800 men.

PRERAU (Slav. *Prerov*), one of the oldest towns in Moravia, lies on the Bečwa, thirteen miles to the southeast of Olmütz. The population in 1880 was 10,985.

PREROGATIVE, in law, is an exclusive privilege of the crown. The word, originally an adjective, is derived from the *centuria prerogativa*, or century which voted first on a proposed law (*rogatio*) in the Roman *comitia centuriata*. In English law, Blackstone says, "by the word prerogative we are to understand the character and power which the sovereign hath over and above all other persons, in right of his regal dignity; and which, though part of the common law of the country, is out of its ordinary course."

PRESBYTER. Toward the end of the second century the organization of the Christian congregations throughout the Roman empire, at least of all the greater ones, was identical. At the head of each was the bishop, whose function it was to conduct public worship, control the church funds, and keep watch over the manners of his flock. The free prophets and teachers having almost everywhere died out, the duty of religious instruction and edification also fell on him. In conducting the worship and in ministering to the wants of the poor he was assisted by the deacons as his subordinates. The presbyters formed a college, whose business was that of advising the bishop. Of this college he was the president, and as such he was himself a presbyter, and conversely the presbytery, inclusive of the bishop, formed the governing body of the community. Outside of the presbytery the individual presbyter as such had no definite official duties. If he baptized, celebrated the eucharist, preached, or the like, this was only as commissioned and deputed by the bishop. Such deputation was frequently necessary, and therefore the presbyter behaved as far as possible to be qualified to teach. As member of the college, which before everything had to do with jurisdiction and discipline, it was required of him that he should be of blameless life, that he should administer just judgment without respect of persons, and that in private life also he should as occasion offered exhort and admonish the faithful and set before them the law of God. The presbyters, who as a rule were expected to be men of advanced years, were, like the bishop and the deacons, chosen by the congregation.

The office of presbyter was not during the oldest period (90-140) a *spiritual* one. The apostle, the prophet, the teacher, in a certain sense also even the old bishop and deacon, had a spiritual character, for they possessed a charisma. It was not so with the presbyters; they had no charisma, and the respect in which they were held arose out of the *natural* position which they took within the congregations.

PRESBYTERIANISM. The Presbyterian form

of church government began at the Reformation, and attained development only in the churches commonly called "Reformed."

In 1526 John Brenz drew up at Halle (Swabia) a scheme including elders, ministers chosen from the elders, and councils, by which the elders were chosen by the government, who also had the final decision in all questions of importance. Franz Lambert, at the same time, provided for the church at Hesse provincial synods, representative of the churches, and a general or land synod, under the control of the government. Within the limits of a congregation the scheme was purely congregational. At Ziegenhain, in 1539, a decided advance was made toward autonomy, as only half the elders, who had extended powers, were there chosen by the government. Zwingli theoretically gave the power to the congregation, practically to the civil power, as being the representative of the church. In Basel, in 1529, the clergy alone had the power of church discipline. In 1530, however, Ecolampadius, fearing a spiritual tyranny, wished to join a body of elders with the clergy, to be chosen by the council, partly from its own body and partly from the congregation, four from each, who with the clergy would form the "censurum consensus." But the council, fearing the *imperium in imperio*, preferred four colleges, one for each parish, each college being formed by two members of the council, one of the congregation, and the minister; and the council also retained the final decision regarding excommunication. At Strasburg (1531) the council created an assembly of the ministers of the seven churches, with three life elders from each, nominated by the council. In 1534 this system was modified: ordinary matters were settled each fortnight by the minister and three of the twenty-one elders. Difficult questions were carried to the twenty-one, and discipline, short of excommunication, to them with the seven ministers. Capito's system at Frankfort differed from this in that only three out of nine elders were elected by the council, and that the office was for three years only.

These all remained mere theories, limited, fragmentary, and abortive. Calvin set himself to create a majestic and comprehensive system and to give to it the double authority of argumentative statement and practical realization. He saw that the impulses and the aspirations of the Reformation were, for want of discipline, robbed of a large part of their dynamic force. He threw these forces and aspirations into the mold of his own genius, developed order out of tumult, and created a definite, yet elastic code, which should match the discipline of Rome and at the same time frustrate the anarchical tendencies of extreme Protestantism. The contrast with Luther is complete: Luther created, Calvin fashioned; "the watchword of the one was war, of the other order." Calvin, surrounded by Catholic powers, felt more strongly than Luther that a definite protest as to church government was necessary. His leading principles are that—(1) a separate ministry is an ordinance of God; (2) ministers duly called and ordained may alone preach and administer sacraments; (3) a legitimate ministry is one where suitable persons are appointed with the consent and approbation of the people, but that other pastors should preside over the election to guard against inconstancy, intrigue, or confusion, the final act of ordination, the laying on of hands, being confined to the pastors; (4) to cooperate with the pastors there should be "governors," whom he "apprehends" to be persons of advanced years, selected from the people to join with the pastors in admonishing and in exercising discipline; (5) discipline, the ordering of men's lives, is all-important and is the special business of the governors aforesaid.

With regard to the relations between the church and the state, Calvin was utterly opposed to the Zwinglian theory, whereby all ecclesiastical power was handed over to the state. The political administration, he says, is as necessary to human weakness as are food and light and air; but it has not the right to legislate for religion or divine worship, though it must take care that the gospel religion is not insulted or injured. "The church of God stands in need of a certain spiritual polity, which, however, is entirely distinct from civil polity, and is so far from obstructing or weakening it, that on the contrary it highly conduces to its assistance and advancement."

The course of events in Geneva had developed a theocratic feeling; and the essence of a theocracy seemed gained when the citizens were summoned by tens in 1536 to swear to the confession contained in Calvin's first *Catechism* (really an analysis of the *Institutes*). They swore as citizens, and those who refused lost their citizenship. As soon, however, as Calvin attempted to make this a reality trouble followed. His ruling idea was discipline, and this was exercised against both the moral and the spiritual libertines—against those who objected to the discipline of manners and those who disliked submission to the confession. As the reins were drawn tighter these two bodies gained influence in the council, and inveighed against the new popedom. At length, in 1538, when Calvin, Farel, and Conrad refused to give the communion in a city which, as represented by the council, would not submit to church discipline, the storm broke out. The three preachers were banished, and Calvin retired to Strasburg. This refusal of the sacrament is important as a matter of ecclesiastical history, because it is the essence of that whole system which Calvin subsequently introduced, and which rests on the principles that the church has the right to exclude those who, according to her judgment, appear unworthy, and that she is in no way subject to the state in matters of religion. For the present the state had refused to admit the claims of the church. Calvin laid down as the conditions of his return the recognition of the church's independence, the division of the town into parishes, and the appointment by the council of elders in each parish for excommunication. The feeling, however, was for three years too strong; the banishment was confirmed on the specific ground that the insistence on excommunication was an attempt at despotic power. Calvin's absence left the town a prey to anarchy; one party threatened to return to Romanism, another to give up their independence to Bern. It was felt to be a *political* necessity to recall Calvin, and in 1541 he returned on his own terms. Meanwhile he had been maturing and carrying out his system in the French and Walloon churches in Strasburg.

In 1549 Lasky, who had established a flourishing church at Emden, was driven to London. There in 1550 he became superintendent of the foreign congregation, which was independent of the state church, but which was intended by the king to serve as a model to be followed when England should be ripe for reform. This church was in two congregations, French and German. The French kept the Genevan system, the German a modification of it. In this latter the ministers, elders, and deacons were chosen by the written votes of the congregation, with revision and final decision by the officers already existing, though any objection on the part of the congregation must be duly considered. The strictest discipline was carried out.

*Scotland.*—The initial conditions of Scottish Presbyterianism are seen in the historical facts—(1) that the Reformation was the form taken by the triumph of a violent and grasping aristocracy over the encroachments

of the sovereign and an alien church; and (2) that John Knox was its spiritual leader. Under his advice the Protestant nobles in December, 1557, formed themselves into a covenanted body called "The Lords of the Congregation;" in 1559 Perth declared itself Protestant, and Knox's sermon there on May 11th was the manifesto of revolt. In 1560, being hard pressed, the lords concluded with England the Pacification of Berwick, and a few months later the treaty of Edinburgh, whereby the whole government was placed in their hands.

To the parliament which now assembled a petition was addressed praying (1) that a "true kirk of God" and the sound doctrines of the Reformation might be established, (2) that the true discipline of the ancient church might be restored, and (3) that the ecclesiastical revenues might be applied to the support of the ministry, schools, and the poor. Meanwhile the Reformers garrisoned, as it were, the country. Under Knox's agency Edinburgh, St. Andrews, Aberdeen, Jedburgh, Perth, Dunfermline, and Leith had fixed ministers appointed, while wider districts were placed under superintendents or traveling ministers. To meet the first prayer of the petition Knox and five other ministers drew up a scheme of doctrine and discipline. The *Confession of Faith*, produced within four days and ratified by the three estates on July 17, 1560, was naturally aggressive and uncompromising. It expresses abhorrence especially of the blasphemy of them "that affirme that men who live according to equity and justice shall be saved, what religion soever they have professed," and of all the doctrines of the Anabaptist. The civil magistrate is appointed for the "suppressing of idolatrie and superstition whatsoever." Above all, no mercy was to be shown to Catholicism; the celebration of mass was to be punished by death. To accomplish the second prayer of the petition the Reformed ministers and the leading Protestant nobles met at Edinburgh on December 20, 1560. This was a purely church meeting; parliament had in it no part whatsoever. Even in its birth the Scottish Church announced its independence. It will, however, be observed that there were in the forty-six members comprising it but six ministers. At this assembly was drawn up the *First Buik of Discipline*, which, though not accepted by the privy council, was on January 27, 1561 signed by the great majority of the members, and by the chiefs of the great Protestant families, on the noteworthy condition that the deposed prelates were allowed to enjoy their benefices during life. This book, which was a grand effort to reconstruct society, and for which its authors asserted, "they took not their example from any kirk in the world—no, not from Geneva," was nevertheless on the Genevan principle.

Care was taken to preserve the rights of the congregation: "It apperteaneth to the Pepill, and to everie several congregation, to elect their minister. \* \* \* Altogether this is to be avoided that any man be violently intruded or thrust in upon any congregation." But, once elected, he is irremovable, except for heinous crimes or by the majority of the whole kirk. Of course he is strictly "examined" as regards both "lyiff and maneris" and "doctryne and knowlege," and especially as to his grasp of the chief points of controversy with Papists, Anabaptists, etc. No special method of nomination of elders is laid down, but from those nominated the whole congregation is to choose, special care being taken "that every man may gyf his vote freelie." The liberty of the churches is preserved by making the elections of elders and deacons annual. The affairs of each congregation were managed by the kirk session (French "consistoire"), which met at least once a week. In every considerable town another weekly meeting was held, called

the "exercise of prophesying," which in course of time became the presbytery or classical assembly (colloque). It was formally erected in 1579, and generally introduced in 1581. Then, again, the superintendent, with the ministers and delegated elders of his district, formed what developed into the provincial assembly. To this any one aggrieved by the kirk session might appeal, and, if necessary, the appeal went to the general assembly. This right of appeal was given in 1563. The general assembly, composed of delegated ministers and elders, into the constitution of which a change similar to that in France in 1565 was introduced in 1568, met as occasion served.

During the troublous years 1566-7 the kirk, stable in a time of confusion, consolidated her strength, and within her own bounds established the strictest discipline. In 1567 parliament made the monarchy Protestant, ratified the rights of the church to collation, and established the important principle, resisted from time to time, that the "thirds" of benefices should be henceforth collected by persons nominated *by herself*, and that she should pay the surplus into the exchequer after satisfying the ministers' stipends. Her progress may be gathered from the fact that, while in 1560 the general assembly contained only six ministers and thirty-four laymen, in 1567 it contained 252 ministers and 467 readers. Her power is seen in the censure passed upon the countess of Argyll, the earl being the most powerful of the nobility, for assisting at the baptism of Mary's son with Catholic rites.

In 1574 Andrew Melville appeared on the scene, and, by steady persistence gave fresh life to the church. The *Second Book of Discipline*, sanctioned by the general assembly in April, 1578, and ordered in 1581 to be registered in the acts of the church, represents her determination to repel the aggressions of the nobility. It was decreed that no more bishops should be appointed, that the existing ones should be called by their own names, not by their titles, and that they should submit to the general assembly for disposal.

The *First Book of Discipline* occupied itself chiefly with the congregation, the *Second Book* with the dependence of the congregation upon higher courts. It did away with superintendents and established complete parity among ministers, transferring discipline and authority from individuals to bodies of men.

The contest which was waged during 1582-84 between the kirk and the crown was chiefly concerned with the denial by Melville of the primary jurisdiction of the privy council over ministers summoned for offenses committed in their ministerial capacity. He demanded in his own case to be tried, in the first instance, by the ecclesiastical courts. A more important case of the same claim, because connected with less important persons, occurred in 1591, and the demand of the church was allowed so far that the offender was tried in both courts concurrently. In May, 1584, the parliament met secretly and, having been thoroughly corrupted by the court, passed the "Black Acts." Act 2 declared Melville's claim to be treason; act 4 forbade presbyteries, synods, and assemblies, as being not allowed by parliament; act 20 reestablished episcopacy and made it treason to speak against any of the three estates (*e.g.*, bishops). The king was made supreme in all cases and over all persons, while none were to presume "to meddle with the affairs of his Highness and estate." The course of events from 1584 to 1592, the fear of Catholic Spain, the league with England, and especially the ability of Robert Bruce led to a settlement, by which in May, 1592, Presbyterianism was restored and ratified by parliament. It was of course a compromise, as is shown in the provision that, if a presby-

tery refuse to admit a qualified minister, the patron may retain the income.

The quarrel, however, was not to be settled. For rejecting the bill of attainder against the popish lords the synod of Fife excommunicated James and convened a meeting from the whole kingdom to complain of his conduct. A little later Andrew Melville, when sent on a deputation, called James "God's silly vassal," and told him that there were two kings and two kingdoms in Scotland; King James the head of the commonwealth and Christ Jesus the head of the church, whose subject he was. James, however, was strong enough to remain inflexible and to secure a victory on the question of the church courts, which, in the case of David Black, one of the ministers of St. Andrews, who had in a sermon reflected upon the queen and Church of England, had arisen in its most acute form.

Two alternative steps were now suggested for preventing future strife, the establishment of episcopacy or the admission into parliament of representatives of the church without any title or jurisdiction derived from the crown. In a general assembly opened at Perth on February 29, 1597, and packed with ministers from the remote northern presbyteries, where the democratic spirit of the High Presbyterians of the south was unknown, James obtained leave to suggest in a future assembly alterations in the existing government of the church, a disapproval of the discussion of state questions and of the denunciation of individuals from the pulpit, and the forbidding of extraordinary conventions. Ministers were also to confine their discourses strictly to their own congregations, and summary excommunication was abolished. He had previously with a high hand put down the opposition of the Edinburgh ministers, Bruce and others seeking safety in flight.

In April, at Dundee, an assembly similar to that of Perth consented that commissioners should be appointed to advise the king on church affairs, which step in a great degree freed him from the general assembly. These commissioners were easily induced to petition that the church might be represented in parliament. Parliament thereupon passed an act allowing those to sit there who might be appointed *by the king*, as bishop, abbot, or other prelate, the duties of their offices to be determined in conference with the assembly. At the second assembly of Dundee, however, which met on March 7, 1598, and at which Andrew Melville was refused admittance by James on frivolous though legal grounds, it was resolved that fifty-one representatives of the church, chosen partly by the king and partly by the church, should vote in parliament.

Almost the first act of Charles I. was to proclaim the strict observance of the articles of Perth. In November 1625 he revoked all the acts of his father prejudicial to the crown, as a first step toward the resumption of the church lands. This, of course, met with the vehement opposition of the nobility, and the scheme in the end had to be given up. In 1630 Maxwell, in Laud's confidence, was sent to Scotland to try to force upon the people the English liturgy. It is significant of the change in feeling that a paper of grievances sent in by ministers was supported by several of the nobility. Their hatred was always directed to the nearest enemy, against the crown before the Reformation and during its early stages, against the Reformed Church of late years, now against the crown again. In 1633 Charles came to Edinburgh and forced through the convention the "Act anent his Majesty's Prerogative and Apparel of Churchmen," a combination of two acts passed in 1606 and 1609 respectively. All protests were disregarded and the whole nation was thrown into a state of anger and disappointment. The attack on Balmerino still

further alienated the lords. In 1635 diocesan courts were erected with the most vexatious powers, and the *Book of Canons*, subversive of Presbyterianism and insulting in language, was distributed; and in 1636 the people were ordered to adopt Laud's book of public worship; while in July, 1637, the prelates obtained an order of outlawry against ministers who should be backward in receiving the liturgy. As Baillie said, they were like to go "to Rome for religion, to Constantinople for policy." On July 23d, however, the outburst of St. Giles' took place. The history of the great rising cannot be traced here. The National Covenant, which was its outcome, drawn up by Alexander Henderson and Johnston of Warriston, consisted of the *Second Book of Discipline*, a recapitulation of the acts of Parliament condemning Popery and ratifying the acts of the general assembly, and the application of the whole to present times.

After some months of trickery and evasion, frustrated with firmness and ability by the Covenanters, the general assembly met on Wednesday, November 21 1638. When they determined to sit in judgment on the prelates, Hamilton, the king's commissioner, dissolved the assembly. It, however, continued its sitting, refused to acknowledge the assemblies which had introduced prelacy, condemned the acts of Perth and all the late innovations, and abjured all episcopacy different from that of a pastor over a particular flock. Baillie alone made a stand for not rejecting episcopacy as represented by the superintendents of Knox's time. Eight prelates were excommunicated, four deposed only, two reduced to the simple pastorate. All church assemblies were restored, and the principle that the consent of the congregation was necessary to a minister's appointment was reënacted. Schools and schoolmasters were at once to be provided. In August, 1639, an act was passed, called the Barrier Act, that no change should be made in the laws of the church until the proposal had been submitted to all provincial synods and presbyteries. The church was now secure. She had gained the day as against the crown, and had taken her affairs into her own hands.

Passing over the events of the next six years, as coming more conveniently under the head of England, we notice that the moment external danger was removed the natural and abiding antipathy between a licentious and entirely selfish aristocracy and a masterful, censorious, and democratic church broke out. Two parties showed themselves—that of the ministers, who insisted that no arrangement should be come to with Charles unless he would take the covenant (compare the French "consistoriaux"), the other headed by Hamilton, Lanark, Lauderdale, and others, who "engaged" to raise an army for him on condition, ostensibly, that he would confirm Presbyterian church government for three years. The real conditions, as long believed but only just discovered, contain not a word about the church, but are entirely concerned with the privileges of the Scottish nobility. A vehement disruption of the church at once took place and did not cease until the defeat of Hamilton. Then the ministers were once more masters. Parliament repealed the Act of Engagement and passed the Act of Classes, whereby all those to whom the church deemed it inexpedient to give political power were registered in four classes according to their faults. It was by this parliament that lay patronage was abolished, and that the rights of the congregation as to election of ministers were settled for the time. After the battle of Dunbar, when troops were being hastily raised, the Act of Classes stood much in the way. In spite of the remonstrances of Patrick Gillespie and the western Covenanters, the commission of the

assembly (which sat *en permanence* during the recess of the assembly itself) resolved to allow all persons to serve who were not professed enemies to the Covenant or excommunicated. The parliament went further and rescinded the Act of Classes altogether. Against this union of the church with the "malignants" Gillespie's faction protested, and henceforward the rivalry and bitterness between Resolutioners and Protesters, the latter being favored by Cromwell, deprived the church of much of its power of resistance. Both parties, absorbed in their quarrel, looked on while Monk, after the battle of Worcester (1651), took the matter into his own hands by refusing to allow any general assembly whatever to meet, though he permitted the continuance of the other assemblies.

Within two years of the Restoration the Presbyterian Church ceased to exist. Weariness, internal dissension, the indifference or positive hatred of the nobles, and the extremity of treachery in James Sharp brought about the downfall. Finally, on August 14, 1661, episcopacy was restored by proclamation; Sharp, Fairfoul, Hamilton, and Leighton were consecrated in London; and on January 2, 1662, all Presbyterian assemblies of every sort, unless authorized by the prelates, were forbidden.

Revolt soon followed; it was crushed at Pentland and ruthlessly punished. But the nobles speedily became jealous of the growing power of the prelates. Lauderdale in especial saw his influence threatened. He reported to Charles that prelacy was becoming as great a danger to the crown as Presbyterianism had been, "so unwilling are churchmen, by whatever name they are distinguished, to part with power." Sharp was easily threatened and cajoled, and Burnet, after a struggle of three years, was forced to resign. It was not, however, until after the fall of Clarendon in 1667 that indulgence was seriously tried there as in England. In July, 1669, ten ministers, of whom Hutcheson was the chief, who were willing to admit the ecclesiastical supremacy of the king, and to accept the bishops' collation, were allowed to return to their livings, and were henceforth known as the "bishops' curates." This subservience caused a renewal of the breach in the church; from that time on the feud between the "Indulged" and the "non-Indulged" took the place of that between Resolutioners and Protesters. Forty-two ministers accepted the indulgence. A second indulgence followed in 1672. From Lauderdale's marriage with Lady Dysart until 1687 there ensued a policy of extermination, borne with marvelous fortitude. To Covenanters had succeeded Protesters, to Protesters Conventiclers, to Conventiclers now succeeded Hamiltonians, to Hamiltonians Cameronians or Society People.

On November 5, 1688, William landed at Torbay; the bishops' curates were ejected without violence; no retribution was taken, but Presbyterianism quietly reasserted itself as the form of church government natural to the Scottish mind. Presbyterianism, however, was not now what it had been in the days of Andrew Melville or in 1638. The last twenty-six years had thoroughly cowed a great part of the nation, and a new generation had come to manhood who could not even remember the time when Scotland was not Episcopal. The nobles had no interest to serve in reëstablishing the old form; the very ministers were those who had conformed or had accepted indulgence. Out of the 400 ejected in 1663 only sixty now survived. Moreover, Scotland had not escaped the wave of latitudinarianism that had come over all forms of Protestant religion. Most of all, the character of William III. and his confidential adviser Carstares affected the nature of the settlement. William was above all a statesman, and a tolerant statesman, and he wished for union of the mod-

erate parties in both kingdoms; on taking the coronation oath he refused to swear the clause binding him to root out heretics and enemies of the true worship of God. The claim of right, too, avoids any assertion of the *jus divinum* of Presbyterianism. But on July 22, 1689, its declaration that prelacy had been an insupportable grievance was made into an act by the convention of estates, and all acts in favor of episcopacy were rescinded. In April, 1690, the Act of Supremacy was also rescinded; ministers ejected since 1661 were replaced, and the Presbyterian government of 1592 (thus avoiding all mention of the covenants) restored; lay patronage was abolished, but pecuniary compensation was granted. On October 16, 1690, the first general assembly since 1653 met, when the preliminary act was to receive into the national church the remaining three ministers of the Cameronians (Thomas Lining, Alexander Shields and William Boyd). Their followers, however, regarded this as a compromise with Satan, and kept themselves aloof. Episcopalian ministers who subscribed the confession and obeyed the Presbyterian government retained their livings, and all sentences of Resolutions and Protesters against one another were rescinded. Mr. Hetherington well says, "Without a clear conception of this point it is impossible to understand the subsequent history of the Church of Scotland. In consequence of the introduction of the prelatic party the church thenceforward contained within its pale two systems, that of the old and true Presbyterian subsequently known as the 'evangelical,' and that of the new and semi-prelatical, subsequently known as the 'moderate.' Thenceforward the history of the Church of Scotland is the history of the protracted struggle between these two systems, which were necessarily irreconcilable."

In the first case of friction with the crown, which occurred in 1691, a compromise was effected—the church successfully asserting its autonomy by granting only part of the privileges which William desired for the Episcopal clergy. The critical dispute occurred when parliament imposed a new oath of allegiance, the taking of which was made a necessary qualification for sitting in the assembly. The church denied the right of the crown to impose a civil oath as a condition of spiritual office; and a serious breach would have occurred but for the efforts of Carstairs, who induced the king to give way at the last moment. Having thus asserted her independence, the church conceded to William nearly all he had asked for on behalf of the Episcopalians. In 1696 the parish schools were established. In 1698, to vindicate the church from the charges of backsliding, the general assembly published the *Seasonable Admonition*, which claimed in emphatic language the dependence of the church on Christ alone, and repudiated the doctrine that the inclination of the people was the foundation of Presbyterianism. In 1701 the first condemnation of heresy took place.

The spirit of watchfulness on the part of the church increased during Anne's reign. In naming commissioners for the Union the parliament forbade them to mention the church. The extreme section indeed regarded the Union itself as a violation of the Solemn League and Covenant. The Act of Security provided that the *Confession of Faith* and the Presbyterian government should "continue without any alteration to the people of this land in all succeeding ages," and the first oath taken by the queen at her accession was to preserve it. The Union, however, tended to Anglicise the upper classes, and thus to increase the latitudinarianism which was finding its way within the church. Politically speaking, the settlement of the Scottish Church was of great importance to the government during the Jacobite

intrigues, for its attitude was one of vigilance against all that was favorable to prelacy, and its influence consolidated opinion against the Stuarts.

The High-Church revival of 1710, however, had its effect upon the church. In 1711 an Episcopalian named Greenshields used the English liturgy in Edinburgh. He was condemned by the Court of Session; but the House of Lords reversed the decision, and imposed heavy damages on the magistrates who had closed his chapel. In 1712 a Bill of Toleration, which allowed Episcopalian dissenters to use the English liturgy, was hurried through both houses, in spite of the urgent remonstrances of the Scottish commissioners, and on April 22d lay patronage was restored. This latter act, as violating the Act of Security, has never been regarded as valid by the severer Presbyterians. That no further resistance was made than by protests and petitions, shows how far the "moderatizing" spirit had spread. The remnant of the Cameronians, who were outside of and discouraged by the church, alone met and renewed the Covenant after solemnly acknowledging the sins of the nation.

The progress toward Arminianism, due to the influence of Baxter's writings and to the training of the young ministers in Holland, may be seen in the treatment of Professor Simson and in the Auchterarder case. It was now that Neonomianism, or the doctrine that the gospel is a new law, promising salvation upon the condition of the abandonment of sin, began. Its first victory was when the general assembly condemned the doctrines of the *Marrow of Modern Divinity*, and rebuked the twelve ministers who had sent in a representation against the decision. The Patronage Act was rapidly being accepted and was showing its effects chiefly in the neglect shown to the wishes of the congregations. In 1731 the right was given to the heritors and elders to "elect and call" instead of to "name and propose the person to the whole congregation to be approved or disapproved," and was made law without having first been submitted to the presbyteries according to the Barrier Act of 1639. This led to the first great schism. Ebenezer Erskine denounced the action of the assembly in two sermons. Being rebuked by the synod of Perth and Stirling, he appealed to the assembly, who approved the rebuke. With three other ministers he protested. The four were temporarily deposed by the assembly, and on December 6, 1733, they formed the "Associate Presbytery." In 1737 their number was largely increased, and they published their manifesto, the "Declaration and Testimony." Their final deposition, and the first schism, occurred on May 15, 1740.

For several years the wishes of congregations were ignored; wherever the presbytery refused to appoint at the will of the assembly, a "riding committee," often assisted by military force, carried out the decision. The civil courts were bound to obey the Act of Patronage, and therefore never upheld the congregation against a legal appointment. At length in 1752 the leader of the "moderate" party, Principal Robertson, seeing in this refusal of presbyteries the elements of endless confusion, and that temporary substitutes, *e.g.*, riding committees, were unconstitutional and bad in principle, determined that the presbyteries themselves should be compelled to carry out the decisions of the assembly. From the deposition of Thomas GILLESPIE (*q.v.*), a member of the presbytery of Dunfermline, who refused to act in accordance with the assembly's decision, is dated the second or "Relief" schism. Principal Tulloch says upon this: "The policy was so far successful; but the success was of that nature which is almost worse than defeat. It introduced order within the church. It crushed the revolt of presbv-

teries. It silenced in many cases popular clamor. But it quietly and gradually alienated masses of the people from the establishment." So rapidly did dissent spread that from a report presented to the general assembly in 1765 it appears that "there are now 120 meeting-houses erected, to which more than 100,000 persons resort, who were formerly of our communion, but have separated themselves from the Church of Scotland. This secession," the report adds, "is most extensive in the greatest and most populous towns." For the subsequent history of Presbyterianism in Scotland, see FREE CHURCH, UNITED PRESBYTERIAN CHURCH, and SCOTLAND (CHURCH OF).

Presbyterianism existed in England a few years after the Reformation, and although it was always in a subordinate position, still its struggles with both the Episcopacy and the Roundhead congregationalists are not devoid of interest to the student of church history. In Ireland Presbyterianism has existed since the Ulster colony was first founded. Here, too, the church underwent great trouble from both internal and external sources, several schisms having taken place in its economy. It has of late years been quite prosperous. In France, the organization of the church was completed about 1555. The church has been the victim of persecution at various times but at present is in a flourishing condition.

#### UNITED STATES.

Presbyterianism in the United States is a reproduction and further development of Presbyterianism in Europe. It differs from the latter in that the various types produced in Great Britain and on the continent of Europe combined to produce a new American type.

1. *The Colonial Period.*—The earliest Presbyterian emigration consisted of French Huguenots under the auspices of Admiral Coligny, led by Ribault in 1562 to the Carolinas and in 1565 to Florida. But the former enterprise was soon abandoned, and the colonists of the latter were massacred by the Spaniards. The Huguenots also settled in Nova Scotia in 1604 under De Monts. The later Huguenot colonists mingled with the Dutch in New York and with the British Presbyterians and Episcopalians in New England and the Carolinas.

English Puritanism emigrated under the auspices of the Virginia Company to the Bermudas in 1612. In 1617 a Presbyterian church, governed by ministers and four elders, was established by Lewis Hughes, and the liturgy of the isles of Guernsey and Jersey was used. From 1620 onward English Puritanism colonized New England. This was of the two types which developed from the discussions of the Westminster Assembly (1643-48) into Presbyterianism and Congregationalism. They coöperated in New England as they did in Old England in the county associations. The Plymouth colony was more of the Congregational type, the Massachusetts Bay colony more of the Presbyterian type. A mixed system was produced which has been happily called by Henry M. Dexter "a Congregationalized Presbyterianism or a Presbyterianized Congregationalism \* \* \* which was essentially Genevan within the local congregation and essentially other outside of it." Presbyterianism was stronger in Connecticut than in Massachusetts. Thence it crossed the borders into the Dutch settlements on the Hudson and the Delaware, and mingled with other elements in Virginia, Maryland, and the Carolinas.

Dutch Presbyterianism was planted in New Amsterdam, N. Y., in 1628, when the first Reformed Dutch church was organized by Jonas Michaelius with two elders and fifty communicants. This had a strong

Huguenot and Walloon representation. Services were held in the Dutch and the French languages and subsequently in the English language also. The Dutch churches spread along the valleys of the Hudson, the Mohawk, the Raritan, and the Passaic, and also on the Delaware. They continued in subordination to the classis of Amsterdam, Holland, until 1747.

Irish Presbyterianism was carried to America by an unknown Irish minister in 1668, by William Traill in 1683, and especially by Francis Makemie in the same year, an ordained missionary of the presbytery of Laggan, who was invited to minister to the Maryland and Virginia Presbyterians. He was a merchant and a man of executive ability, and was the chief instrument in establishing the presbytery of Philadelphia, and interesting the Presbyterians of London, Dublin, and Glasgow in the feeble state of their church in America. In 1704 he obtained aid from the London ministers and returned to America with two ordained missionaries, John Hampton (Irish) and George Macnish (Scotch).

Meanwhile the New England ministers had sent several missionaries to the banks of the Delaware; Benjamin Woodbridge and Jedidiah Andrews went to Philadelphia in 1698-1700; John Wilson became pastor of a Presbyterian church at Newcastle, Del., in 1098; Samuel Davis and Nathaniel Taylor supplied other churches in the vicinity. Seven of these ministers organized the presbytery of Philadelphia in 1706. Friction was caused by a contest between Gilbert Tennent and his friends, who favored Whitefield and his revival measures, and Robert Cross and his friends, who opposed them. Passions were deeply stirred when the synod met in 1741. The moderate men remained away. The Cross party brought in a protestation to the effect that the Tennent party were no longer members of the synod; and thus the synod suddenly broke in two. The New York presbytery declined at first to unite with either party, and endeavored to bring about a union, but in vain. The Tennent party were found at length to be more reasonable, and the New York presbytery combined with them in establishing the synod of New York, which was called the New Side in contradistinction to the synod of Philadelphia, which was called the Old Side.

The synod of New York and Philadelphia embraced only a portion of the Presbyterian ministers of the middle colonies. In the Carolinas Presbyterianism had an independent development. There was a considerable Scottish emigration between 1684 and 1687. William Dunlop ministered to them until 1688, when he returned to become principal of the university of Glasgow. A mixed congregation of English Puritans and Scottish Presbyterians was organized at Charleston in 1690. In 1710 there were five churches, which combined to form the presbytery of James Island in 1722-23. This presbytery went through the same struggle with reference to subscription as the synod of Philadelphia, and the parties separated in 1731 into subscribers and non-subscribers.

2. *From the Revolution to the Civil War.*—During the war of the Revolution the Presbyterian churches suffered severely. The ministers and people, with scarcely an exception, entered upon the struggle for constitutional liberty with all their souls. The Presbyterian Church was the church of constitutional government and orderly liberty. The Presbyterians exerted great influence in the construction of the constitution of the United States, and the government of the church was assimilated in no slight degree to the civil government of the country.

In 1785 the synod of New York and Philadelphia took steps for the organization of a general assembly and also with a view to the union of all the Presbyte-

rian bodies into one. In 1789 the synod resolved itself into a general assembly of four synods, which, after revising the chapters relating to church and state, adopted the Westminster symbols as their constitution, "as containing the system of doctrine taught in the Holy Scriptures," and they made them unalterable without the consent of two-thirds of the presbyteries and the general assembly. In 1798 another effort was made for union with the Reformed Dutch and the Associate Reformed, which failed. Three years afterward a plan of union with the general association of Connecticut was agreed upon by the general assembly, and the work of home missions in the western section of the country was prosecuted jointly. The result was mixed churches in western New York and the new States west of the Alleghany Mountains, which grew into presbyteries and synods having peculiar features midway between Presbyterianism and Congregationalism.

The revivals in Kentucky brought about differences which resulted in the high-handed exclusion of the revivalists. These formed themselves into the presbytery of Cumberland, February 4, 1810, which grew in three years into a synod of three presbyteries. In 1813 they revised the Westminster confession and excluded, as they claimed, fatalism and infant damnation.

A great and widespread revival marked the opening years of the century, resulting in marvelous increase of zeal and numbers in the churches. New measures were adopted, doctrines were adapted to the times and occasions, and ancient disputes were revived between the conservative and progressive forces. Theological seminaries had been organized at Princeton in 1812, at Auburn in 1820, at Hampton Sydney in 1824, Alleghany in 1827, Columbia in 1828, Cincinnati in 1829, and Union Seminary, New York, in 1836. Differences in doctrine as well as polity and discipline became more and more prominent.

The agitation with reference to African slavery threw the bulk of the Southern Presbyterians on the Old Side, which was further strengthened by the accession of the Associate Reformed. In 1834 a convention of the Old Side was held in Philadelphia, and the "Act and Testimony" was adopted, charging doctrinal unsoundness and neglect of discipline upon the New Side, and urging that these should be excluded from the church. The moderate men on both sides opposed this action, and strove for peace or an amicable separation, but in vain. In 1837 the Old Side obtained the majority in the general assembly for the second time only in seven years. They seized their opportunity and abrogated the "Plan of Union," cut off the synod of Western Reserve, and then the synods of Utica, Geneva, and Genesee, four entire synods, without a trial, and dissolved the third presbytery of Philadelphia without providing for the standing of its ministers. This revolutionary proceeding brought about the second great rupture in the Presbyterian Church. The New Side men met in convention at Auburn, in August, 1837, and adopted measures for resisting the wrong. In the general assembly of 1838 the moderator refused to recognize the commissioners of the four excised synods. An appeal was made to the assembly and the moderator's decision reversed. A new moderator was chosen, while the assembly adjourned to another place of meeting. The Old Side remained after the adjournment, and organized themselves, claiming the historic succession. Having the moderator and clerks from the assembly of 1837, they retained the books and papers. Thus two general assemblies were organized, the Old and the New School. An appeal was made to the civil courts, which decided in favor of the New School; but this decision was overruled on a technical point of law by the court in bank,

and a new trial ordered. It was deemed best, however, to cease litigation and to leave matters as they were.

Several years of confusion followed. In 1840 we have the first safe basis for comparison of strength.

	Ministers.	Churches.	Communicants.
Old Side.....	1,308	1,898	126,583
New Side .....	1,234	1,375	102,000

The churches remained separate throughout the remainder of this period. The North was especially agitated by the slavery question, and the anti-slavery element became so strong that the Southern synods of the New School assembly felt constrained to withdraw in 1858. They organized the United Synod of 4 synods, 15 presbyteries, 113 ministers, 197 churches, 10,205 communicants. Just before the outbreak of the Civil War in 1861 these churches numbered:—

	Synods.	Presbyteries.	Ministers.	Churches.	Communicants.
Old Side .....	33	171	2,656	3,531	292,927 (1860)
New Side .....	22	104	1,523	1,482	134,933 (1860)
United Synod ..	4	15	113	197	10,205 (1858)
Cumberland Presbyterian	23	96	890	1,189	82,008 (1859)

The Civil War in separating the people of the North from the people of the South also brought about a separation of churches. Some of the breaches have been healed, others remain until now.

In 1861 the Southern section of the Presbyterian Church withdrew from the Northern and organized the general assembly of the Presbyterian Church in the Confederate States of America, with 11 synods, 47 presbyteries, about 700 ministers, 1,000 churches, and 75,000 communicants. In 1865 this body united with the United Synod of the South, and increased its strength by 120 ministers, 190 churches, and 12,000 communicants. After the close of the war the name of the denomination was changed to "the Presbyterian Church in the United States." In 1867 this church was joined by the presbytery of Patapsco, in 1869 by the synod of Kentucky, and in 1874 by the synod of Missouri, all of which had separated from the Northern church.

The war also united the Northern churches more closely together, and there was an increasing desire for organic union. An effort was made to combine all the Presbyterian bodies of the North in 1867, but in vain. In 1869, however, the Old and New School churches of the North combined on the basis of the common standards.

The American Presbyterian churches have always been marked by a zeal for missions.

The tendency of Presbyterianism in the United States is to adapt itself to the circumstances of the country.

PRESCOT, a market-town of Lancashire, is situated on rising ground on the Liverpool and Wigan branch of the London and Northwestern Railway, eight miles east of Liverpool and twenty-eight west of Manchester. Population, 8,000.

PRESCOTT, WILLIAM HICKLING, historian, born in Salem, Mass., May 4, 1796. After graduating honorably in 1814, he entered his father's office as a student of law. On May 4, 1820, he was married to Miss Susan Amory. Prior to his marriage he had made a few experiments in composition which had obtained no further publicity than that of his own circle of friends, but he now finally decided to devote his life to literature. Of the direction and quality of his

thought at this time he has left indications in his papers on *Essay-Writing* (1822) and on *French and English Tragedy* (1823).

In the meantime his aims had been gradually concentrating. History had always been a favorite study with him, and Mably's *Observations sur l'Histoire* appears to have had considerable influence in determining him to the choice of some special period for historic research. He was happy in the possession of both ample means and admirable friends to supply so far as might be the necessary materials, and of a wide leisure in which to give them literary shape and polish; and he sketched with no undue restriction or hesitancy the plan of the *History of the Reign of Ferdinand and Isabella*—his first great work. On October 6, 1829, he began the actual work of composition, which was continued without more serious interruptions than those occasioned by the essays on *Asylums for the Blind* (1830), *Poetry and Romance of the Italians* (1831), and *English Literature of the Nineteenth Century* (1832), until June 25, 1836, when the concluding note was written. Another year, during which his essay on *Cervantes* appeared, was spent in the final revision of the *History* for the press, in which the author was ably assisted by two friends, of whom Gardiner, the son of his schoolmaster, criticised the style and Folsom verified the facts. Its success upon its publication in Boston was immediate, the five years' contract being discharged in a few months. After coquetting for a short time with the project of a life of Molière he decided to follow in the track of his first work with a *History of the Conquest of Mexico*. Washington Irving, who had already made preparations to occupy the same field, generously withdrew in his favor; and in May, 1838, Prescott began his first reading in the subject. The work was completed in August, 1843, the five years' labor having been broken by the composition of reviews of Lockhart's *Life of Scott* (1838), Kenyon's *Poems* (1839), *Chateaubriand* (1839), Bancroft's *United States* (1841), Mariotti's *Italy* (1842), and Madame Calderon's *Life in Mexico* (1843), and by the preparation of an abridgment of his *Ferdinand and Isabella* in anticipation of its threatened abridgment by another hand. On December 6, 1843, the *Conquest of Mexico* was published with a success proportionate to the wide reputation won by his previous work.

In February, 1845, he received the announcement of his election as corresponding member of the French Institute in place of the Spanish historian Navarrete, and also of the Royal Society of Berlin. The winter found him arranging for the publication in England of the selection from his articles and reviews which appeared in 1845, under the title of *Critical and Historical Essays*, and which was issued almost contemporaneously at New York under the title of *Biographical and Critical Miscellanies*. After some minor interruptions—his removal from the old mansion-house in Bedford street to the house in Beacon street, visits to friends, and a renewed failure of sight—the *Conquest of Peru* was completed in November, 1846, and published in March following. His misgivings as to its reception were at once set at rest, and it was speedily issued in translations into French, Spanish, German, and Dutch, in addition to the English editions of New York, London, and Paris. He had been for many years collecting materials for a history of Philip II., but he hesitated for some time to attempt a work of such magnitude. The idea of writing memoirs was dismissed in favor of the more elaborate form, and in November, 1855, the first two volumes of his uncompleted *History of Philip II.* were issued from the press, their sale eclipsing that of any of his earlier books. This was his last great undertaking; but as Robertson's *Charles V.* in the

light of new sources of information, was inadequate to take its place as a link in the series, he republished it in an improved and extended form in December, 1856. A slight attack of apoplexy on February 4, 1858, foretold the end, though he persevered with the preparation of the third volume of *Philip II.* for the press, and with the emendation and annotation of his *Conquest of Mexico*. On the morning of January 27, 1859, a second attack occurred, and he died in the afternoon of the same day in his sixty-third year.

PRESCRIPTION in the broadest sense of the word denotes the acquisition or extinction of rights by lapse of time. The term is derived from the *præscriptio* of Roman law, originally a matter of procedure, a clause inserted before the *formula* on behalf of either the plaintiff or, in early times, the defendant, limiting the question at issue. (See PLEADING.) It was so called from its preceding the *formula*. One of the defendant's *præscriptiones* was *longi temporis* or *longæ possessionis præscriptio* (afterward superseded by the *exceptio*), limiting the question to the fact of possession without interruption by the defendant for a certain time (See POSSESSION). It seems to have been introduced by the prætor to meet cases affecting aliens or lands out of Italy where the *usucapio* of the civil law (the original means of curing a defect of title by lapse of time) could not apply. The time of acquisition by *usucapio* was fixed by the Twelve Tables at one year for movables and two years for immovables. *Præscriptio* thus constituted a kind of prætorian *usucapio*. In the time of Justinian *usucapio* and *præscriptio* (called also *longi temporis possessio*), as far as they affected the acquisition of ownership, differed only in name, *usucapio* being looked at from the point of view of pleading. By the legislation of Justinian movables were acquired by three years' possession, immovables by ten years' possession where the parties had their domicile in the same province (*inter presentes*), twenty years' possession where they were domiciled in different provinces (*inter absentes*). Servitudes could not be acquired by *usucapio* proper, but were said to be acquired by *quasi usucapio*, probably in the same time as sufficed to give a title to immovables. There was also a *longissimi temporis possessio* of thirty years, applicable to both movables and immovables, and requiring nothing but *bona fides* on the part of the possessor. Where the right sought to be established was claimed against the church, a still longer period of forty years (at one time a hundred) was necessary. Immemorial prescription was required in a few cases of a public character, such as roads. *Præscriptio* was also the term applied to lapse of time as barring actions upon contracts or torts under various provisions corresponding to the English Statutes of Limitation. The prescription of Roman land (and of modern systems based upon it) is thus both acquisitive and extinctive. It looks either to the length of time during which the defendant has been in possession, or to the length of time during which the plaintiff has been out of possession. In English law the latter kind of prescription is called LIMITATION, (*q.v.*) The tendency of law is to substitute a definite for an indefinite period of prescription.

*United States.*—The law of the United States (except in Louisiana) is based upon that of England, but the period of enjoyment necessary to found a title by prescription varies in the different States.

*International law* uses the term "prescription" in its wider or Roman sense.

PRESERVED FOOD. The perfect preservation of any substance for use as food implies the retention of its full nutritive power, sapidity, and digestibility, with its natural odor and color unimpaired, for such length



of time as may be required. The process employed must be sufficiently cheap to allow of the preserved food being placed in the market at a price which will insure a demand for it. The operations connected with the preparation of many food-substances are partly directed to the production of food in a new and more convenient form from that in which it is yielded by nature, and partly with the view of preserving the alimentary body. Cheese is an example of such a food-preparation, and to a smaller extent so also are butter and other edible fats and oils, as well as fruit and vegetable jellies and conserves. Concentrated foods and extracts, such as Liebig's extract of beef, belong to the same category, consisting of certain essential principles of animal food easily preserved, and prepared partly on that account.

Many of the most important food-staples require nothing more than favorable natural conditions for their preservation, till they are ordinarily required for consumption. Such is the case with the cereal grains, which are sufficiently ripened and dried in the harvest field, and with all hard farinaceous and oleaginous seeds, nuts, and fruits. Most soft succulent fruits and vegetables, on the other hand, and all varieties of animal food require artificial preservation, and it is to these that the various processes in use are applied. These processes resolve themselves into four groups—(1) drying, (2) use of antiseptics, (3) exclusion of air, and (4) refrigeration. Several hundreds of patents have been obtained in the United Kingdom alone for preservative processes coming under one or more of these heads; but in reality the methods of preservation in practical operation are not many.

1. *Drying* is the most ancient and primitive of all processes for preserving food, and, although it answers but imperfectly for most animal substances, yet in dry hot countries it is very extensively practiced.

Succulent fruits and vegetables are satisfactorily preserved by simple drying. The principal dried saccharine fruits of commerce are raisins, currants, figs, dates, and prunes. These differ in their nutritive properties considerably from the natural fruits they represent, as do also the farinaceous fruits and vegetables preserved by drying, such as the banana, bread-fruit, mandioc, etc.

2. *Use of Antiseptics.*—The variety of antiseptic substances which have been experimented with for the curing of food is numberless. Bodies solid, liquid, and gaseous have been proposed, and these have been variously recommended for superficial application, for injection, and for forming an artificial atmosphere around the substance to be preserved; and further, it has been suggested that the creature whose flesh is to be preserved should, before killing, be impregnated with the antiseptic by inhalation or otherwise. In practice the antiseptics used are very few in number, since many of them have a physiological effect on the digestive and other internal organs into which they are introduced with the food, and so must injure the health. Besides, many proposed antiseptics are either in themselves unpleasant in smell or taste, or alter the appearance, color, taste, or consistency of the food preserved. The least objectionable are substances which enter into human food themselves, such as certain salts, sugar, vinegar, and alcohol.

3. *Exclusion of Air.*—The principal method of food preservation dependent on the exclusion of air is the invention of François Appert and dates from 1809. It consists essentially in securing cooked food in hermetically sealed vessels from which the atmospheric air is as far as possible driven off before sealing, and in killing by heat or otherwise such germs or ferments as may re-

main within the vessel either before or after it is sealed up. At present the innumerable varieties of tinned foods, both animal and vegetable, are entirely the result of the application of Appert's principle. In practice there are several processes of "tinning" food, but the general method adopted is everywhere uniform in principle.

The tins used are manufactured with the greatest care, and most ingenious machinery has been devised for their thorough and expeditious preparation. The proper quantity of meat, generally, though not necessarily, free from bone, tendon, and undue proportion of fat, is weighed out and placed raw in the tin, over which the cover is soldered. In the cover a small "pin-hole" is left, and the tins are placed in a bath or boiler of solution of chloride of calcium, which boils at a temperature of from 260° to 270° Fahr. Each tin is immersed to within an inch or two of the top, and as the heat is gradually raised steam issues from the pin-hole, carrying off the atmospheric air from within the tin. When all the air has been expelled the pin-hole is promptly closed with a drop of solder, and the tin, hermetically sealed, is entirely immersed for some time in the superheated solution. When withdrawn and cooled, the tins are placed in a heated testing-house, in which after a few days those that have been imperfectly treated manifest their defects by bulging of the sides, due to the generation of gases from the putrefying mass they contain. Those which have been successfully preserved generally show both ends collapsed or depressed by the pressure of the air outside; and usually on a well-preserved tin being pierced the air is audibly sucked in. This method is the one which is employed in the extensive canneries and packing houses of America, and has been found eminently satisfactory.

About the year 1875 ice began to be used on a large scale for the preservation of fresh meat during its transit from America to the European markets. This, the first practically successful method of preserving fresh meat for such a period as enabled it to be sold in remote markets, consisted in cooling a large meat chamber hung full of carcasses by continually blowing into it air which had previously been cooled to near the freezing point by being made to pass through reservoirs of ice. The process was not all that could be desired, but it successfully solved a question which had previously been attempted many times and ways. It continued to be the method by which large quantities of fresh meat were brought in good condition to the European market, till in 1879 Mr. J. J. Coleman inaugurated a new era by the introduction, in conjunction with Mr. H. Bell and Mr. J. Bell, of his Bell-Coleman dry-air refrigerator.

PRESSBURG (Hung., *Pozsony*; Lat., *Posonium*), capital of the county of the same name and in former times also of the country, is a royal free town in Hungary, situated on the left bank of the Danube, in 48° 8' N. latitude and 17° 6' E. longitude. Pressburg is the see of an evangelical bishop, and the headquarters of one of the fifteen army-corps of the Austro-Hungarian army and of a honved district; its civil departments include finance, posts, land surveying, state forestry, public instruction, river regulation, and government buildings; it has also a district court of justice, a superior law court, and a chamber of trade and commerce.

PRESS LAWS. The liberty of the press has always been regarded by modern political writers as a matter of supreme importance. "Give me liberty to know, to utter, and to argue freely according to conscience, above all other liberties," says Milton in the *Areopagitica*. At the present day the liberty of the press in English-speaking countries is (with perhaps the single

exception of Ireland) a matter of merely historical importance. The liberty was a plant of slow growth.

The constitutions of Pennsylvania, Delaware, Maryland, and North Carolina, all enacted in 1776, are interesting as containing the earliest declarations of any legislative authority in favor of the liberty of the press. The same principle was afterward adopted in the constitution of the United States. By art. i. of the amended constitution, "Congress shall make no law \* \* \* abridging the freedom of speech or of the press." Art. iv. secures against warrants for the seizure of papers, except on probable cause supported by oath or affirmation and particularly describing the thing to be seized. The constitution of Louisiana is that in which the right of liberty of the press is declared with the greatest minuteness. By art. vi. s. 21 of the constitution of that State, "Printing presses shall be free to every person who undertakes to examine the proceedings of the legislature or any branch of the government, and no law shall ever be made to restrain the right thereof. The free communication of thoughts and opinions is one of the invaluable rights of man, and every citizen may freely speak, write, and print on any subject, being responsible for the abuse of that liberty." The acts of Congress dealing with the press are not numerous, as each State has for the most part its own legislation on the subject, dealing generally with, among other matters, the registration of newspapers, the monopoly of the State printer, and the right of giving the truth in evidence in defense to proceedings for libel. The act of August 18, 1856, forbids diplomatic or consular officers of the United States to correspond with any foreign newspaper in regard to the affairs of a foreign state. The act of March 3, 1873, prohibits the printing and circulation of obscene literature. By the act of June 23, 1860, the congressional printer has, except where otherwise provided by law, the monopoly of printing for the Senate or House of Representatives and the executive and judicial departments. State prosecutions for seditious libel were not infrequent in the early years of the republic; examples will be found in Wharton's *State Trials*.

*India*.—During the governor-generalship of Lord Lytton was passed the "Act for the better control of publications in Oriental languages," act ix. of 1878. (1) By this act copies of newspapers published out of British India are liable to forfeiture and seizure by warrant throughout the whole of British India if the papers "contain any words, signs, or visible representations likely to excite disaffection to the government established by law in British India, or antipathy between any persons of different races, castes, religions, or sects in British India." The governor-general may, by notification in the *Gazette of India*, exclude newspapers, books, etc., from British India.

Liberty of the press is the rule in most European states. This liberty is in almost every case secured by a constitution or organic law, the earliest being those of Sweden and Spain in 1812. In some states there is a tax upon newspapers and advertisements; in others, as in Sweden and Norway, there is none. In most states there is a government official newspaper, and a government printer, enjoying peculiar privileges.

*Mexico*.—A board or "junta" of censors existed during the Spanish dominion. The fundamental law of Mexico is now the constitution of 1857, as amended by subsequent additions. By art. vi. the expression of ideas cannot be the object of any judicial or administrative inquiry, unless in case of attacks on morality, public order, etc. By art. vii. the liberty of writing and publishing writings on any subject is inviolable. Censorship is abolished, and press offenses are to be

tried by one jury which testifies the act and another which applies the law and defines the penalty.

**PRESTER JOHN**. The history of Prester John is that of a phantom, taking many forms. It no doubt originally was based on some nucleus of fact or connected itself with some such nucleus, though what that nucleus was has been much controverted and is extremely difficult to determine. But the name and the figure which it suggested occupied so prominent a place in the mind of Europe for two or three centuries that a real history could hardly have a stronger claim to exposition here than this history of a will-o'-the-wisp.

The first mention of Prester John occurs in the chronicle of Otho or Otto, bishop of Freisingen. This writer states that when at the papal court in 1145 he met with the bishop of Gabala (Jibal in Syria), who related how "not many years before one John, king and priest (*rex et sacerdos*), who dwelt in the extreme Orient beyond Persia and Armenia, and was, with his people, a Christian but a Nestorian, had made war against the brother kings of the Persians and Medes, who were called Samiards (or Sanjards), and captured Egbatana their capital. The battle with those princes endured three days, but at last *Presbyter John*—for so he was wont to be styled—routed the Persians with immense slaughter. After this victory the aforesaid John was advancing to fight in aid of the church at Jerusalem; but, when he arrived at the Tigris, and found no possible means of transport for his army, he turned northward, as he had heard that the river in that quarter was frozen over in winter-time. After halting on its banks for some years (*per aliquot annos*) in expectation of a frost he was obliged to return to his own land. This personage was said to be of the ancient race of the Magi mentioned in the gospel, to rule the same nations that they ruled, and to have such a plenitude of wealth and glory that he used none but a scepter of solid emerald. It was as if by the example of his ancestors (they said) that he was proposing to go to Jerusalem when thus obstructed." We cannot say how far the report of the bishop of Gabala, or other rumors of the events on which this was founded, made an impression on Europe at that time. But there can be no doubt about the impression that was made some twenty years later (*c.* 1165) by the wide circulation of a letter which purported to have been addressed by the potentate in question to the Greek emperor Manuel. This letter, professing to come from "Presbyter Joannes, by the power and virtue of God and of the Lord Jesus Christ, Lord of Lords," is filled with the most extravagant details of the greatness and splendor of the writer. He claims to be the greatest monarch under heaven as well as a devout Christian and protector of Christians.

**PRESTON**, a market-town and municipal and parliamentary borough of Lancashire, is situated on the north bank of the Ribble, on the Lancaster Canal, and at the junction of several railway lines, twenty-eight miles northeast of Liverpool and thirty-one northwest of Manchester. Population (1891), 111,696.

**PRESTWICH**, a township of Lancashire, is situated on a branch of the Lancashire and Yorkshire Railway, four miles northwest of Manchester and five south of Bury. The population of the urban sanitary district (area, 1,917 acres) in 1871 was 6,820, and in 1891 it was 7,689.

**PRESUMPTION**. See **EVIDENCE**.

**PREVESA**, the chief town of a sandjak in the Turkish vilayet of Janina, commanding the entrance to the Gulf of Arta. Prevesa, which represents the ancient **NICOPOLIS** (*q.v.*), has a population of about 7,000.

**PRÉVOST, PIERRE**, was born in Geneva, March 3, 1751. He died at Geneva on April 8, 1839. **Prévost**

published much on philology, philosophy, and political economy; but he will be remembered mainly on two accounts—(1) his having published, with additions of his own, the posthumous memoirs of the ingenious Le Sage (see ATOM and ATTRACTION); and (2) his having first enunciated the theory of exchanges (see RADIATION), on which has been based one of the grandest experimental methods of modern times.

PRÉVOST D'EXILLES, ANTOINE FRANÇOIS, more commonly called the abbé Prévost, one of the most important French novelists of the eighteenth century, was born at Hesdin in Artois on April 1, 1697. He died in 1763.

PRÉVOST-PARADOL, LUCIEN ANATOLE, a writer whose career, except in its unhappy end, was typical of the importance of journalism in France, was born at Paris on August 8, 1829. He committed suicide at Washington, whither he had been sent as envoy to the United States, on July 20, 1870.

PRIAM. See TROY.

PRIAPUS, the Greek god of teeming flock and fruitful field. He was unknown to the earliest Greek poets Homer and Hesiod, but in later times his worship prevailed on the fertile coast of Asia Minor. Lampsacus on the Hellespont, nestling in its vineyards, claimed to be his birthplace.

PRIBRAM or PRZIBRAM, a prosperous mining town of Bohemia, is situated about thirty-two miles southwest of Prague. The population of Pribram in 1880 was 11,171, or, including the adjacent Birkenberg, where the largest mines are situated, 14,881.

PRICE, RICHARD, philosopher, son of a Dissenting minister, was born on February 23, 1723, at Tynton, in the parish of Llangeinor, Glamorganshire, Wales. He died in 1791.

PRICHARD, JAMES COWLES, the founder of ethnology or anthropology in England, was born on February 11, 1786, at Ross in Herefordshire, England, and died in 1848.

PRIDE, THOMAS, Parliamentary officer, was of humble origin, and is stated to have been brought up by the parish of St. Bride's, London. At the beginning of the Civil War he served as ensign under the earl of Essex, and gradually obtained promotion to the rank of colonel. He distinguished himself at the battle of Preston, August 17, 1648, and in Cromwell's Scottish campaign he held command of a brigade. He was noted for his resolute character and extreme anti-Royalist sentiments. After the Commons had voted that the king's concessions at Newport were a basis for a settlement, he was chosen by the army chiefs to effect their purpose of "purging" the Commons. Taking his stand at the entrance of the House of Commons with a written list in his hand, he caused the arrest of the Royalist members who were pointed out to him, and placed them in custody. After about a hundred members had been dealt with by this ordinance, subsequently known as "Pride's Purge," the mutilated House of Commons proceeded to bring the king to trial. Pride was one of the judges of the king, and signed his death-warrant. Under Cromwell he received the honor of knighthood, and was also chosen a member of the new House of Lords. He died at Nonsuch on October 23, 1658, and after the Restoration his body was dug up and suspended on the gallows at Tyburn along with that of Cromwell.

PRIDEAUX, HUMPHREY, dean of Norwich, was born at Place, England, on May 3, 1648. He died at Norwich on November 1, 1724, and was buried in the cathedral on November 4th.

PRIESSNITZ, VINCENZ. See HYDROPATHY.

PRIEST (Ger. *Priester*, Fr. *prêtre*) is a contracted

form of "presbyter" (*πρεσβύτερος* "elder;" see PRESBYTER), a name of office in the early Christian church, already mentioned in the New Testament. But in the English Bible the presbyters of the New Testament are called "elders," not "priests;" the latter name is reserved for ministers of pre-Christian religions, the Semitic (*kōhānīm*, sing. *kōhēn*) and (*kemārīm*). The theologians of the Greek and Latin Churches expressly found the conception of a Christian priesthood on the hierarchy of the Jewish temple, while the names by which the sacerdotal character is expressed—*sacerdos*—originally designated the ministers of sacred things in Greek and Roman heathenism, and then came to be used as translations into Greek and Latin of the Hebrew *kōhēn*. *Kōhēn*, *sacerdos*, are in fact fair translations of one another; they each denote a minister whose stated business was to perform, on behalf of the community, certain public ritual acts, particularly sacrifices, directed godward. Such ministers or priests existed in all the great religions of ancient civilization, and indeed a priesthood in the sense now defined is generally found, in all parts of the world, among races which have a tribal or national religion of definite character, and not merely an unorganized mass of superstitious ideas, fears, and hopes issuing in practices of sorcery. The term "priest" is sometimes taken to include "sorcerer," just as religion is often taken to include the belief in mysterious or superhuman powers which can be constrained by spells, but this is an abuse of language. Religion begins when the relation of the divine powers to man is conceived—on the analogy of the relations of formed human society—as having a certain stable personal character on which the worshipers can calculate and act.

The influence of the Hebrew priesthood on the thought and organization of Christendom was the influence not of a living institution, for it hardly began till after the fall of the temple, but of the theory embodied in the later parts of the Pentateuch. Two points in this theory were laid hold of—the doctrine of priestly mediation and the system of priestly hierarchy. The first forms the text of the principal argument in the Epistle to the Hebrews, in which the author easily demonstrates the inadequacy of the mediations and atoning rites of the Old Testament, and builds upon this demonstration the doctrine of the effectual high-priesthood of Christ, who, in His sacrifice of Himself, truly "led His people to God," not leaving them outside as He entered the heavenly sanctuary, but taking them with Him into spiritual nearness to the throne of grace. This argument leaves no room for a special priesthood in the Christian church, and in fact nothing of the kind is found in the oldest organization of the new communities of faith. The idea that presbyters and bishops are priests and the successors of the Old Testament priesthood first appears in full force in the writings of Cyprian, and here it is not the notion of priestly mediation but that of priestly power which is insisted on. Church office is a copy of the old hierarchy.

There is probably no nature religion among races above mere savagery which has not had a priesthood; but an examination of other examples would scarcely bring out any important feature that has not been already illustrated. Among higher religions orthodox Islam has never had real priests, doing religious acts on behalf of others, though it has, like Protestant churches, leaders of public devotion (imáms) and an important class of privileged religious teachers ('ulemá). But a distinction of grades of holiness gained by ascetic life has never been entirely foreign to the Eastern mind, and in the popular faith of Mohammedan peoples something

very like priesthood has crept in by this channel. For where holiness is associated with ascetic practices the masses can never attain to a perfect life, and naturally tend to lean on the professors of special sanctity as the mediators of their religious welfare. The best example, however, of a full-blown priestly system with a monastic hierarchy grafted in this way on a religion originally not priestly is found in Tibetan Buddhism (see LAMAISM), and similar causes undoubtedly had their share in the development of sacerdotalism in the Christian church. The idea of priestly asceticism expressed in the celibacy of the clergy belongs also to certain types of heathen and especially Semitic priesthood, to those above all in which the priestly service is held to have a magical or theurgic quality.

PRIESTLEY, JOSEPH, was born on March 13, 1733, at Fieldhead near Birstal, in the West Riding of Yorkshire.

The works of Doctor Priestley fill twenty-five octavo volumes one of which, however, consists of memoirs and correspondence. The date of this collected edition is 1832. It contains upward of 130 separate works, varying in size from brief pamphlets to treatises in four volumes, and his labors range over almost all possible subjects of human knowledge or speculation. Mathematics, chemistry, physiology, grammar, logic, mental and moral philosophy, history, theology, interpretation of prophecy, politics, and sociology, all alike furnished themes for Priestley's untiring pen, and if he did not write on any of them with striking originality he treated all with freedom and intelligence. In 1761 he issued his first published works, a treatise on the *Scripture Doctrine of Remission* and *The Rudiments of English Grammar*. From that date till 1767 he was content with publishing something every alternate year. But from 1767 to 1804 he allowed only two years to go by unmarked by one or more publications, many of them remarkable as monuments of conscientious and laborious industry. His first scientific work, *The History and Present State of Electricity, with Original Experiments*, was published in 1767. The rapid advance of science has left to this and similar works of his little more than an antiquarian interest. But the treatise illustrates his prophetic spirit, inasmuch as it shows how far he was in advance of his contemporaries in appreciation of the prospects of physical research. In 1774 he issued his first volume of *Experiments and Observations on Different Branches of Air, etc.* In this volume he announced his discovery of "dephlogisticated air," now known as oxygen. The then prevalent theory of *phlogiston*, or the combustible principle in matter, betrayed him into great confusion, evident enough in the very name he gave to his new "branch of air." Nevertheless it is said of him in Roscoe and Schorlemmer's *Chemistry*, that "no one obtained more important results or threw more light upon the chemical existence of a number of different gases than Joseph Priestley." These *Experiments and Observations* were continued through five volumes, of which the last appeared in 1780. Perhaps the limit of Priestley's power of growth is illustrated by the persistency with which he clung to *phlogiston* notwithstanding the discoveries of Black, Lavoisier, and Cavendish. In 1800 he issued a treatise called *The Doctrine of Phlogiston established, and that of the Composition of Water refuted*. Doctor Priestley clearly failed to appreciate the progress of the science he had done so much to promote. But the attempt made by Lavoisier to claim for himself a concurrent discovery of oxygen at the same time as Priestley's was certainly unjustifiable. This achievement, together with the first preparation of nitric oxide, nitrous oxide, hydrochloric acid, and other

important gases, constitutes the true ground of his fame as a scientific pioneer.

Priestley's chief theological works were the *Institutes of Natural and Revealed Religion*, *A History of the Corruptions of Christianity*, and *A General History of the Christian Church to the Fall of the Western Empire*. Bishop Horsley's criticisms on the second of these works produced letters in reply, "with additional evidence that the primitive church was Unitarian." His principal metaphysical writings were *Disquisitions relating to Matter and Spirit* and various essays and letters on necessitarianism. He died in 1804.

PRIM, JUAN, MARQUIS DE LOS CASTILLEJOS, COUNT DE REUS, Spanish soldier and statesman, was the son of Lieutenant-Colonel Pablo Prim, and was born at Reus in Catalonia on December 12, 1814. On November 16, 1870, Amadeo, duke of Aosta, was elected king of Spain, but Prim was not destined to receive the new monarch, for on leaving the chamber of the cortes on December 28th, he was shot by unknown assassins and died two days later.

PRIMATE (*primas i.e., primus*), a title more than once bestowed in the *Codex Theodosianus* on various civil functionaries, came about the beginning of the fourth century to be used also, especially in Africa, as a designation of the "primæ sedis episcopus." In the canon law the word "primate" is regarded as essentially the Western equivalent of the Eastern "patriarch." See ARCHBISHOP and PATRIARCH.

PRIMOGENITURE. The term "primogeniture" is used to signify the preference in inheritance which is given by law, custom, or usage to the eldest son and his issue, or in exceptional cases to the line of the eldest daughter. The practice prevailed under the feudal codes throughout all the Western countries. It is now almost entirely confined to the United Kingdom, having been abolished (except in the succession to the crown) by the various civil codes which have superseded feudalism on the Continent, and having been universally rejected in the United States as being contrary to the spirit of their institutions. The system has of late years been persistently attacked in Great Britain, chiefly on the ground of hardship in cases of intestacy where the property is small; but the rule was found to operate so successfully in former times toward keeping large properties together that it seems likely to be still maintained by law; and even if abolished as a rule of law it would most probably be maintained in full vigor as a habit or rule of practice.

PRIMROSE. The genus *Primula* contains numerous species distributed throughout the cooler parts of Europe and Asia, and found also on the mountains of Abyssinia and Java. They are all herbaceous perennials, possessing a permanent stock, from which are emitted tufts of leaves and flower-stems which die down in winter; the new growths formed in autumn remain in a bud-like condition ready to develop themselves in spring. They form the typical genus of *Primulaceæ*, the floral conformation of which is very interesting on several accounts independently of the beauty of the flowers.

PRINCE. "Prince" and "princess" are names or descriptions implying either political authority or social rank in the persons to whom they relate or are accorded. We have in "prince" the English and French form of the Latin *princeps*, which with more or less modification has been adopted into nearly every language of modern Europe, and of which the original and common use was to indicate priority or preëminence of any sort. In an honorary sense it was, to begin with, applied by the Romans to the first or most distinguished members of the senate and the equestrian order respectively, and

their appellations of *princeps senatus* and *princeps juventutis* were afterward appropriated to the emperors themselves and to their adopted heirs and successors in the empire. Hence the attribute *princeps* became definitely associated with the notions of sovereignty and dominion, and its derivatives have been always and everywhere employed as titles of dignity and expressions of awe and respect.

In English the word "prince" may be used in certain connections in the original wide sense of the Latin word. More definitely it is applicable to supreme rulers of both sexes and almost all kinds. Thus the emperor of Russia, the queen of England, and the king of the Belgians are equally princes or monarchs, and the consorts of emperors and kings are princesses. But the presidents of republics are neither princes nor monarchs. Prince, however, unlike monarch, applies to rulers who are subordinate as well as to rulers who are supreme, to such minor potentates as the electors of the old German empire or the federal peers of France once were, and the reigning grand dukes or dukes of Germany now are. Again, all the children, and many of the descendants and other relations of monarchs, and princes of every class and grade are themselves princes or princesses, although it often happens that they have also some special name or personal dignity by which they are ordinarily known. But, when they are not dukes, or princes with a territorial title, as the prince of Wales or the princes of Naples in Italy, and Orange in Holland, they are described as "prince" with additions of "imperial," "crown," "royal," or "hereditary," as the case may be, and the name of the dominions to which they are the heirs-apparent. The eldest sons of reigning grand dukes, or dukes, however, are called "hereditary grand-dukes" or "hereditary dukes," their younger brothers and sisters being all the same, princes and princesses.

PRINCE EDWARD ISLAND, formerly called Isle St. Jean, a province of Canada, in British North America, lies between  $45^{\circ} 58'$  and  $47^{\circ} 7'$  N. latitude and  $62^{\circ}$  and  $64^{\circ} 27'$  W. longitude, on the south side of the Gulf of St. Lawrence. It is separated from Nova Scotia on the south and from New Brunswick on the south and west by Northumberland Strait, which varies from nine to thirty miles in width. Its greatest length is nearly 150 miles, its general breadth 34 miles, and the area 2,133 square miles (1,365,120 acres).

*Physical Features.*—Prince Edward Island resembles a crescent in its northern outline, the two horns being North and East Capes, and it is altogether irregular in form. Its surface is slightly rolling, the elevations of land, however, rising nowhere higher than 500 feet. The coast-line is indented with numerous bays and projecting headlands.

The climate of Prince Edward Island is much milder than that of the adjacent provinces, and, though the winter is severe and cold, the air is invigorating and salubrious. The coldest month is January, when the thermometer registers a daily average of  $15.9^{\circ}$ . Fogs seldom occur. In summer the heat is less extreme than in Quebec, the mean being  $62.3^{\circ}$ , and the pleasant autumn months attract visitors from all parts of the American continent. Vegetation develops rapidly, and agriculture is extensively prosecuted. Wheat, barley, oats, peas and beans, potatoes, turnips, and other crops ripen to perfection.

Prince Edward Island does not grow much fruit, but the apple crop is usually good, though not large, and grapes, plums, and currants are grown in small quantities. The land which is not cultivable consists of soft spongy turf, which may be used for fuel.

The forests of the island used to be very extensive,

but lumbering operations, destructive fires, and the needs of the husbandmen have reduced them, though many trees still remain, the principal being beech, birch, pine, maple, poplar, spruce, fir, hemlock, larch, cedar, etc.

*Industries.*—Shipbuilding in former years was a very active industry. It is still carried on, but to a considerably smaller extent—the number of vessels built in 1883 having been only seventeen, with a tonnage of 5,343.

The fisheries are exceedingly valuable, particularly those on the north coast, the catch being chiefly mackerel, haddock, cod, hake, and herrings, though other kinds are taken. Of late years increased impetus has been given to this industry, and many men and boats are employed in conducting it. Enormous quantities of lobsters and oysters are annually shipped to all parts of the American continent as well as elsewhere. The value of the fisheries in 1883 was nearly half a million dollars.

Wild ducks, teal, brant, wild geese, woodcocks, partridges, pigeons, and snipe occur in great abundance. Birds number 260 species. Of wild animals the principal are bears (found occasionally only), lynxes, foxes, muskrats, hares, squirrels, etc. In the summer and autumn seals in large numbers frequent the shores.

Good wagon roads are to be found wherever there is a settlement. The Prince Edward Island Railway, 200 miles long, runs from one end of the island to the other, and branches off to every town or point of importance. The main line extends from Souris and Georgetown on the east to Tignish on the northwestern extremity, connecting with Summerside and Charlottetown, the capital.

The province is divided into three counties, viz., King's, Queen's, and Prince, which are subdivided into sixty-seven townships and three royalties. The population is of mixed origin, a large proportion being emigrants from Great Britain, and the remainder natives of the country, descendants of the French Acadians, Scottish, English, and Irish settlers, and the loyalists who went to the island after the American revolution. The Indians number 281. In 1881 the population was 108,891 (54,729 males and 54,162 females). The Roman Catholic diocese is situated at Charlottetown, and authority over the spiritual affairs of the Episcopalians is exercised by the bishop of Nova Scotia.

The chief towns are Charlottetown (11,485), the capital of the island, and the county town of Queen's, Summerside (2,853), capital of Prince county, and Georgetown (1,118), capital of King's county.

*Administration, Finance, etc.*—The affairs of the province are administered by a lieutenant-governor and an executive council consisting of nine members, three with portfolios and six without, assisted by a legislative council of thirteen members and a legislative assembly of thirty members, both elective. The lieutenant-governor is appointed by the governor-general of Canada in council. A system of responsible government has existed in the island since 1851. Prince Edward Island returns six members to the Canadian House of Commons, and four senators are appointed to the Canadian Senate by the crown. All males owning freehold or leasehold property to the value of \$400, or partly freehold and partly leasehold amounting together to \$400, and in possession of the same for at least twelve months previous to election, have the right to vote for a member of the Legislative Council. The franchise for the House of Assembly is practically residential manhood suffrage.

The chief source of revenue is the yearly subsidy granted by the Dominion Government under the terms of the British North America Act.

The free-school system has obtained in the island since 1852. Previous to that date the schools were mainly supported by voluntary subscription and such local assistance as could be obtained. In 1877 the Public Schools Act—an ample and liberal measure—was passed, and a department of education was instituted.

Sebastian Cabot is said to have discovered this island in 1497, but the authority on which this statement rests is at least doubtful. Certain it is that Jacques Cartier had the credit of naming it Isle St. Jean when he discovered it on June 24, 1534, during one of his voyages up the St. Lawrence. That name clung to it for 265 years. Champlain, early in the next century, took possession of it for France, and in 1663 a grant was made of it to Captain Doublet, an officer in the army, who, however, failing to make settlements in the colony, soon afterward lost his grant. Little attention was paid to the island until after the peace of Utrecht, when the French, allured by its fertility, made efforts to colonize it. In 1719 it was granted, *en seigneurie*, to the count of St. Pierre, who tried to establish fisheries and a trading company. He lavished considerable means on his enterprise, but the scheme proved unsuccessful and his grant was revoked. In 1755 the island was captured by the British, but after the treaty of Aix-la-Chapelle it was restored to France, from which it was again wrested in 1758. It was afterward placed under the administration of Nova Scotia, and some years later it was erected into a separate government. The first parliament was called together in 1773, and a constitution was given to the colony. In November, 1798, the legislature passed an act changing the name of the province to Prince Edward Island, out of compliment to the duke of Kent, who was at that time commander of the forces in British North America. In February, 1799, the act was confirmed by the king in council.

Prince Edward Island declined to accept the Act of Confederation in 1867, but in July, 1873, it entered the union of American colonies which constituted the Dominion of CANADA, (*q.v.*)

PRINCE OF WALES ISLAND, the official name of the island popularly known as PENANG or PULO-PENANG (*i.e.*, Areca Nut Island), which lies eight or nine miles off the west coast of the Malay peninsula in 5° 20' N. latitude and 100° 20' E. longitude. The island is about fifteen miles long by five broad, and has an area of 107 square miles or 69,000 acres, considerably less than the Isle of Wight. Population, 10,000.

PRINCE OF WALES LAND, a large insular tract in the northern Arctic region opposite Boothia Felix, from which it is separated by Franklin Strait.

PRINCES ISLANDS, the Demonesi or Demonesi of the ancients, a beautiful cluster in the Sea of Marmora opposite that part of the Asiatic coast which trends southeast from Scutari to the entrance of the Gulf of Ismid (Nicomedia). They are nine in number—Prinkipo or Principo (with an Italian *c*), Kyzyl-Ada or Red Island of the Turks, the largest of the group, is a broad green hill of red quartz rising with soft and verdant outlines into two peaks, the higher of which (500 feet) is crowned by the ex-monastery of St. George, embosomed amid its oaks. On the height above the town of Prinkipo is the monastery of the Transfiguration and on the coast opposite Antirobido that of St. Nicholas.

PRINCETON, a borough and township of the United States, in Mercer county, N. J., on the Delaware and Raritan Canal, three miles north by rail from Princeton Junction, which is forty-eight miles southwest of New York and forty-two northeast of Philadelphia on the Pennsylvania Railway. Standing on high ground, it commands a fine prospect toward the east

and south. The town is the seat of Princeton or New Jersey College, founded in 1746 by members of the presbytery of New York, chartered in the same year, and opened at Elizabethtown (now Elizabeth) in 1747, removed to Newark in the same year and rechartered in 1748, and finally transferred in 1756 to Princeton, where Nassau Hall, so called in honor of William III. of England, had been erected. Nassau Hall has been twice burned down, in 1802 and 1855, but was restored in 1856 in the old style. Almost all the buildings are the gifts of generous benefactors, the most munificent of whom was Mr. John C. Green, by whom and the trustees of his estate not less than \$1,500,000 has been given in buildings and endowments. In 1884 the college, which is steadily growing, had 39 professors and 519 students, and the library contained 77,000 volumes. The endowments amount to \$1,392,000. The governor of the State of New Jersey is *ex officio* president of the board of trustees, who are 25 in number besides the president of the college. The trustees appoint the members of the faculty, and have entire control over the funds and property of the college. They fill all vacancies in their own body. Besides the Halstead observatory, there is another well-equipped observatory at the School of Science, and the laboratories and museum are well furnished for scientific study. In the cemetery, which lies to the north of the college, are the tombs of Jonathan Edwards, Aaron Burr, etc. Princeton is also the seat of the oldest theological seminary of the Presbyterian church in the United States (founded in 1812), with 7 professors, 1 instructor, about 150 students, and an endowment of about \$1,000,000. Population (1890), 4,200.

At Princeton, on January 3, 1777, Washington defeated the British forces; the Continental Congress met in the town (Nassau Hall) from June 26 to November 4, 1783.

PRINCETON, the county seat of Bureau county, Ill., is situated on the Chicago, Burlington & Quincy railroad, twenty-two miles west-southwest of Mendota and 105 miles west-southwest of Chicago. It has three banks, three newspaper offices, manufactories of flour and farming implements and some coal mines. Population, 5,000.

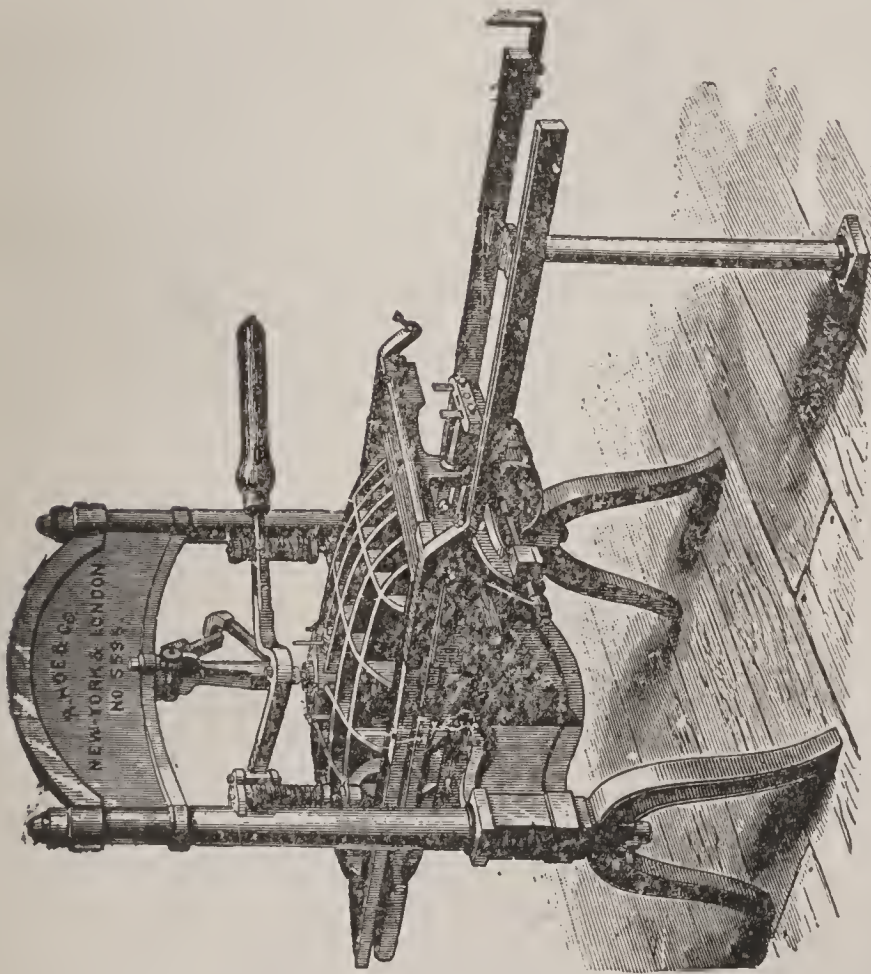
PRINCETON, the county seat of Gibson county, Ind., is a town of 5,000 people, situated twenty-seven miles north of Evansville. It has good railroad and banking facilities and is of some importance as a shipping point for local produce. Princeton has good schools and some fine residences.

PRINGLE, SIR JOHN, a distinguished physician, was the younger son of Sir John Pringle, of Stichel, Roxburghshire, and was born on April 10, 1707, and died in 1782.

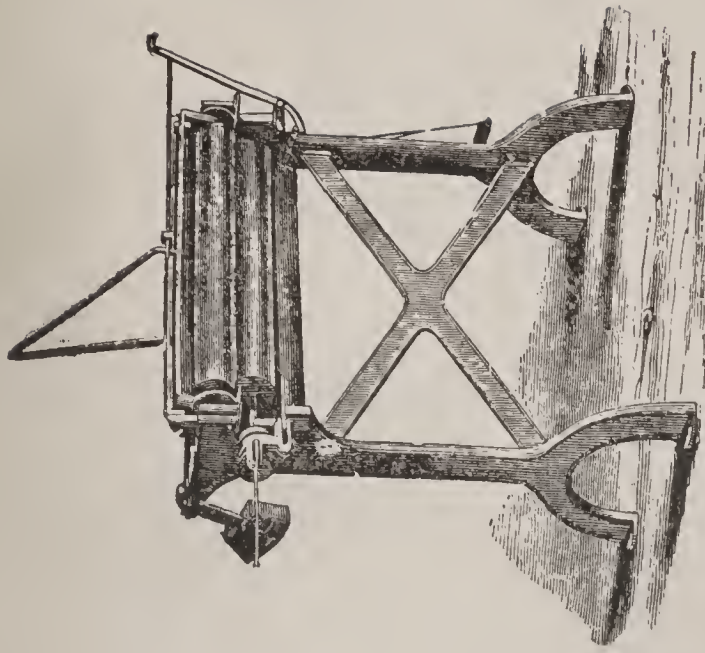
PRINTING, TYPOGRAPHIC. See TYPOGRAPHY.

PRINTING PRESS. In no branch of industry has there been a greater development of appliances than has been apparent in the printing press. From the old-fashioned wedge press the stride to the hand lever press was thought to be a great one. But the gulf between the hand press and the latest achievements of the modern builders is greater yet. In the execution of "press work" the following operations are essential. 1. The types, carefully set, fixed with precision in forms, rendered level all over, so that ail parts may be pressed alike, and the whole properly cleaned by a wash of potash lye. Much printing has latterly been done from plates, which necessitates overlaying and underlaying and calls for great skill on the part of the pressman. 2. A uniform inking of the surface, to give uniformity of color. 3. The paper dampened equably, neither too much nor too little, so as to take an impression easily and

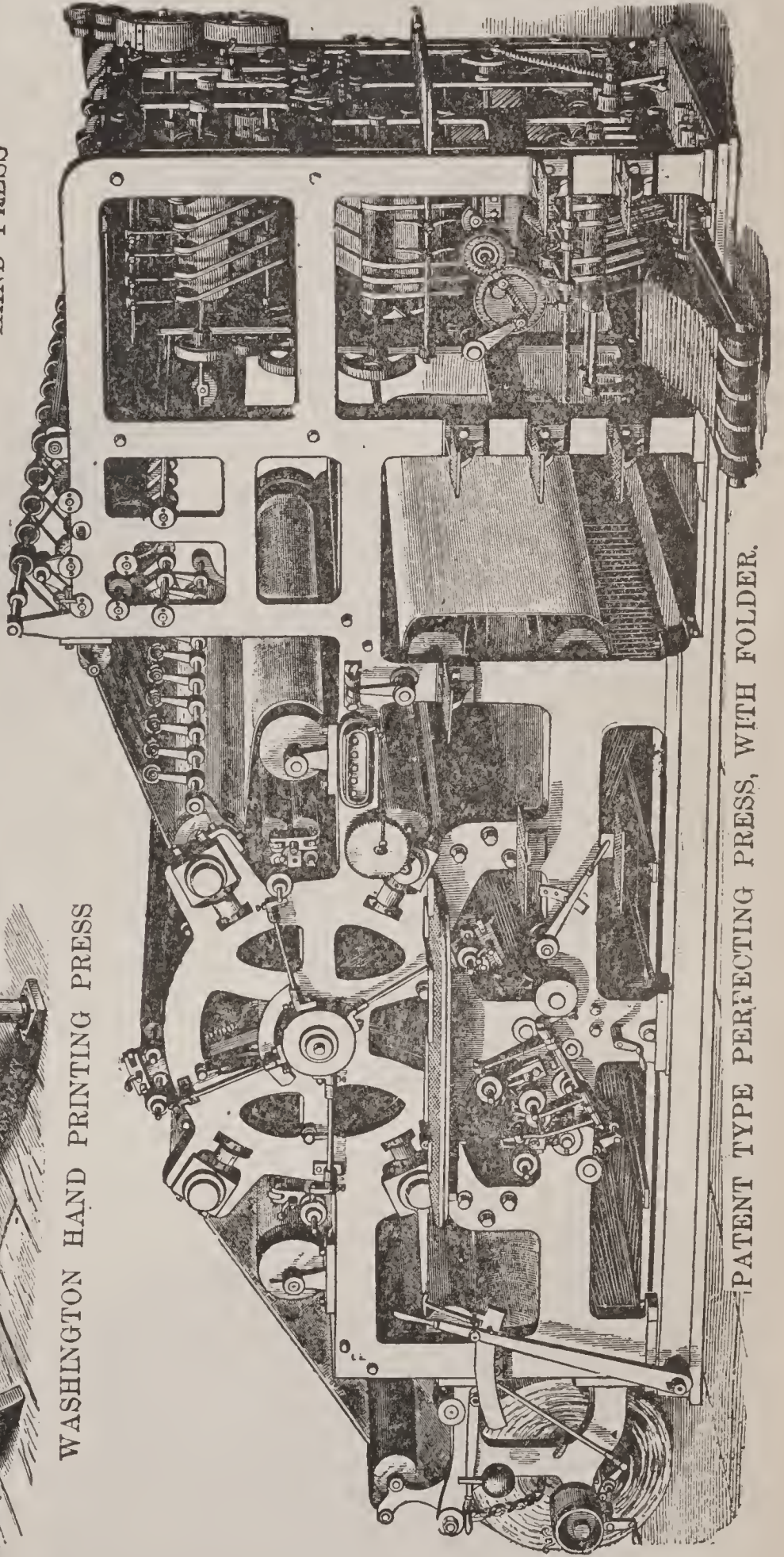
PRINTING PRESSES.



WASHINGTON HAND PRINTING PRESS



SELF INKERS FOR WASHINGTON HAND PRESS



PATENT TYPE PERFECTING PRESS, WITH FOLDER.

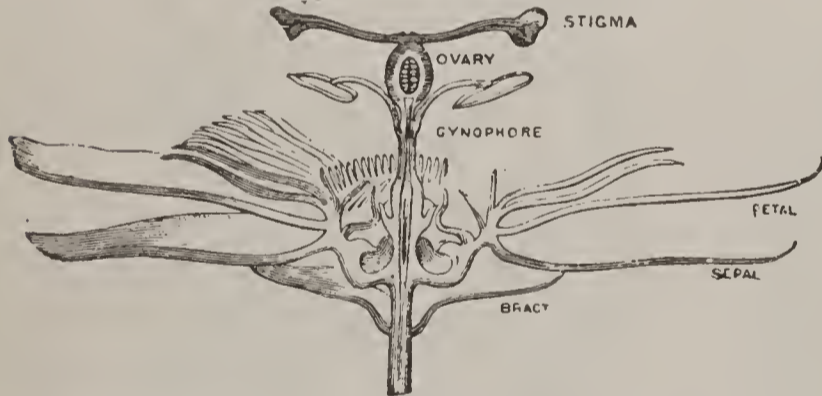
MISCELLANEOUS.



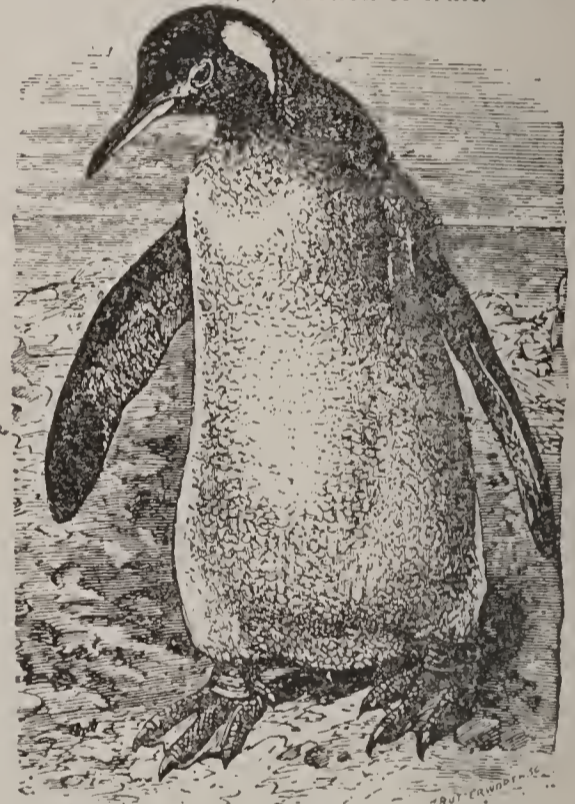
*Passiflora carulea*, var., showing leaf, stipule, tendril and detached flower.



*Piper nigrum*. a, Twig with fruit; b, longitudinal section of flower; c, section of fruit.



Flower of Passionflower cut through the center to show the arrangement of its constituent parts.



King-Penguin (*Aptenodytes pennanti*).



Peccary



Platypus. From Gould's *Mammals of Australia*



evenly. In using paper with a glazed surface the dampening is omitted, in fact except in newspaper or in very careful book work damping the sheets is rarely practiced. 4. An equable, firm, and smart pressure, and with that degree of steadiness in the mechanism that the sheet shall touch and leave the types without shaking and blurring. 5. Care in adjusting the pointers (or gauge), so that perfect register may be secured in printing the second side. 6. Such frequency in changing fly or under-sheets on the tympan, that the first side shall not get dirtied by off-setting when printing the second side. 7. The laying of small patches on the tympan, where, from any inequality, it seems necessary to bring up the pressing-surface to a thorough equality. A regard to all these circumstances constitutes the duty of a pressman. Bad printing is usually a result of old and worn types, want of proper cleaning, or an inferior kind of ink. Early in this century important improvements were made on the old system. The presses then brought out have been still further improved, until we now have as the outgrowth of the original hand press, the great Cottrell, the Potter, the Bullock, the Hoe, and other steam-power presses, capable of delivering 10,000 to 20,000 impressions an hour. Hand presses of an improved kind continue to be used, however, in the case of limited impressions, or where extra care and elegance in typography are required; also where machinery is unattainable. The web perfecting press prints from a continuous roll of paper, which is dampened as it goes into the machine, and impressions are printed on both sides, alternately, from curved stereotype plates fitted to the large cylinders. The same machine cuts off the sheet of the required length, folds and pastes it, cuts the edges, and delivers on the fly-board a complete 4, 8, 12, or 16 page newspaper, so rapidly that complete editions of the great dailies are now run off in a few hours.

PRIOR, MATTHEW, the most distinguished of English society poets, was born in 1664, and died in 1721.

PRISCIAN (PRISCIANUS CÆSARIENSIS), the most celebrated Latin grammarian, lived about 500 A.D., *i.e.*, somewhat before Justinian. This is shown by the facts that he addressed to Anastasius, emperor of the East 491-518, a laudatory poem, and that the MSS. of his *Institutiones Grammaticæ* contain a subscription to the effect that the work was copied (526, 527) by Flav. Theodorus, a clerk in the imperial secretariat ("memorialis sacri scrinii epistolarum"). Three minor treatises are dedicated to Symmachus (the father-in-law of Boetius). Cassiodorus, writing in the ninety-third year of his age (560? 573?), heads some extracts from Priscian with the statement that he taught at Constantinople in his (Cassiodorus's) time. His title *Cæsariensis* points, according to Niebuhr and others, to Cæsarea in Mauretania.

PRISCILLIANISTS, an heretical sect which rose to some prominence in Spain toward the end of the fourth century and continued to subsist, in varying numbers, there and in Gaul, until after the middle of the sixth. Its founder was Priscillian, a wealthy and influential layman of considerable reading and ability who had devoted his life to a self-denying study of the occult sciences and the deeper problems of philosophy. In the course of his speculations he came under the influence of two teachers, Elpidius and Agape, who professed to have derived their views from a certain Marcus, a native of Egypt who had settled in Spain. The creed which Priscillian now formulated appears to have combined various features of Gnosticism and Manichæism: he seems, for example, to have held the theory of emanations—high in rank among these being the heavenly powers whom he called by the name of the

twelve patriarchs, and brought also into close relation with the signs of the zodiac—the doctrine of the demiurge, the preëxistence of souls, the eternity of the devil, the essential sinfulness of the flesh, the unlawfulness of procreation, and the like. He and his followers retained their connection with the Catholic Church, insisting, however, on fasting on Sundays, and refusing the bread in the sacrament; but they also held separate meetings in private at which they were accused by their adversaries (with what truth is not known) of practicing magic and indulging in licentious orgies. Many women joined the sect, and among the more prominent of its converts were two bishops, named Instantius and Salvianus.

PRISHTINA, or PRISTINA, a town of European Turkey, since 1877 at the head of a liwa in the vilayet of Kossovo, lies on an affluent of the Sitnitza, a tributary of the Morava, and gives its name to one of the stations on the Salonica-Uskub-Mitrovica Railway, which runs at a distance of six or seven miles to the west of the town. Population, 11,000.

PRISON DISCIPLINE. Authority in every age and in every country has claimed to impose penalties on all who offend against it. Either coercion or protection has been the moving principle: the master extorted submission, or society, through its rulers, defended itself against evil doers. The most common punishments in early times were naturally those most easily inflicted. Offenders paid in their persons: they were put to death with every variety of the capital sentence, were branded, mutilated, or sold as slaves. They were fined also, were degraded, or forfeited civil rights, or yet again were simply banished from their homes. Enforced detention, incarceration within four walls, was another method of coercion which grew and gained favor under the feudal system. The lord temporal or spiritual or corporate body could thus hold the vassal safe until he yielded fealty or submitted to extortion. A dungeon told no tales, and served conveniently to bury the victims of mediæval oppression. The unrestrained and unjustifiable exercise of the power to imprison lingered long in lands where personal liberty was unknown; nor did arbitrary imprisonment terminate with the destruction of the Bastille.

In the olden time the prisoner was the unreserved property of his captor or jailor, and the most frightful excesses and barbarities were practiced on the victim, who was by reason of his imprisonment unable to defend himself, or make his condition known to his friends. John Howard was the first to inaugurate a movement looking toward reform in this direction; but for many years there was but little progress made in European governments in regard to this important matter. Indeed, America may be said to have furnished, in the earlier years of the present century, the first specimen of genuine prison-reform and wholesome discipline.

The true object of penal treatment had begun to be understood, and keen controversy had arisen as to the best methods for securing it. This object, broadly stated, was to compass the reformation of the convicted offender and at the same time deter others from crime. The chief experiments in this direction had been made in the United States, where two remarkable systems of penal discipline had for some time been in operation. Each had its warm supporters and friends. One had originated with the Quakers of Pennsylvania, who, as far back as 1786, had abolished capital punishment and all other purely personal penalties, and had subjected all offenders instead to solitary confinement without occupation for mind or body. This, as developed in the years following, became the purely solitary system, and was the first of the two methods mentioned above. The

idea, although not absolutely new, having been already accepted in the United Kingdom both in the Gloucester penitentiary and the Glasgow bridewell, was hailed with enthusiasm as a solution of all difficulties of prison treatment. Many other States in the Union followed the lead of Pennsylvania. That of New York built the great Auburn penitentiary in 1816 to carry out the new principles. There every prisoner was kept continuously in complete isolation. He saw no one, spoke to no one, and did no work. But within a short period very deplorable results began to show themselves at Auburn. Many prisoners became insane; health was impaired, and life greatly endangered. Some relaxation of the disastrous severity seemed desirable, and out of this grew the second great system, which was presently introduced at Auburn, and afterward at the no less renowned prison of Sing Sing. It was called the silent system. While the prisoners were still separated at night or meals, they were suffered to labor in association, but under a rule of silence ruthlessly and rigorously maintained. The latter, intrusted to irresponsible subordinates, degenerated into a despotism which brought the system into great discredit. All discipline officers were permitted to wield the whip summarily and without the slightest check. Under such a system the most frightful excesses were possible, and many cases of brutal cruelty were laid bare.

The only other system ever tried in the United States is the contract system, happily now almost extinct. This consisted in hiring the convicts to contractors who had absolute charge of them—in fact, it was a horrible system of slavery, far worse than absolute slavery, for the reason that the contractors failed to have the interest in the welfare of their charges which ownership would have given. The most brutal cruelties were inflicted, and public sentiment has long demanded the extinction of the system, which at present only exists in one or two of the southern States.

The following sketch will give the career of the English criminal and best illustrate the system of discipline in vogue in that country. After a short detention in a police cell, an offender, unless disposed of summarily, passes into one of her majesty's local prisons, there to await his trial at sessions or assizes. The period thus spent in the provinces will never exceed three months; in London, with the frequent sittings at Clerkenwell and of the Central Criminal Court, it is seldom more than one month. While awaiting trial the prisoner may wear his own clothes, provide his own food, see and communicate with his friends and legal adviser, so as to prepare fully for his defense. His fate after conviction depends on his sentence. If this be imprisonment, so called to distinguish it from penal servitude, although both mean deprivation of liberty and are closely akin, it is undergone in one of the "local" prisons—the prisons till 1878 under local jurisdiction, but now entirely controlled by the state through the home secretary and the commissioners of prisons. The régime undergone is cellular; able-bodied prisoners are kept in strict separation for at least one month, and during that time subjected to first-class hard labor, which is purely penal in character; and nowadays, under the uniform system introduced by the commissioners, consists of the treadwheel, in which each individual ascends 8,640 feet in a day's work, or six hours' work on cranks or hard labor machines is exacted where there are no treadwheels; and the labor, whether of treadwheel or crank, is generally utilized as the motive power for grinding corn or pumping water for prison use. Beating oakum with a heavy beater and mat-making with heavy implements are also considered

first-class hard labor. Throughout the sentence the prisoner has the advantage of religious and moral instruction; he attends divine service regularly and according to his creed, is visited by the chaplain, and receives educational assistance according to his needs. His physical welfare is watched over by competent medical men; close attention is paid to the sanitary condition of prisons; strict rules govern the size of the cells, with their lighting, warming, and ventilation. Dietaries are everywhere the same, they are calculated with great nicety according to the terms of duration, and afford variety and ample nutrition without running into excess. In a word, as regards discipline, labor, treatment, exactly the same system obtains throughout the United Kingdom from Bodmin to the far north, from Cork to Belfast.

Where the sentence passes beyond two years it ceases to be styled imprisonment and becomes penal servitude, which may be inflicted for any period from five years to life. The prisoner becomes a convict, and undergoes his penalty in one or more of the convict prisons. These are entirely under state management. A sentence of penal servitude, as now administered, consists of three distinct periods or stages:—(1) that of probation endured in separate confinement at a so-called "close" prison; (2) a period of labor in association at a public works prison; and (3) conditional release for the unexpired portion of the sentence upon license or ticket-of-leave.

Most civilized nations have considered the question of prison discipline from time to time, and have endeavored, but with varying degrees of earnestness, to conform to accepted modern ideas as to the proper method of dealing with criminals. The subject has also been dealt with at two international congresses, one of which assembled in London in 1873, and the other at Stockholm in 1878, when views were exchanged, and matters of much interest discussed.

The prison system of Canada is advanced and enlightened. The numbers incarcerated are not great, and crime is not very prevalent. Six establishments suffice for the Dominion—Kingston, St. Vincent de Paul (for the province of Quebec), Halifax, Manitoba, British Columbia, and Dorchester.

In Mexico the rule of constant separation for all prisoners has been accepted, but not yet carried out entirely. The old prisons were on the associated system; but new cellular prisons have recently been built, or are in process of construction at Jalisco, Durango, Puebla, and Mexico. These will receive trial prisoners and those sentenced. There is an "hospicio de pobres" for young children; also a special reformatory establishment for children between nine and eighteen. Political offenders are kept apart from ordinary offenders. All convicted prisoners may earn conditional release on completion of half their whole sentence. This form of release is called preparatory liberty, and for a short time preceding it they are allowed to leave the jail to run errands or seek work. The labor in Mexican prisons is industrial, not penal, and in theory at least the advantages of learning a trade in prison are fully understood. Contracts for prison labor are forbidden.

In Russia deportation to Siberia began in 1591. It was used for political prisoners, insurgents, religious dissenters, and conspirators. There are several hundred prisons in Siberia. They are of three kinds:—(1) the *etape*, which afford temporary lodgings for prisoners on the line of march; (2) the *prisylnic*, where the detention is often for several months during the winter or until the ice is broken up; and (3) the *ostrog*, the generic Russian name for a prison, which is the place of duration for all exiles not on their own resources. Few of the large prisons in Siberia were built for the

purpose. They are converted buildings—old factories, distilleries, and so forth. They are all upon the associate principle, containing a number of large rooms to accommodate any number from twenty-five to a hundred. The great central prison near Irkutsk, called the Alexandreffsky, one of the most important in Siberia, generally holds from 1,600 to 2,000 prisoners all under sentence of hard labor, and awaiting transfer to the mines. Prison offenses are punished by relegation to a solitary cell, a certain number of which exist at all the prisons. Diminutions of diet are also inflicted, and an obligation to wear irons if they are not already worn. All exiles wear leg-irons for a certain time. These are riveted onto the ankles, and caught by a chain which is carried suspended to a belt round the waist. The irons are worn for various periods from eighteen months to four and even eight years. Very heinous offenders or those who have escaped frequently are chained to a wheelbarrow, which they are obliged to pull about with them wherever they go. A more severe punishment when confinement and irons fail is birching with a rod, for the knout is now abolished. The rod consists of switches so small that three may be passed together into the muzzle of a musket.

In the United States, while there are but few agencies for the assistance of discharged prisoners, considerable care is devoted to the treatment and checking of juvenile crime. Reformatories have existed since 1825, when the first was established on Randall's Island within the limits of the city of New York. Others followed; but these did not form part of the penal system of the States till 1847, when the State reform school at Westborough was established by law. They soon increased and multiplied, and now between sixteen and twenty are to be found within the principal States. There are also a number of semi-public schools. The average reformatory population is about 15,000. The results are said to be very satisfactory. The percentage of youths reformed and trained into good citizens has been placed as high as 60, 75, even 80 per cent. Parents may in some States contribute to the support of their children in reformatories, but as a rule the inmates are orphans or abandoned children or those whose parents are very poor. The best system for training and caring for juvenile offenders probably is that which obtains in Massachusetts.

PRISREND, PRISDREN, PRISDRA, PISDRA, PISREN, or PISRA, in Roumelia, the chief town of a sandjak and the seat of a Greek and a Roman Catholic archbishop, in the Turkish vilayet of Kossovo (formerly Monastir), stretches for two or three miles along the northwestern base of the Scardus or Shar-dagh, and is traversed by the rapid waters of the Resna Mitritza, which, issuing from a deep gorge a little above the town, joins the Drin (White or Albanian Drin) a few miles below.

PRIVATEER is an armed vessel belonging to a private owner, the subject of a belligerent power, commissioned by the sovereign of that power. The commission is either a commission of war or of marque and reprisals in time of peace. Privateers stand in a position between that of a public ship of war and a merchant vessel. They are not entitled to the full rights which the comity of nations extends to public ships of war; *e.g.*, by the municipal regulations of most nations they may not carry the flag of a public ship of war.

PRIVET (*Ligustrum*), the vernacular name of a genus of *Oleaceæ*. There are several species, all of them shrubs or low trees with evergreen or nearly evergreen opposite entire leaves, and dense cymes of small white tubular four-parted flowers, inclosing two stamens and succeeded by small, globular, usually black berries, each with a single pendulous seed.

PRIVILEGE, in law, is an immunity or exemption conferred by special grant in derogation of common right. The term is derived from *privilegium*, a law specially passed in favor of or against a particular person. In Roman law the latter sense was the more common; in modern law the word bears only the former sense. Privilege in English law is either *personal* or *real*—that is to say, it is granted to a person, as a peer, or to a place, as a university.

In the United States the term privilege is of considerable political importance. By Art. IV. § 2 of the constitution, "the citizens of each State shall be entitled to all privileges and immunities of citizens in the several States." By Art. XIV. § 1 of the amendments to the constitution (enacted July 28, 1868), "no State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States." It will be noticed that Art. IV. applies to citizens of the States, Art. XIV. to the citizens of the United States. "The intention of this clause (Art. IV.) was to confer on the citizens of each State, if one may so say, a general citizenship, and to communicate all the privileges and immunities which the citizens of the same State would have been entitled to under the like circumstances" (Story, *Constitution of the United States*, § 1806). The clauses have several times been the subject of judicial decision in the supreme court. Their practical effect may be thus illustrated. With regard to Art. IV., it was held that a State license tax discriminating against commodities of production of other States was void as abridging the privileges and immunities of such other States (*Ward v. State of Maryland*, 12 Wallace's Reports, 418). With regard to Art. XIV. § 1, it was held that its main purpose was to protect from the hostile legislation of the States the privileges and immunities of citizens of the United States, looking more especially to the then recent admission of negroes to political rights. Accordingly it was held that a grant of exclusive right or privilege of maintaining slaughter-houses for twenty-one years, imposing at the same time the duty of providing ample conveniences was not unconstitutional, as it was only a police regulation for the health of the people (*The Slaughter-House Cases*, 16 Wallace, 36). The same has been held of a refusal by a State to grant a woman a license to practice law (*Bradwell v. The State*, 16 Wallace, 130), of a State law confining the right of suffrage to males (*Minor v. Happersett*, 21 Wallace, 162), and a State law regulating the sale of intoxicating liquors (*Bartemeyer v. Iowa*, 18 Wallace, 129). Suits to redress the deprivations of privilege secured by the constitution of the United States must be brought in a United States court. It is a crime to conspire to prevent the free exercise and enjoyment of any privilege, or to conspire to deprive any person of equal privileges and immunities, or under color of law subject any inhabitant of a State or Territory to the deprivation of any privileges or immunities (*Revised Statutes of the United States*, §§ 5507, 5510, 5519).

PRIVY COUNCIL. In England the king, almost of necessity, has been at all times guided by a council. The council, as it existed in the Norman period under the name of *curia regis* (a branch of the larger *commune concilium regni*), exercised judicial, legislative, and administrative functions. It contained the germs of the courts of law and equity, the House of Parliament, and the privy council. The Courts of King's Bench and Common Pleas were gradually separated from it, and became only courts of first instance, subject to appeal to the king's council. From the time of Edward I. the *concilium ordinarium*, the ordinary or standing council of the king, superseded the *curia regis*

It exercised high judicial functions as the ultimate court of appeal, as the adviser of suitors on petition what court to choose for redress, and as the resort of those who failed to obtain justice in the ordinary course. It was also the supreme administrative body, and as such issued ordinances on matters of a local or temporary nature, with not infrequent usurpations at a later period of jurisdiction belonging more properly to the common law courts or to parliament. The council "consisted of the chief ministers, the chancellor, treasurer, lord steward, lord admiral, lord marshal, the keeper of the privy seal, the chamberlain, treasurer, and comptroller of the household, the chancellor of the exchequer, the master of the wardrobe; and of the judges, king's serjeant, and attorney-general, the master of the rolls, and justices in eyre, who at that time were not the same as the judges at Westminster."

**PRIZE**, or **PRIZE OF WAR**, denotes the ship or goods of an enemy, or *in transitu* to an enemy, captured at sea. Goods captured on land are not prize, but booty of war. To be good prize the capture must be on the high seas or in the territorial waters of one of the belligerents, and must be by an armed vessel duly commissioned by the sovereign of the captor. A capture made in neutral waters is a violation of neutrality, and may be restored at the discretion of the neutral power. Most nations have municipal regulations upon the subject. Thus prizes captured in breach of the neutrality of Great Britain may be restored by the High Court of Justice (Admiralty Division) under the powers of the Foreign Enlistment Act, 1870. Capture may be actual or constructive. Constructive or joint captors are those who have assisted the actual captors by conveying encouragement to them or intimidation to the enemy. All public ships of war within signaling distance are usually held entitled to share in the proceeds of the capture. This rule is incorporated in the United States code of prize law, the Act of Congress of June 30, 1864. It is not all enemy's property that is good prize. The conflicting interests of neutrals have led to modifications of the general belligerent right of seizing enemy's property wherever found, a right which had become established as part of the general maritime law as early as the *Consolato del Mare*.

By the Naval Discipline Act, 1866, a commanding officer making an unlawful agreement for ransom is liable to be dismissed from the service. The United States has never prohibited ransom bills. The rights of the sovereign to prize may be waived, as was formerly done by the crown of Great Britain in the case of privateers (see **PRIVATEER**).

*Prize Court.*—This is a court sitting by the commission of the sovereign of the captor for the determination of prize causes. A capture does not become good prize until condemnation by a prize court. The United States prize courts have by the act of 1854 jurisdiction over property captured in an insurrection.

*Prize Money.*—The term prize money is used in a wider sense than the term prize. It extends to any reward granted by the state for the capture of enemy's property whether by land or sea. By an act of Congress of March 3, 1819, a bounty of \$25 is given for each slave captured, and the proceeds of condemned slave ships are divided between the United States and the captors, half to each.

**PROBABILITY.** The mathematical theory of probability is a science which aims at reducing to calculation, where possible, the amount of credence due to propositions or statements, or to the occurrence of events, future or past, more especially as contingent or dependent upon other propositions or events the probability of which is known.

Any statement or (supposed) fact commands a certain amount of credence, varying from zero, which means conviction of its falsity, to absolute certainty, denoted by unity. An even chance, or the probability of an event which is as likely as not to happen, is represented by the fraction  $\frac{1}{2}$ . It is to be observed that  $\frac{1}{2}$  will be the probability of an event about which we have no knowledge whatever, because if we can see that it is more likely to happen than not, or less likely than not, we must be in possession of some information respecting it. It has been proposed to form a sort of thermometrical scale, to which to refer the strength of the conviction we have in any given case. Thus if the twenty-six letters of the alphabet have been shaken together in a bag, and one letter be drawn, we feel a very feeble expectation that A has been the one taken. If two letters be drawn, we have still very little confidence that A is one of them; if three be drawn, it is somewhat stronger; and so on, till at last, if twenty-six be drawn, we are certain of the event, that is, of A having been taken.

Probability, which necessarily implies uncertainty, is a consequence of our ignorance. To an omniscient Being there can be none. Why, for instance, if we throw up a shilling, are we uncertain whether it will turn up head or tail? Because the shilling passes, in the interval, through a series of states which our knowledge is unable to predict or to follow. If we knew the exact position and state of motion of the coin as it leaves our hand, the exact value of the final impulse it receives, the laws of its motion as affected by the resistance of the air and gravity, and finally the nature of the ground at the exact spot where it falls, and the laws regulating the collision between the two substances, we could predict as certainly the result of the toss as we can which letter of the alphabet will be drawn after twenty-five have been taken and examined.

The probability, or amount of conviction accorded to any fact or statement, is thus essentially subjective, and varies with the degree of knowledge of the mind to which the fact is presented (it is often indeed also influenced by passion and prejudice, which act powerfully in warping the judgment)—so that, as Laplace observes, it is affected partly by our ignorance partly by our knowledge. Thus, if the question were put, Is lead heavier than silver? some persons would think it is, but would not be surprised if they were wrong; others would say it is lighter; while to a worker in metals probability would be superseded by certainty. Again, to take Laplace's illustration, there are three urns, A, B, C, one of which contains black balls, the other two white balls; a ball is drawn from the urn C, and we want to know the probability that it shall be black. If we do not know which of the urns contains the black balls, there is only one favorable chance out of three, and the probability is said to be one-third. But if a person knows that the urn A contains white balls, to him the uncertainty is confined to the urns B and C, and therefore the probability of the same event is one-half. Finally to one who had found that A and B both contained white balls, the probability is converted into certainty.

In common language, an event is usually said to be likely or probable if it is more likely to happen than not, or when, in mathematical language, its probability exceeds one-half; and it is said to be improbable or unlikely when its probability is less than one-half. Not that this sense is always adhered to; for, in such a phrase as "It is likely to thunder to-day," we do not mean that it is more likely than not, but that in our opinion the chance of thunder is greater than usual; again, "Such a horse is likely to win the Derby," simply means that he has the best chance, though according to the betting that chance may be only one-sixth. Such unsteady and ellip-

cical employment of words has of course to be abandoned and replaced by strict definition, at least mentally, when they are made the subjects of mathematical analysis.

PROBATE. See WILL.

PROBUS, MARCUS AURELIUS, Roman emperor from 276 to 282 A.D., was a native of Sirmium on the Save, and son of a military officer of moderate fortune. One of his principles was never to allow the soldiers to be idle, and to employ them in time of peace on useful works, such as the planting of vineyards in Gaul, Pannonia, and other districts where a selfish policy had previously forbidden this form of husbandry. This increase of duties was naturally unpopular with the troops, and while the emperor was urging on the drainage of the marshes of his native place he was attacked and slain by a sudden mutiny. Scarcely any emperor has left behind him so good a reputation.

PROCESS, in law, denotes in the widest sense of the word any means by which a court of justice gives effect to its authority. In the old practice of the English common law courts process was either original or judicial. Original process was a means of compelling a defendant to compliance with an original writ (see WRIT). Judicial process was any compulsory proceeding rendered necessary after the appearance of the defendant. Process was also divided in civil matters into original, mesne, and final. Original process in this sense was any means taken to compel the appearance of the defendant.

In the United States process is governed by numerous statutes, both of Congress and of the State legislatures. The law is founded upon the English common law.

PROCIDA, an island less than two miles off the west coast of southern Italy between Capo Miseno (or rather Monte Procida) on the mainland and the island of Ischia, forming part of the circondario of Pozzuoli and the province of Naples.

PROCLUS. See NEOPLATONISM.

PROCONSUL. See CONSUL and PROVINCE.

PROCOPIUS, the most eminent historian of the Eastern Roman empire, was born at Cæsarea in Palestine, then one of the chief cities of the Roman East, toward the end of the fifth century, probably between 485 and 495 A.D. Of his family and earlier life nothing is known, but it has been plausibly conjectured from the aristocratic sympathies he manifests that he belonged to one of the better families of his city, and from the place of his birth that he was educated at the great law school of Berytus (Beirut).

As an historian, Procopius would have deserved honor in any age, and is of quite unusual merit when one considers the generally low literary level of the age which produced him. From the fourth to the fifteenth century the Eastern empire has no lay writer of gifts approaching his. He is industrious in collecting facts, careful and impartial in stating them; his judgment is sound, his reflections generally acute, his conceptions of the general march and movement of things not unworthy of the great events he has recorded. His descriptions, particularly of military operations, are clear, and his especial fondness for this part of the subject seldom leads him into unnecessary minuteness.

The *Anecdota*, or Secret History, in length almost equal to the *De Aedificiis*, and somewhat shorter than the average length of a book of the *Histories*, purports to be a supplement to these, containing explanations and additions which the author could not place in the *Histories* for fear of Justinian and Theodora.

PROCOPIUS. Two leaders of this name are mentioned in connection with the wars of the HUSSITES, (*q. v.*)

I. ANDREAS PROCOPIUS, surnamed "the Great" or "the Bald," was a native of Bohemia, born about 1380. He perished in the decisive battle fought near Böhmischtrod on May 30, 1434.

II. Of PROCOPIUS surnamed "the Little," nothing is known save that he coöperated with Procopius "the Great" from 1427 onward, and that he shared his fate.

PROCTER, BRYAN WALLER, poet and miscellaneous writer, was born on 21st Nov., 1787. He was sent to a small boarding school near London, and thence in his thirteenth year to Harrow, where he had for contemporaries Lord Byron and Sir Robert Peel. On leaving school he was placed in the office of a solicitor at Calne, Wiltshire, remaining there until about 1807, when he returned to pursue his legal studies in London. By the death of his father in 1816 he became possessed of a small property, and soon entered into partnership with a solicitor; but in 1820 the partnership was dissolved, and during the temporary difficulties thus occasioned he supported himself in part by literary work under the pseudonym of Barry Cornwall. After his marriage in 1824 he returned to his professional work as conveyancer, and was called to the bar in 1831. In the following year he was appointed metropolitan commissioner of lunacy, an appointment annually renewed until his election to the permanent commission constituted by the act of 1842. He resigned office in 1861. During the last years of his life a failure of speech led him to withdraw from society, and his death took place on October 4, 1874.

PROCTOR, the English form of the Latin *procurator*, denotes a person who acts for another, and so approaches very nearly in meaning to AGENT, (*q. v.*) The word is used in three senses: (1) A particular kind of university official; (2) a representative of the clergy in convocation. A proctor represents either the chapter of a cathedral or the beneficed clergy of a diocese.

PRODICUS of Ceos, whose birth is conjecturally assigned to 465-460 B.C., was a humanist of the first period of the Sophistical movement. He was still living in 399 B.C.

PROHIBITION is defined by Blackstone as "a writ directed to the judge and parties of a suit in any inferior court, commanding them to cease from the prosecution thereof, upon a surmise either that the cause originally or some collateral matter arising therein does not belong to that jurisdiction, but to the cognizance of some other court." A writ of prohibition is a prerogative writ—that is to say, it does not issue as of course, but is granted only on proper grounds being shown.

PROHIBITION PARTY (See LIQUOR LAWS). The prohibition party is a political organization that during recent years has occupied a position of no inconsiderable importance among the political parties of the United States, and wielded an influence extending to a considerable degree beyond local circles. It grew out of the conviction among those who have been identified with the cause of temperance for years that the manufacture and sale of intoxicating liquors could only be suppressed by legislative enactment, and the purpose of its organization was a "stronger and more formal bond of union between those who favor the legal prohibition of the liquor traffic." The principles of the party first found expression in Maine during 1851, when the State adopted a law prohibitory in its character that yet remains on the statute book. Through succeeding years the question thus specifically addressed to "the intelligence of mankind" was made the subject of agitation in many of the States, on the hustings, through the columns of the daily press, in the pulpit, and by lect-

urers employed for such purpose. Societies and associations of a semi-political character were also formed, and efforts were made to concentrate an army of reformers, so to speak, to the end that the contest in behalf of the cause of prohibition might be solidified and strengthened. On various occasions since 1867 conventions have been held, and since 1869 those convening have nominated candidates for the presidency of the United States, as also for state and county offices. During the year 1889, the party encountered many obstacles to its progress and prosperity. At the convention held at Chicago, in the summer of that year, dissensions arose in that body growing out of the political complexion sought to be given the organization. After some earnest discussion, the Iowa delegation withdrew and has since formed the nucleus of a new party. In 1890 the Supreme Court of the United States in a case on appeal from Iowa, decided that the transportation of liquor through, and the sale of liquor in original packages could not be prohibited in any of the States or Territories of the United States, and that the statute of Iowa prohibiting the sale of liquors in the State was in violation of the constitution of the United States. The policy of re-submitting the entire matter to the popular vote in some of the States interested was seriously mooted for a time, but the leaders of the party incline to an opinion that the only possible method of attaining their object is through national legislation, and an effort will likely be made, in the near future, to secure a constitutional amendment embodying their views on the question of prohibition.

**PROJECTILES.** See **MECHANICS** and **GUNNERY**.

**PROJECTION.** If from a fixed point *S* in space lines or rays be drawn to different points *A, B, C, \* \* \** in space, and if these rays are cut by a plane in points *A', B', C', \* \* \** the latter are called the projections of the given points on the plane. Instead of the plane another surface may be taken, and then the points are projected to that surface instead of to a plane. In this manner any figure, plane or in space of three dimensions, may be projected to any surface from any point which is called the center of projection. If the figure projected is in three dimensions then this projection is the same as that used in what is generally known as *perspective*.

In modern mathematics the word *projection* is often taken with a slightly different meaning, supposing that plane figures are projected into plane figures, but three-dimensional ones into three-dimensional figures. Projection in this sense, when treated by coördinate geometry, leads in its algebraical aspect to the theory of linear substitution and hence to the theory of invariants and co-variants.

If all points in a figure be projected from a fixed center to a plane, each point on the projection will be the projection of all points on the projecting ray. A complete representation by a single projection is therefore possible only when there is but one point to be projected on each ray. This is the case by projecting from one plane to another, but it is also the case if we project the *visible* parts of objects in nature; for every ray of light meeting the eye starts from that point in which the ray, if we follow its course from the eye backward, meets for the first time any object. Thus, if we project from a fixed center the *visible* part of objects to a plane or other surface, then the outlines of the projection would give the same impression to the eye as the outlines of the things projected, provided that one eye only be used and that this be at the center of projection. If at the same time the light emanating from the different points in the picture could be made to be of the same

kind—that is, of the same color and intensity and of the same kind of polarization—as that coming from the objects themselves, then the projection would give sensibly the same impression as the objects themselves. The art of obtaining this result constitutes a chief part of the technique of a painter, who includes the rules which guide him under the name of perspective, distinguishing between *linear* and *aerial* perspective—the former relating to the projection, to the *drawing* of the outlines, the latter to the coloring and the shading off of the colors in order to give the appearance of distance.

**PROJECTION OF THE SPHERE.** See **GEOGRAPHY**.

**PROME**, a district in Pegu division, British Burmah, India, between  $18^{\circ} 30'$  and  $19^{\circ} 15'$  N. latitude, and  $94^{\circ} 40'$  and  $96^{\circ}$  E. longitude, containing an area of 2,887 square miles. In 1881 the population was 322,342 (161,433 males and 160,909 females).

The early history of the once flourishing kingdom of Prome, like that of the other states which now form portions of the province of British Burmah, is veiled in obscurity. Fact and fable are so interwoven that it is impossible to disentangle the true from the false. After the conquest of Pegu in 1758 by Aloung-bhúra, the founder of the third and present dynasty of Ava kings, Prome remained a province of the Burman kingdom till the close of the second Burmese war in 1853, when the province of Pegu was annexed to British territory.

**PROME**, chief town of the above district, on the left bank of the Irawadi, had a population in 1881 of 28,813 (males 14,982, females 13,831).

**PROMETHEUS**, son of the Titan Iapetus by the sea nymph Clymene, is the chief "culture hero," and, in some accounts, the Demiurge of Greek mythical legend. The pedigree and early exploits of Prometheus are given by Hesiod. On a certain occasion gods and men met at Mecone. The business of the assembly was to decide what portions of slain animals the gods should receive in sacrifice. On one side Prometheus arranged the best parts of the ox covered with offal, on the other the bones covered with fat. Zeus was invited to make his choice, chose the fat and found only bones beneath. A similar fable of an original choice, in which the chooser is beguiled by appearances, recurs in Africa and North America. The native tribes adapt it to explain the different modes of life among themselves and white men. In wrath at this trick, according to Hesiod, or in other versions for the purpose of exterminating the remnants of people who escaped the deluge of Deucalion, Zeus never bestowed, or later withdrew, the gift of fire. In his "philanthropic fashion," Prometheus stole fire, concealed in a hollow fennel stalk, and a fennel stalk is still used in the Greek islands as a means of carrying a light. According to some legends he gained the fire by holding a rod close to the sun. Probably the hollow fennel stalk in which fire was carried got its place in myth from the very fact of its common use.

**PRONGBUCK.** See **ANTELOPE**.

**PRONY**, GASPARD CLAIR FRANÇOIS MARIE RICHELIEU, a celebrated French engineer, was born at Chamelet, in the department of the Rhone, July 22, 1755, and died at Lyons July 31, 1839.

**PROPAGANDA**, or Sacred Congregation *de Propaganda Fide*, is the name given to a commission of cardinals appointed for the direction of the missions of the Roman Church. The idea of forming such an institution was conceived by Pope Gregory XIII. and other pontiffs, but it was Gregory XV. (1621-1623) who, after having sought counsel from cardinals and information concerning the state of religion in various countries from apostolic nuncios and superiors of religious orders,

published, July 22, 1622, the bull *Inscrutabile*, by which he founded the Congregation of Propaganda and provided means for its continuance.

The primary purpose of the Propaganda being to secure laborious and pious missionaries, colleges for their education and training were established. Chief among these is the Propaganda or Urban College in Rome, so named from Urban VIII. It is a general missionary seminary for the whole world. Here students are received from all foreign nations, and there are special foundations for Georgian, Persian, Chaldaean, Syrian, Coptic, Brahman, Abyssinian, Armenian, Greek, and Chinese students, as well as for students from England, Ireland, America, and Australia, although these last have special colleges in Rome. After the age of fourteen each student takes an oath to serve the missions during his whole life in the ecclesiastical province or vicariate assigned to him by the Congregation, to which he must send annually an account of himself and of his work. He is maintained and clothed free of expense. His studies embrace the full course of Greek, Latin, and Italian letters, some of the chief Oriental languages, as Hebrew, Syriac, Arabic, Armenian, and, when necessary, Chinese. There are also schools for the teaching of rational and natural philosophy, a complete course of theology, and the institutions of canon law. Besides this principal seminary, the Propaganda has colleges dependent on it both in Rome and in other countries, under the direction of regular and secular priests. From its beginning it had at its disposition national colleges—such as the English, founded by Gregory XIII.; the Irish, by Cardinal Ludovisi in 1628; the Scotch, by Clement VIII. in 1600; the German and Hungarian; the American, of the United States, opened by Pius IX. in 1859; the Greek, founded by Gregory XIII.; the Armenian, recently established by Leo XIII.; and the Bohemian, opened November 4, 1884. The jurisdiction of the Propaganda extends over the English colleges of Lisbon and Valladolid, the Irish college of Paris, and the American of Louvain. Until recently it had the Chinese college of Naples, transformed by the Italian Government, and the Illyrian college of Loreto, suppressed by the same government; and it still has the Albanian pontifical college of Scutari. Besides these, other colleges serve for the education of missionaries for the Propaganda, as the college of SS. Peter and Paul in Rome, founded by Pius IX., in Milan; the seminary of St. Calocero for all foreign missions, and at Genoa the College Brignole Sale for Italian emigrants to America. The institutions at Verona for central Africa are the support of the missions in the Soudan. Chief of all the seminaries is that of Paris which, for two centuries, has supplied missionaries for India and China.

PROPERTIUS, SEXTUS, the greatest elegiac poet of Rome, was born of a good Umbrian family. The year of his birth is uncertain, and it has been variously placed between 57 and 44 B.C. The poems of Propertius, as they have come down to us, consist of four books containing 4,046 lines of elegiac verse. The author died sometime subsequent to 16 B.C.

PROPHET (*προφήτης*) is a word taken from the vocabulary of ancient Greek religion, which passed into the language of Christianity, and so into the modern tongues of Europe, because it was adopted by the Hellenistic Jews as the rendering of the Hebrew נָבִי (*nābî*, pl. *nebíim*). The word therefore as we use it is meant to convey an idea which belongs to Hebrew and not to Hellenic belief; but when it first underwent this change of application the age of the *nebíim* was long past, and the Jews themselves had a very imperfect conception of what they had been and done. Hence in actual usage

the idea conveyed by the word prophet has never quite corresponded with its historical prototype; the prophets of early Christendom, for example, are not by any means exact counterparts of the Old-Testament prophets, and in general very various ideas have prevailed as to what a prophet is or should be, because up to quite a recent date the work of the Hebrew prophets has been habitually approached not in a purely historical spirit but under the influence of preconceived ideas.

*The Prophets of the Old Testament.*—The author of 1 Sam. ix. 9, tells us that “beforetime in Israel, when a man went to inquire of God, thus he spake, Come and let us go to the seer; for he that is now called a prophet (*nābî*) was beforetime called a seer.” This remark is introduced to explain how his contemporaries spoke of Samuel. He was a “seer,” or, as he is also called, a “man of God,” that is one who stood in closer relations to God than ordinary men; “all that he said was sure to come to pass,” so that he could be consulted with advantage even in private matters like the loss of the asses of Kish. The narrative of 1 Sam. ix. is so vivid and exact that not many generations of oral tradition can have separated the author from the events he records; it shows us therefore, at least broadly, what the word prophet meant in the early times of the Hebrew kingdom, and it shows us that it had acquired that meaning after the age of Philistine oppression in which Samuel lived, and to which his younger contemporaries Saul and David put an end. That this is the sense of the author, and that we must not suppose that the word prophet had merely become more common in his time and supplemented an older synonym, appears beyond question a few verses further down, where we see that there were already in Samuel’s time people known as *nebíim*, but that they were not seers. The seer, with his exceptional insight, is a man of prominent individuality and held in great respect: when Saul asks for the seer every one knows that there is only one person in the town whom he can mean. With the prophets it is quite otherwise; they appear not individually but in bands; their prophesying is a united exercise, accompanied by music, and seemingly dance-music; it is marked by strong excitement, which sometimes acts contagiously, and may be so powerful that he who is seized by it is unable to stand, and though this condition is regarded as produced by a divine afflatus, it is matter of ironical comment when a prominent man like Saul is found to be thus affected. Samuel in his later days appears presiding over a group of *nebíim* at Ramah, where they seem to have had a sort of cœnobium (Naioth), but he was not himself a *nābî*—that name is never applied to him except in 1 Sam. iii. 21, where it is plainly used in the later sense for the idea which in Samuel’s own time was expressed by “seer.”

*Prophets in the Christian Church.*—The appearance of prophets in the first Christian communities is one proof of the strength of faith and hope by which these bodies were animated. An old prophecy (Joel iii. 1) had foretold that in the Messianic age the Spirit of God would be poured out on every member of the religious community, and, in point of fact, it was the universal conviction of those who believed in Christ that they all possessed the Spirit of God. This Spirit, manifesting His presence in a variety of ways and through a variety of gifts, was to be the only ruling authority in the church. He raised up for Himself particular individuals, into whose mouths He put the word of God, and these were at first regarded as the true leaders of the congregations. We find accordingly that there were prophets in the oldest church, that of Jerusalem, and again that there were “prophets and teachers” in the church at Antioch. These were not office-bearers

chosen by the congregation, but preachers raised up by the Spirit and conferred as gifts on the church. When Paul says: "God has set some in the church, first as apostles, second as prophets, third as teachers," he points to a state of things which in his time prevailed in all the churches both of Jewish and of heathen origin. We here learn from Paul that the prophets occupied the second position in point of dignity; and we see from another passage (1 Cor. xiv.) that they were distinguished from the teachers by their speaking under the influence of inspiration—not, however, like the "speakers in tongues," in unintelligible ejaculations and disconnected words, but in articulate, rational, edifying speech. Until recently it was impossible to form any distinct idea of the Christian prophets in the post-apostolic age, not so much from want of materials as because what evidence existed was not sufficiently clear and connected. It was understood, indeed, that they had maintained their place in the churches till the end of the second century, and that the great conflict with what is known as Montanism had first proved fatal to them; but a clear conception of their position and influence in the churches was not to be had. But the discovery, by Bryennios, of the ancient Christian work *Διδαχὴ τῶν δωδεκά ἀποστόλων* (The Teachings of the Twelve Apostles), has immensely extended the range of our knowledge, and has at the same time thrown a clear light on many notices in other sources which for want of proper interpretation had been previously neglected or incorrectly understood.

PROSELYTE (*προσήλυτος*) is the term most frequently adopted by the Septuagint, especially in legal passages, to represent the Hebrew גֵר. The *gēr*, or more fully *gēr w'tōshāb*, is not any "stranger," but a stranger dwelling in a Hebrew community, and enjoying a certain measure of protection. In old time at least the position of such a stranger was no doubt very insecure, for he had no strong kinsmen to take his part, and so, like the widow and orphan, with whom many passages of the Old Testament associate him, he was liable to oppression. The law as well as the prophets commend him to the humane regard of his neighbors, but it would have been quite foreign to antique ideas to grant him equal rights.

The condition of admission to the full privileges of an Israelite, in particular to the passover, is, according to the Priestly Code (Exod. xii. 48; Numb. ix. 14), circumcision—to which the later Jewish usage adds lustration by immersion in water (baptism, *t'bilā*) and the presentation of a sacrifice (*korbān*). The immersion, about which there has been a good deal of controversy, some maintaining that it came into use later than Christian baptism, was really a necessary act for one who had been previously unclean, and may be held to be involved in the general Pentateuchal law of ceremonial washings. The later technical name for a heathen who thus joined the theocracy was גֵר הַצְדִק, "proselyte of righteousness."

PROSERPINE (*Proserpina*) is the Latin form of PERSEPHONE, a Greek goddess, daughter of Zeus and the earth-goddess Demeter. As she was gathering flowers with her playmates in a meadow, the earth opened and Pluto, god of the dead, appeared and carried her off to be his queen in the world below. Torch in hand, her sorrowing mother sought her through the wide world, and finding her not she forbade the earth to put forth its increase. So all that year not a blade of corn grew on the earth, and men would have died of hunger if Zeus had not persuaded Pluto to let Proserpine go. But before he let her go Pluto made her eat the seed of a pomegranate, and thus she could not stay away from him forever. So it was arranged that she should spend two-thirds (according to later authors,

one-half) of every year with her mother and the heavenly gods, and should pass the rest of the year with Pluto beneath the earth.

PROSKUROFF, a district town of the government of Podolia, Russia, situated on the railway from Odessa to Lemberg, sixty-two miles to the northwest of Schmerinka junction, and on the highway from Zhitomir to Kieff. Of the population (11,750 in 1880), more than one-half are Jews.

PROSPER OF AQUITAINE (AQUITANUS, or AQUITANICUS), a Christian prose and verse writer of the first half of the fifth century. Of his personal history almost nothing is known; his surname seems to imply that he was a native of Aquitania, and there are various indications that he was educated as a "rhetorician."

PROSSNITZ (Slavonic, *Prostejov*), the chief place in the fertile district of the Hanna, in Moravia, Austria, is situated on the small river Rumza, eleven miles southwest of Olmütz. Population in 1880, 16,751.

PROTAGORAS of Abdera, the first of the so-called Sophists—who, about the middle of the fifth century B. C., asserted throughout Greece the claims of education or culture in opposition on the one hand to technical instruction and on the other to physical research—was an older contemporary of Socrates. At the age of seventy, having been accused and convicted of atheism, Protagoras fled from Athens, and on his way to Sicily was lost at sea. His birth has been plausibly assigned to 481 and his death to 411 B. C. Forty years of his life were spent in the exercise of his popular and lucrative profession in the principal cities of Greece and Sicily.

PROTECTION. See FREE TRADE and POLITICAL ECONOMY.

PROTESTANTENVEREIN is the name of a society in Germany the general object of which is to promote the union and the progress of the various established Protestant churches of the country in harmony with the advance of culture and on the basis of Christianity. It was founded at Frankfort-on-the-Main in 1863 by a number of distinguished clergymen and laymen of liberal tendencies, representing the freer parties of the Lutheran and reformed churches of the various German states, among whom were the statesmen Bluntschli and Von Bennigsen and the professors Rothe, Ewald, Schenkel, Hilginfeld, and Hitzig.

PROTESTANTS is the generic term for members of the churches which owe their origin directly or indirectly to the REFORMATION, (*q. v.*) The name is derived from the Protest of Spires in 1529 (see LUTHER). Certain small communities of Christians older than the Reformation, but agreeing with it in rejecting the authority of Rome, are generally and quite logically grouped as Protestants; and popularly the name is considered to include all Christians who do not belong to the Greek and Roman Catholic communions, though members of the Anglican Church, for example, frequently protest against such a classification as historically false and personally obnoxious. Protestantism has flourished best among the Teutonic peoples of Northern Europe, and has always found it difficult to make its way among the Latin peoples of the South.

The following table shows approximately the number of Protestants in the world:—

#### I. EUROPE—

Great Britain and Ireland (Anglicans, 18,800,000; Presbyterians, 3,900,000; Methodists, 3,500,000; Independents, 1,200,000; Baptists, 1,000,000) . . . . .	28,400,000 (estimate)
German Empire (Lutherans, Reformed, and United, 28,318,280; Mennonites and other Baptists, 38,744) . . . . .	28,357,024 (1880)



Norway and Sweden (Norway, 1,805,076; Sweden, 4,561,759, mostly Lutheran).....	6,366,835 (1875 and 1880)
Denmark and Iceland (Denmark, 1,960,844; Iceland, 72,000, mostly Lutheran).....	2,032,844 (1880)
Holland (Reformed, 2,346,568— including Remonstrants, 9,678; Lutherans, 73,696; Mennonites, 50,705).....	2,472,680 (1879)
Switzerland (mainly Reformed) (Making a total in countries of the Teutonic race of 69,296,492.)	1,667,109 (1880)
France (Reformed or Calvinists, 467,631; Lutherans, 80,117; others, 33,109).....	580,757 (1872)
Belgium, Spain, and Portugal, Luxemburg and Monaco (respectively 15,000, 10,500, 963, and 626).....	27,089 (various)
Italy (Waldensians, Free Church of Italy, Methodists, Baptists, etc.).....	62,000 (estimate)
Roumania (Total in countries of Latin race, 683,646.)	13,800 (estimate)
Austria (Lutherans, 289,005; Reformed, 110,525; Unitarians, 169, etc.).....	401,479 (1880)
Hungary (Lutherans, 1,130,150; Reformed, 2,043,280; Unitarians, 56,190).....	3,220,620 (1880)
Russia in Europe (Lutherans in Finland, 2,019,727).....	4,504,000 (partly estimate)
Turkey, Greece, Servia (respectively 10,200, 20,000, and 500). (Total in countries of Slavonic, non-Aryan, and mixed race, 8,165,799.)	30,700 (estimate)
<b>II. AMERICA—</b>	78,145,937
United States (Methodists, 3,686,114 church members; Baptists, 2,424,878; Lutherans, 950,868; Disciples of Christ, 591,821; Congregationalists, 381,697; Episcopalians, 347,781).....	30,000,000 *
Canada.....	2,422,285 (1881)
West Indies.....	160,500 (estimate)
Central and South America....	180,000 (partly estimate)
	32,762,785
<b>III. ASIA and AUSTRALASIA—</b>	
India, (Anglicans, etc., 373,848; Baptists, Presbyterians, etc., 128,694; Lutherans, 29,577)...	532,219 (1881)
Dutch Possessions.....	170,000 (partly estimate)
China and Corea (73,000), Japan (13,000), and Siam (2,000) ...	88,000 (estimate)
Turkey in Asia (100,000) and Persia (5,000).....	105,000 (estimate)
New South Wales (516,512), Victoria (618,392), Queensland (139,380).....	1,274,284 (1881)
South Australia (216,626) and West Australia (20,613).....	237,239 (1881)
New Zealand.....	393,971 (1881)
Polynesia, Micronesia, and Melanesia (260,000, 8,000, and 16,000).....	284,600 (estimate)
	3,084,713
<b>IV. AFRICA—</b>	
Egypt and North Africa (10,000) and West Africa (110,000)....	120,000 (estimate)
Cape Colony, etc.....	400,000 (estimate)
East and Central Africa (2,000) and Madagascar (300,000)....	302,000 (estimate)
	822,000
Total number of Protestants thus ascertained...	114,815,435

This total of 115,000,000 is for obvious reasons considerably within the truth. Making allowance for increase of population since some of the census returns, it will probably be not beyond the mark to state the Protestants of Europe at 81,000,000, of America at 34,000,000, of Asia and Australasia at 3,300,000, and of Africa at 850,000, and the total in round numbers at 120,000,000.

\* This estimate of the Protestant population is based on the details of church membership (partly given above) obtained at the census of 1880.

PROTEUS, a Greek sea-god, spoken of by Homer as the Old Man of the Sea. In the *Odyssey* he dwells in the sea near Pharos, an island said to be a day's sail from the mouth of the Nile; in Virgil his home is the Carpathian Sea between Crete and Rhodes. He knew all things past, present, and future, but was very loth to tell what he knew. Those who would consult him had first to surprise and bind him during his noon-day slumber in a cave by the sea, where he was wont to pass the heat of the day surrounded by his seals. Even when caught he would try to escape by assuming all sorts of shapes; now he was a lion, now a serpent, a leopard, a boar, a tree, fire, water. But if his captor held him fast, the god at last returned to his proper shape, gave the wished-for answer, and then plunged into the sea.

PROTEUS ANGUINUS, a blind, newt-like perennibranchiate Amphibian, about a foot long, found in the Adelsberg, Maddalena, and other limestone caverns of Carinthia and Carniola.

PROTOGENES, a Greek painter, born in Caunus on the coast of Caria, but resident in Rhodes during the latter half of the fourth century B.C., was celebrated for the minute and laborious finish which he bestowed on his pictures, both in drawing and in color.

PROTOPLASM. In most of the biological articles of the present day special reference is made to protoplasm as the living matter from which all kinds of living beings are formed and developed, and to the properties of which all their functions are ultimately referred. Fundamentally important then as this substance is, whether we occupy the standpoint of morphology, physiology, or ætiology, an attempt must be made to outline the way in which our knowledge of it has been reached, to bring together by the aid of a short summary the statements of such preceding articles, and to supply means of extending the general idea thus obtained by reference to the original literature of the subject.

*Appearance and Properties of Protoplasm.*—To obtain a notion of the appearance and physical properties of protoplasm, it is expedient as it were to repeat the process of discovery, and acquire concrete ideas by actual observation as far as possible, or at least from good figures. The *Amæba* (see PROTOZOA) and the FORAMINIFERA (*q.v.*) thus afford convenient and classical examples of the protoplasm of the lowest animal forms; the colorless corpuscles of blood should also be examined, and the structure of the higher tissues (see ANATOMY and HISTOLOGY) inquired into, and the segmentation of an ovum (see REPRODUCTION) observed—most conveniently perhaps in frog spawn.

*Manifestations of Life (Functions).*—The vital properties or "functions" exhibited by undifferentiated living protoplasm (*e.g.*, *Amæba*) are usually enumerated as contractility, irritability and automatism, reception and assimilation of food, metabolism with secretion and excretion, respiration, and reproduction.

*Chemical Composition and Processes.*—This aspect of protoplasm is of constantly increasing importance, since for the chemist all functions alike can only be viewed in terms of those specific anabolic or katabolic changes which to the physiologist, on the other hand, seem mere accompaniments of them (see PHYSIOLOGY, NUTRITION, REPRODUCTION). The determination of the chemical nature of protoplasm is thus the supreme problem of physiological chemistry; and, while, thanks to the labors of Reinke, E. Schultze, and others, there has been a rapidly increasing knowledge of its anastates, but more especially of its katabates, and of many cases of the unity of metabolic processes throughout nature, several daring general hypotheses are already in the field. Of these that of Schützenberger, who views proteid bodies as complex ureides, and that of Loew

and Bokorny, who regard them as a complex mixture of aldehyde groups, are examples.

PROTOZOA is the name applied to the lowest grade of the animal kingdom, and originated as a translation of the German term "Urthiere." While at first used some forty years ago in a vague sense, without any strict definition, so as to include on the one hand some simple organisms which are now regarded as plants, and on the other some animals which are now assigned a higher place in the animal series, the term has within the last twenty years acquired a very clear signification.

The protozoa are sharply and definitely distinguished from all the rest of the animal kingdom, which are known by the names "Metazoa" or "Enterozoa." They are those animals which are structurally single "cells" or single corpuscles of protoplasm, whereas the Enterozoa consist of many such units arranged definitely (in the first instance) in two layers—an endoderm or enteric cell-layer and an ectoderm or deric cell-layer—around a central cavity, the enteron or common digestive cavity, which is in open communication with the exterior by a mouth.

The protozoa are then essentially unicellular animals. The individual or person in this grade of the animal kingdom is a single cell; and, although we find protozoa which consist of aggregates of such cells, and are entitled to be called "multicellular," and yet an examination of the details of structure of these cell-aggregates and of their life-history establishes the fact that the cohesion of the cells in these instances is not an essential feature of the life of such multicellular protozoa, but a secondary and non-essential arrangement. Like the budded "persons" forming, when coherent to one another, undifferentiated "colonies" among the polyps and corals, the coherent cells of a compound protozoon can be separated from one another and live independently; their cohesion has no economic significance. Each cell is precisely the counterpart of its neighbor; there is no common life, no distribution of function among special groups of the associated cells, and no corresponding differentiation of structure. As a contrast to this we find even in the simplest enterozoa that the cells are functionally and structurally distinguishable into two groups—those which line the enteron or digestive cavity and those which form the outer body wall. The cells of these two layers are not interchangeable; they are fundamentally different in properties and structure from one another. The individual enterozoon is not a single cell; it is an aggregate of a higher order consisting essentially of a digestive cavity around which two layers of cells are disposed. The individual protozoon is a single cell; a number of these individuals may, as the result of the process of fission (cell-division), remain in contact with one another, but the compound individual which they thus originate has not a strong character. The constituent cells are still the more important individualities; they never become differentiated and grouped in distinct layers differing from one another in properties and structure; they never become subordinated to the individuality of the aggregate produced by their cohesion; hence we are justified in calling even these exceptional aggregated protozoa unicellular.

By far the larger number of protozoa are absolutely single isolated cells, which, whenever they duplicate themselves by that process of division common to these units of structure (whether existing as isolated organisms or as constituents of the tissues of plants or of animals), separate at once into two distinct individuals which move away from one another and are thenceforward strangers.

The feeding of plants upon carbonic acid is invariably accompanied by the presence of a peculiar green-coloring matter—chlorophyl. In virtue of some direct or indirect action of this chlorophyl the protoplasm of the plant is enabled to seize the carbon of the mineral world—the carbon which has sunk to the lowest resting stage of combination—and to raise it into combination with hydrogen and oxygen and ultimately with nitrogen. There are plants which have no chlorophyl, and are thus unable to feed upon carbonic acid. They are none the less plants since they agree closely with particular chlorophyl-bearing plants in details of form and structure, mode of growth and reproduction. A large series of these are termed fungi. Though unable to feed on carbonic acid, they do not feed as do animals. They can take their carbon from acetates and tartrates, which animals cannot do, and their nitrogen from ammonia. Even when it is admitted that some of these colorless plants, such as the bacteria (Schizomycetes), can act upon albumens so as to digest them and thus nourish themselves, it is not reasonable to place the bacteria among animals, any more than it would be reasonable so to place nepenthes, sarracenia, and drosera (insectivorous phanerogams); for the structure and mode of growth of the bacteria is like that of well-known chlorophylligerous minute algæ from which they undoubtedly differ only in having secondarily acquired this peculiar mode of nutrition, distinct from that which has dominated and determined the typical structure of plants.

So we find in a less striking series of instances among animals that here and there the nutritional arrangements which we have no hesitation in affirming to be the leading characteristic of animals, and to have directly and perhaps solely determined the great structural features of the animal line of descent, are largely modified or even altogether revolutionized. The green hydra, the freshwater sponge, and some planarian worms produce chlorophyl corpuscles in the protoplasm of their tissues just as green plants do, and are able in consequence to do what animals usually cannot do—namely, feed upon carbonic acid. The possibilities of the protoplasm of the plant and of the animal are, we are thus reminded, the same. The fact that characteristically and typically plant protoplasm exhibits one mode of activity and animal protoplasm another does not prevent the protoplasm of even a highly developed plant from asserting itself in the animal direction, or of a thoroughly characterized animal, such as the green hydra, from putting forth its chlorophylligenous powers as though it belonged to a plant.

Hence it is not surprising that we find among the protozoa, notwithstanding that they are characterized by the animal method of nutrition and their forms determined by the exigencies of that method, occasional instances of partial vegetable nutrition such as is implied by the development of chlorophyl in the protoplasm of a few members of the group. It would not be inconsistent with what is observed in other groups should we find that there are some unicellular organisms which must, on account of their structural resemblances to other organisms, be considered as Protozoa and yet have absolutely given up altogether the animal mode of nutrition (by the ingestion of solid albumens) and have acquired the vegetable mode of absorbing ammonia, nitrates, and carbonic acid. Experiment in this matter is extremely difficult, but such "vegetable" or "holophytic nutrition" appears to obtain in the case of many of the green flagellata, of the dinoflagellata, and possibly of other protozoa.

On the other hand there is no doubt that we may fall into an error in including in the animal line of descent all unicellular organisms which nourish themselves by

the inception of solid nutriment. It is conceivable that some of these are exceptional creophagous protophytes parallel at a lower level of structure to the insectivorous phanerogams. In all cases we have to balance the whole of the evidence and to consider probabilities as indicated by a widely-reaching consideration of numerous facts.

The mere automatic motility of unicellular organisms was at one time considered sufficient indication that such organisms were animals rather than plants. We now know that not only are the male reproductive cells of ferns and similar plants propelled by vibratile protoplasm, but such locomotive particles are recognized as common products ("swarm-spores" and "zoospores") of the lowest plants.

The danger of dogmatizing erroneously in distinguishing protozoa from protophyta, and the insuperable difficulty in really accomplishing the feat satisfactorily, has led at various times to the suggestion that the effort should be abandoned and a group constituted confessedly containing both unicellular plants and unicellular animals, and those organisms which may be one or the other. Haeckel has proposed to call this group the Protista. On the whole, it is more satisfactory to make the attempt to discriminate those unicellular forms which belong to the animal line of descent from those belonging to the vegetable line. It is, after all, not a matter of much consequence if the botanist should mistakenly claim a few protozoa as plants and the zoölogist a few protophyta as animals. The evil which we have to avoid is that some small group of unattractive character should be rejected by both botanist and zoölogist, and thus our knowledge of it should unduly lag. Bearing this in mind, the zoölogist should accord recognition as protozoa to as wide a range of unicellular organisms as he can without doing violence to his conceptions of probability.

A very interesting and very difficult subject of speculation forces itself on our attention when we attempt to draw the line between the lowest plants and the lowest animals, and even comes again before us when we pass in review the different forms of protozoa.

That subject is the nature of the first protoplasm which was evolved from not-living matter on the earth's surface. Was that first protoplasm more like animal or more like vegetable protoplasm as we know it to-day? By what steps was it brought into existence?

Briefly stated the present writer's view is that the earliest protoplasm did not possess chlorophyl and therefore did *not* possess the power of feeding on carbonic acid. A conceivable state of things is that a vast amount of albuminoids and other such compounds had been brought into existence by those processes which culminated in the development of the first protoplasm, and it seems therefore likely enough that the first protoplasm fed upon these antecedent steps in its own evolution just as animals feed on organic compounds at the present day, more especially as the large creeping plasmodia of some mycetozoa feed on vegetable refuse. It indeed seems not at all improbable that, apart from their elaborate fructification, the mycetozoa represent more closely than any other living forms the original ancestors of the whole organic world. At subsequent stages in the history of this archaic living matter chlorophyl was evolved and the power of taking carbon from carbonic acid. The "green" plants were rendered possible by the evolution of chlorophyl, but through what ancestral forms they took origin or whether more than once, *i.e.*, by more than one branch, it is difficult even to guess. The green flagellate protozoa (Volvocineæ) certainly furnish a connecting point by which it is possible to link on the pedigree of green plants to the primitive protoplasm; it is noteworthy that

they cannot be considered as very primitive and are indeed highly specialized forms as compared with the naked protoplasm of the mycetozoon's plasmodium.

Thus then we are led to entertain the paradox that though the animal is dependent on the plant for its food yet the animal preceded the plant in evolution, and we look among the lower protozoa and not among the lower protophyta for the nearest representatives of that first protoplasm which was the result of a long and gradual evolution of chemical structure and the starting point of the development of organic form.

PROUDHON, PIERRE JOSEPH, a well-known revolutionary writer, was born in 1809 at Besançon, France. In 1840 he published his first work *Qu'est-ce que la Propriété?* In 1846 he published his greatest work, the *Système des Contradictions économiques ou Philosophie de la Misère*. The violence of his utterances led to an imprisonment at Paris for three years, during which he married a young working woman. As Proudhon aimed at economic rather than political innovation, he had no special quarrel with the second empire, and he lived in comparative quiet under it till the publication of his work, *De la Justice dans la Révolution et dans l'Église* (1858), in which he attacked the church and other existing institutions with unusual fury. This time he fled to Brussels to escape imprisonment. On his return to France his health broke down, though he continued to write. He died at Passy in 1865.

PROUT, SAMUEL, water-color painter, was born at Plymouth, England, on September 17, 1783. At the time of his death, February 10, 1852, there was scarcely a nook in France, Germany, Italy, and the Netherlands where his quiet, benevolent, observant face had not been seen searching for antique gables and sculptured pieces of stone. In Venice especially there was hardly a pillar which his eye had not lovingly studied and his pencil had not dexterously copied.

PROVENÇAL LANGUAGE AND LITERATURE. Provençal is a name used to comprehend all the varieties of Romanic speech formerly spoken and written, and still generally used by country people, in the south of France. The geographical limits of this infinitely varied idiom cannot be defined with precision, because it is conterminous on the north, south, and east with idioms of the same family, with which at almost every point it blends by insensible gradations. Roughly speaking, it may be said to be contained between the Atlantic on the west, the Pyrenees and Mediterranean on the south, and the Alps on the east, and to be bounded on the north by a line proceeding from the Gironde to the Alps, and passing through the departments of Gironde, Dordogne, Haute Vienne, Creuse, Allier, Loire, Rhone, Isère, and Savoie. These limits are to some extent conventional. True, they are fixed in accordance with the mean of linguistic characters; but it is self-evident that according to the importance attached to one character or another they may be determined differently.

The name Provençal as applied to language is hardly met with in the Middle Ages, except in the restricted sense of the language of Provence proper, *i.e.*, of the region lying south of Dauphiné on the eastern side of the Rhone.

The Provençal language cannot be said to have general characteristics really peculiar to it. Such of its characteristics as are found in all varieties of the language are met with also in neighboring idioms; such as are not found elsewhere are not general characteristics, that is, are manifested only in certain varieties of Provençal. In reality "Provençal language" does not designate, properly speaking, a linguistic unity; it is merely a geographical expression.

Provençal literature is much more easily defined than the language in which it is expressed. Starting in the eleventh and twelfth centuries in several centers, it thence gradually spread out, first over the greater portion, though not the whole, of southern France, and then into the north of Italy and Spain. It nowhere merged in the neighboring literatures. At the time of the highest development (twelfth century) the art of composing in the vulgar tongue did not exist, or was only beginning to exist, to the south of the Alps and the Pyrenees. In the north, in the country of French speech, vernacular poetry was in full bloom; but between the districts in which it had developed—Champagne, Île de France, Picardy, and Normandy—and the region in which Provençal literature had sprung up, there seems to have been an intermediate zone formed by Burgundy, Bourbonnais, Berry, Touraine, and Anjou, which, far on into the Middle Ages, appears to have remained barren of vernacular literature. In its rise Provençal literature stands completely by itself, and in its development it long continued to be absolutely original. It presents at several points genuine analogies with the sister literature of northern France; but these analogies are due principally to certain primary elements common to both and only in a slight degree to mutual reaction.

PROVENCE (*Provincia*), a province of France lying to the extreme southeast on the shores of the Mediterranean, bounded on the west by Languedoc, on the north by Venaissin and Dauphiné and on the east by Italy. It now forms the departments of Bouches-du-Rhône, Var, and Basses-Alpes, with portions of Vaucluse and Alpes Maritimes. It was divided into Upper Provence, containing the four seneschalates of Forcalquier, Castellane, Sisteron Digne, and the valley of Barcelonnette; and Lower Provence, containing the eight seneschalates of Aix, Arles, Brignoles, Grasse, Marseilles, Draguignan, Hyères, and Toulon. In ancient as in modern times the most important city was Marseilles (Massilia), a chief seat of trade for the Greek merchants of the Mediterranean, who extended their power along the coast and founded Agde, Antibes, Grasse, and Nice. They afterward called in the aid of the Romans (125 B.C.) against the Ligurian inhabitants of the surrounding country, and the new-comers soon made themselves masters of the territory which later formed the provinces of Languedoc, Dauphiné, and Provence. The new province, of which the capital was Aquæ Sextiæ (Aix), was called Provincia Gallica until the total conquest of Gaul, when the name of the district was changed to Gallia Narbonensis. In the fourth century of the Christian era, when the greater part of Languedoc, or Narbonensis Prima, had become subject to the Visigoths; and the Burgundians had spread to the Viennois, Provincia came to be applied only to the country lying between the Rhone, the Durance, and the Alps which was still held by the Romans.

On the reconvoation of the estates in 1787 the two upper houses refused to bear their share of taxation, and in 1789, in the states-general of the kingdom, Mirabeau with his colleagues renounced the freedom and independence of the province. The division of Provence into departments in 1790 finally obliterated all traces of the ancient constitution, but the people still preserve in the soft tones of their *langue d'oc* an undying reminder of their former independence.

PROVERBS, BOOK OF. The title of the book of Proverbs is *The Proverbs of Solomon*. In early times the book was frequently referred to both among Jews and Christians under the name of *Wisdom* or *The Wisdom that comprises all Virtues*. The name, however, was employed somewhat indiscriminately, for not

only Proverbs but also Ecclesiastes and the apocryphal books Ecclesiasticus and Wisdom were also designated by it, and sometimes apparently the whole third division of the canon.

PROVIDENCE, a city of the United States, one of the capitals of the State of Rhode Island (the other being Newport), and the seat of justice of Providence county, is situated in 41° 49' 22" N. latitude, and 71° 24' 48" W. longitude, at the head of Narragansett Bay, on both banks of Providence River, and with Seekonk River on its eastern boundary. A nearly circular sheet of water known as the Cove lies in the heart of the city at the junction of river and estuaries. The total area of Providence is 14.76 square miles. On the east side the ground rises to a height of 204 feet. On the extreme southern boundary lies Roger Williams Park (102 acres), bequeathed to the city in 1871. The buildings of the Brown University occupy a commanding position on the East Side. This institution, the seventh college organized in the country, was originally founded at Warren, R. I., in 1764, as "Rhode Island College." It was removed to Providence in 1770, and took its present name (that of its principal benefactor) in 1804. University Hall was erected in 1770, and of the eight other buildings three have been built since 1877. Of its governing board five-eighths must, by its charter, be Baptists, but the faculty and the students have always represented a wide variety of religious beliefs. It possesses a library of 62,000 volumes, preserved in a fire-proof structure, costing about \$120,000. Among other educational institutions are the Friends' school (1819), the academy of the Sacred Heart (Roman Catholic) (1873), the university grammar school, the Berkeley school, and the English and classical school. The city system of public schools comprises high and other schools of various grades. The Rhode Island Historical Society was founded in 1822 and occupied its present building in 1844, and the Providence Franklin Society (scientific) dates from 1823. The Providence Athenæum founded 1838, has a library of over 50,000 volumes, and the Providence public library (1878), 45,000 volumes.

The Rhode Island hospital was completed in 1868, at a cost of more than \$450,000. The Butler hospital for the insane (1847) accommodates about 200 patients, and occupies about 120 acres of land, overlooking the Seekonk River. The Dexter asylum (or city almshouse), erected in 1827, receives about 125 inmates, and devotes about thirty-nine acres to a very profitable system of market-gardening. The State penal and reformatory institutions, formerly within the city limits, were in 1878 removed to new quarters in Cranston, about three miles south of the city boundary. The State-house, erected in 1762, stands on the East Side, as does also the courthouse (1877), erected at a cost of \$400,000. On the West Side is the city hall (1879), costing nearly one million dollars. In front of the latter stands the Soldiers' and Sailors' Monument (1871). There are two principal theaters, erected in 1871 and 1877. Among the churches may be mentioned the cathedral of St. Peter and St. Paul (Roman Catholic), begun in 1878; also Grace, All Saints, and St. John's (Protestant Episcopal), the last dating from 1811; the First Baptist (erected 1775), and the First Congregational (1816). The number of church organizations is about ninety. The predominant interest of Providence is no longer commerce, but manufactures, the census of 1888 ranking it sixteenth among American cities in the value of its products. Out of the total, the value of the cotton products was \$2,250,273, this being one of the chief cotton markets of the Northern states; the woolen and worsted goods, \$7,139,947; iron manufactured products (including steam-engines, boilers, locomotives, sewing-ma-

chines, rifles, screws, hinges, files, machinery, etc.), \$4,757,401; and gold and silver manufactured products (in which department this is among the first), \$6,865,192. An extensive system of street railways, comprising forty-five miles of track, connects all portions of the city and suburbs with the center. The Providence telephone exchange, organized in 1879, controls over 1,500 miles of wire. The city is lighted both by gas and by electric light. It has also an extensive system of water supply and sewerage. There are fifteen newspapers, four being dailies. The population has increased as follows:

1708.....1,446	1810.....10,071	1860.....50,666
1730.....3,916	1820.....11,767	1870.....68,904
1774.....4,321	1830.....16,836	1880.....104,857
1790.....6,380	1840.....23,172	1885.....118,070
1800.....7,614	1850.....41,513	1890.....132,146

In the ratio of its valuation to its population Providence ranks as one of the wealthiest of American cities.

The first settlement within the limits of Providence was made in 1636, by Roger Williams, who had been obliged to leave the neighboring colony on account of his religion and political opinions. He obtained a large tract of land from the Indians by friendly negotiations, the original "deeds" being still preserved in the city archives, and gave the name of Providence to the settlement. The town of Providence united with two others in 1643-44, in applying for and receiving from the Parliamentary government in England the first charter of the colony. The most of the houses were destroyed during an attack by the natives in 1676. The War of Independence in 1775-83 also had the effect of very materially prostrating the commerce and trade of the town. In 1832 the town form of government was exchanged for that of a city, the charter providing for a division into six wards. The present number of wards is ten.

PROVINCE (*provincia*, etymology uncertain), in the Roman sense, may be defined as the department or sphere of duty assigned to one of the higher magistrates (the consuls and prætors). But when, with the spread of the Roman arms, the government of conquered countries grew to be one of the most important duties of the higher magistrates, the term province, from designating the government of a conquered country as one particular duty of a Roman magistrate, came to be used generally as a designation of the country itself.

PROVINS, a town of France, at the head of an arrondissement of the department of the Seine-et-Marne, at the junction of the Durtain with the Voulzie (an affluent of the Seine), fifty-nine miles southeast of Paris by a branch railroad. The population of the town in 1881 was 6,949.

PROVO CITY, a town of the United States, and the capital of Utah county, Utah, is handsomely situated on the Provo river, southeast of Salt Lake City. Located as it is at the base of the Wahsatch mountains, and within three miles of Utah Lake, a beautiful expanse of water, and easily accessible by railroad, the town has become a favorite resort for tourists, as also a prosperous corporation. It contains a bank, theater, town-hall, three hotels, stores, flouring-mills, tanneries, saw-mills, planing-mills, foundry, canning works, machine-shop, electric light works, etc., and is in the midst of a cultivated section of the territory. The population in 1880 was 3,431, and in 1890, 5,153.

PROVOST. See BOROUGH and MUNICIPALITY, also CATHEDRAL and UNIVERSITIES.

PROXY. See PROCTOR.

PRUDENTIUS, AURELIUS CLEMENS, a Christian versewriter. apparently a native of Spain, who flourished during the latter half of the fourth century and in the

beginning of the fifth. According to the meager and vague autobiographical notices given by himself in the preface to his poems he was born in the year 348, and after receiving a liberal education, practiced at the bar and subsequently held judicial office in two important cities. At the time of the publication of his poems in 405 he held from the emperor a high military appointment at court. Of his subsequent history nothing is known.

PRUD'HON, PIERRE, French painter, born at Cluny on April 4, 1758, was the third son of a mason. The monks of the abbey undertook his education. The paintings which decorated the monastery excited his emulation, and by the aid of Moreau, bishop of Mâcon, he was placed with Devosges, director of the art school at Dijon. In 1778 Prud'hon went to Paris. In 1808 he exhibited *Crime pursued by Vengeance and Justice*, and *Psyche carried off by Zephyrs*. These two remarkable compositions brought Prud'hon the Legion of Honor; and in 1816 he entered the Institute. Easy as to fortune, and consoled for the misery of his marriage by the devoted care of his excellent and charming pupil, Mademoiselle Mayer, Prud'hon's situation seemed enviable; but Mademoiselle Mayer's tragical suicide on May 26, 1821, brought ruin to his home, and two years later, February 16, 1823, Prud'hon followed her to the grave.

PRUSSIA, (Ger., *Preussen*; Lat., *Borussia*), a kingdom of northern Europe and by far the most important member of the German empire, occupies almost the whole of northern Germany, between 5° 52' and 22° 53' E. longitude and 49° 7' and 55° N. latitude. It now forms a tolerably compact mass of territory, with its longest axis from southwest to northeast; but within the limits just indicated lie the "enclaves" Oldenburg, Mecklenburg, Brunswick, and other small German states, while beyond them it possesses Hohenzollern, in the south of Würtemberg, and other "exclaves" of minor importance. On the north Prussia is bounded by the North Sea, Denmark, and the Baltic; on the east by Russia and Poland; on the south by Austrian Silesia, Moravia, Bohemia, Saxony, the Thuringian states, Bavaria, Hesse-Darmstadt, the Rhenish Palatinate, and Lorraine; and on the west by Luxemburg, Belgium, and the Netherlands. With the exception of the sea on the north and the mountain-barrier on the south-east, the frontiers are political rather than geographical, a fact that has always been characteristic of Prussia's limits and that has had considerable influence in determining its history. The Prussian monarchy, with an area of 134,490 square miles, comprises nearly two-thirds of the entire extent of the German empire. Its kernel is the Mark of Brandenburg, round which the rest of the state has been built up gradually, not without costly and exhausting wars. The territory ruled over by the first Hohenzollern elector (1415-40) did not exceed 11,400 square miles, an area that had been quadrupled before the death of the first king in 1713. Frederick the Great left behind him a realm of 75,000 square miles, and the following two monarchs, by their Polish and Westphalian acquisitions, brought it to a size not far short of its present extent (122,000 square miles in 1803). After the disastrous war of 1806 Prussia shrank to something smaller than the kingdom of Frederick the Great (61,000 square miles), and the readjustment of Europe in 1815 still left it short by 14,000 square miles of its extent in 1803. Fully one-fifth of its present area is due to the war of 1866, which added Hanover, Hesse-Cassel, Hesse-Nassau, Schleswig-Holstein, and the city of Frankfort-on-the-Main to the Prussian dominions.

The claims which Prussian history makes upon our

attention are based neither upon venerable antiquity nor upon uniformity of origin. The territorial and political development of the country has taken place wholly within the last thousand years; and the materials out of which it has been built up—marquisates and duchies, ecclesiastical principalities and free imperial cities—are of the most heterogeneous description. The history of Prussia acquires its primary significance from the fact that this state was the instrument by which the political regeneration of Germany was ultimately effected from within, and the unity and coherence of the narrative are best observed when we consider it as a record of the training that fitted the country for this task.

The North Mark of Saxony, corresponding roughly to the northern part of the present province of Saxony, to the west of the Elbe, was established by the emperor Henry I. about the year 930, and formed the beginning of the Prussian state. His son Otho I. (936-973) followed in his father's footsteps and founded the bishoprics of Havelberg and Brandenburg. Toward the end of the tenth century, however, the Wendish floodswept over the whole territory to the east of the Elbe, and the Germans were confined to the original limits of the North Mark. Christianity was rooted out and the bishop of Brandenburg reduced to an *episcopus in partibus*.

Things begin to grow a little clearer in 1134, when the emperor Lothair rewarded the services of Albert the Bear, a member of the house of Anhalt, and one of the most powerful princes of the empire, by investing him with the North Mark. The North Mark henceforth began to be known as the Altmark, or Old Mark, while the territory round Brandenburg was for a short time called the New Mark, but more permanently the Mittelmark, or Middle Mark. Albert's descendants, generally known as the Ascanian line from the Latinized form of the name of their ancestral castle of Aschersleben, ruled in Brandenburg for nearly two hundred years; but none of them seem to have been on a par with him in energy or ability.

With Waldemar's death in 1319 the Ascanian line became extinct, and a period of anarchy began, which lasted for a century, and brought the once flourishing country to the verge of annihilation. Internal order completely disappeared, and the nobles made war on each other, or plundered the more peaceful citizens without let or hindrance. Powerful neighbors again took the opportunity of appropriating such parts of Brandenburg as lay most convenient to their own borders, and the final dissolution of the electorate seemed imminent. Jobst, to whom the electorate of Brandenburg had been given in 1388, died in 1411; and Sigismund, who succeeded to the imperial throne mainly through the help of Frederick VI., burgrave of Nuremberg, conferred the electorate on this stout supporter, partly in gratitude for services rendered, and partly as a mortgage for money advanced.

The Brandenburg to which Frederick succeeded was considerably smaller than it had been in the best days of the Ascanians, consisting merely of the Altmark, Priegnitz, the Mittelmark, part of the Uckermark, and the territory of Sternberg. Including his family possessions of Anspach and Baireuth, he ruled over a territory of about 11,400 square miles in extent. The internal condition of Brandenburg had declined as much as its territorial extension had decreased. The central power had become weakened and the whole inner organization relaxed, while the electorate had also lost most of the advantages that once favorably distinguished it from other imperial fiefs. Thus rotten within, it is no wonder that the electorate completely lost its independent political importance.

Frederick, who as elector of Brandenburg assumed the style of Frederick I., showed himself equal to the troublesome task before him, and would have been still more successful had his interests been limited to the electorate. While thus regulating the affairs of Brandenburg, Frederick was also a conspicuous figure in imperial politics, especially in the Hussite wars. His candidature for the imperial throne in 1438 may be regarded as the first occasion on which the houses of Hohenzollern and Hapsburg came into competition. Frederick was succeeded in Brandenburg by his son Frederick II. (1440-1470), and in his Franconian possessions by his son Albert. The former followed in his father's footsteps by taking energetic measures to consolidate his power and restore the electorate to its former extent.

Under his brother and successor Albert (1470-1486), surnamed "Achilles" from his chivalrous valor and military talent, the Franconian lands were again united with Brandenburg. Albert allowed his devotion to the emperor to interfere to some extent with his own interests, but he carried on successful wars with Mecklenburg and Pomerania, and effectually resisted the attempts of the Teutonic knights to repossess themselves of the Neumark. His name is best remembered by the *Dispositio Achillea*, a family ordinance providing for the future separation of Brandenburg and Ansbach-Baireuth, and establishing the custom of primogeniture in each. According to Hallam, this was the first instance of the legal establishment of primogeniture, and, when we consider the effect it had in keeping the Brandenburg possessions together, while those of Saxony (for instance) were frittered away among younger sons of their descendants, we shall not fail to discern its importance in determining Prussia's future. With the accession of John (1486-1499), surnamed "Cicero" on account of his eloquence or of his knowledge of Latin, begins a short period in which the rulers of Brandenburg take little share in imperial politics. At home John found his hands full in repressing the disorders that had arisen through Albert's long absence from the electorate, and he acted with such vigor and address that he succeeded in obtaining from the towns an important excise on beer, frequently refused to his father. The old claim to feudal supremacy over Pomerania, dating from the days of the Ascanians, was compromised in 1493 for an assurance of eventual succession on the extinction of the Pomeranian dukes. The next elector, Joachim I. (1499-1535), acquired the surname of "Nestor" from his encouragement of learning, which he showed *inter alia* by the foundation of a university at Frankfort-on-the-Oder. In violation of the family law, Joachim I. bequeathed the Neumark to his younger son John, and thus Joachim II. (1535-1571) succeeded to only a part of the paternal possessions.

Between the accession of the Hohenzollern dynasty and the period at which we have now arrived the area of Brandenburg had been increased to nearly 15,000 square miles, and its material prosperity had grown in at least an equal ratio. It was still, however, far from being a compact or united state, nor had it as yet any pretension to an independent part on the European stage. Perhaps the most marked internal change was the increase in the power of the estates, resulting in great measure from the financial needs of the electors. Under Joachim's son, John George (1571-1598), who permanently reunited the Neumark with Brandenburg, the tendencies just noticed received emphatic expression. All vacant official positions were filled with members of the noblesse, who also received the right of exacting compulsory service from the peasants and other similar privileges: During his undisturbed reign

the material prosperity of Brandenburg advanced considerably, and the population was increased by numerous Protestant refugees from France and Holland. John Sigismund (1608-1619) does not seem to have been a man of marked personal character, but his reign is of great importance in the history of Brandenburg on account of the extensive territorial enlargement that fell to its lot. During his reign his territories were more than doubled in extent, covering at his death an area of 31,000 square miles.

The duchy of Prussia, acquired by the elector, formed the eastern half of the territory bearing the name of Preussen, and stretched along the Baltic Sea from the Vistula to the Memel. It still remained a Polish fief, and was separated from the rest of the electoral dominions by West Prussia, which the Teutonic Order had been forced to resign to Poland a century and a half before. The native Prussians were of a race akin to the Letts and Lithuanians, and their name (*Pruzi, Prutheni*) was probably derived from a Lettish root meaning "intelligence."

John Sigismund left his territories to his son George William (1619-1640). This unfortunate prince may perhaps be described as the first utterly incompetent ruler of his line, though due allowance must be made for the extreme difficulty of his position. In 1639 the elector removed his court to Königsberg in Prussia, the only part of his realms in which he was sure of comparative tranquillity, and there he died in 1640, leaving a land devastated in great part by fire and sword and at the lowest ebb of dignity and power.

Frederick William (1640-1688), whom both his contemporaries and after ages have agreed to dignify with the title of the "Great Elector," was only twenty years old when he succeeded to the throne, but he at once began to manifest a decided and vigorous character very different from that of his father. He emancipated himself without delay from the guidance of Schwarzenberg, and, in spite of the emperor's displeasure, concluded a peace with Sweden, which provided for the withdrawal of the Swedish troops from the electorate. During the following years of war Frederick William preserved a strict neutrality and utilized the opportunity to restore the material resources of his country and reorganize and strengthen his army. The fruits of this line of action were seen at the peace of Westphalia (1648). He established his right to the whole of Pomerania, but, as the Swedes refused to give up Western or Hither Pomerania (Vorpommern), he received as compensation the rich ecclesiastical principalities of Magdeburg, Halberstadt, and Minden, in central Germany. In the second Swedish and Polish war, which broke out in 1655, the troops of Brandenburg took a prominent share in the defeat of the Poles at the three days' battle of Warsaw (1656), in return for which service Sweden undertook to recognize the elector as independent sovereign of the duchy of Prussia. Scarcely, however, did the scale of victory begin to turn than the elector deserted his former ally, and in the treaty of Wehlau (1657), received his reward in the formal relinquishment by Poland of its feudal rights over Prussia.

When Louis XIV. attacked Holland in 1672, Frederick William, in spite of tempting offers from France, concluded an alliance with Holland, and at the head of Austrian and Brandenburgian troops joined the Dutch in an ineffectual campaign on the Rhine. In 1673 he was forced to make peace with France; but he joined the triple alliance of Holland, Spain, and the empire in the following year and took part in an indecisive campaign in Alsace. There he received intelligence that the Swedes, at the instigation of France, had broken into Brandenburg. Hastening back to his own coun-

try without delay, he took the enemy by surprise, and at the head of about 6,000 men gained a brilliant victory over twice that number of Swedish troops at Fehrbellin (1675), a small town to the northwest of Berlin. This success over the hitherto invincible Swedes lent great prestige to the elector's arms, and he followed it up by a series of vigorous campaigns, in which, with the aid of Denmark, he swept Brandenburg and Pomerania clear of the invaders, capturing Stettin in 1677 and Stralsund in 1678. The invasion of Prussia from Livonia, which formed the last effort of the Swedes, was also triumphantly repelled, the most memorable incident of the short struggle being the elector's forced march over the frozen surface of the Frische Haff. The policy of the last years of the Great Elector may be described as an endeavor to hold the balance between France and the emperor. At his death, which took place in 1688, he was engaged in helping the prince of Orange to prepare for his descent on England. The reign of the Great Elector forms one of the most signal instances in history of the conquest of adverse circumstances by personal energy and merit; and it is with reason that Prussian historians describe him as the second founder of the state. At his accession the greater part of his territory was in the occupation of strangers and devastated by war, and in European politics Brandenburg was regarded as merely an appendage of the empire. At Frederick William's death the new north German state of Brandenburg-Prussia was a power that had to be reckoned with in all European combinations. Its area had been raised to 43,000 square miles; its revenue had multiplied fivefold; and its small army was nowhere surpassed in efficiency. The elector had overthrown Sweden and inherited her position on the Baltic, and he had offered a steady and not ineffectual resistance to the ambition of France. While thus winning for himself a position in the councils of Europe, the elector was not less active in strengthening the central authority within his dominions, and the transformation effected during his reign in the internal government of the state was not less striking than that in its external importance.

In matters of general administration Frederick William showed himself a prudent and careful ruler, and laid the foundation of the future greatness of Prussia in almost every department. The military and bureaucratic systems of the country both received their first important impulse in this reign. The wounds inflicted by the Thirty Years' War were in a great measure healed, and the finances and credit of the state were established on a firm basis. Agriculture and commerce were improved and encouraged by a variety of useful measures, and education was not neglected. The elector even established Prussian colonies in Africa, and formed a small but efficient navy. In matters of religion Brandenburg stands out prominently as the only country of the time in which all Christian confessions were not only tolerated but placed upon an equal footing. The condition of the peasantry, however, reached almost its lowest ebb, and the "recess" or charter of 1653 practically recognizes the existence of villainage. The state of public morals also still left much to be desired, while the clergy were too much occupied with squabbles over Lutheranism and Calvinism to be an effective instrument of reform.

The Great Elector's son Frederick I. (1688-1713) was an ostentatious and somewhat frivolous prince, who hazarded the acquisitions of his father by looking on his position as assured and by aiming rather at external tokens of his dignity than at a further consolidation of the basis on which it rested. The most notable incident in Frederick's reign was his acquisition of the

title of king of Prussia, which long formed the principal object of his policy, and which led him to make important concessions to all whose coöperation was necessary. The emperor's consent was finally purchased by the promise of a contingent of 8,000 men to aid him in the War of the Spanish Succession, and on January 18, 1701, Frederick crowned himself at Königsberg with accompanying ceremonies of somewhat inflated grandeur becoming thenceforth King Frederick I. of Prussia. About the same time (1697) the elector of Saxony also acquired the kingly dignity by his election to the throne of Poland, but in doing so he had to become a Roman Catholic, and thus left the Hohenzollerns without a rival among the Protestant dynasties of Germany. Frederick was an extravagant ruler, who lavished large sums in maintaining his personal state; but his expenditure was not wholly of this profitless nature, since he founded the university of Halle as a school of liberal theology, established academies of art and science at Berlin, and patronized men of literary eminence. Perhaps the general estimate of Frederick's character is unduly low owing to the fact that he was followed as well as preceded by a ruler of unusual capacity. His son Frederick William I. (1713-1740) possessed administrative talents of no mean order and was singularly painstaking, industrious, and determined in carrying out his plans. Though marked by no great external achievements or exciting events, his reign is of the utmost importance in the Prussian annals from having checked the threatened downfall of Prussia and paved the way for Frederick the Great.

After the accession of Frederick the Great (1740-1786) the history of Prussia coincides with that of the German empire, and is treated under GERMANY. The outline of Frederick's foreign policy was probably determined in some degree by the events of the later years of his father's reign. Within a year of his accession he had embarked on the first Silesian War, and this was closely followed by the second, which ended in 1745, leaving Frederick in undisputed possession of almost the whole of Silesia, with the frontier which still exists (See GERMANY and MARIA THERESA).

Though without gain in extent or population, Prussia emerged from the Seven Years' War as an undoubted power of the first rank, and henceforth completely eclipsed Saxony, Bavaria, and Hanover, while it was plain that Austria would no longer stand without a rival for the hegemony of the German empire. The glorious victories over the French and Russians also awakened a spirit of German patriotism that had hitherto been almost unknown.

Frederick's methods of administration did not greatly differ from those of his predecessor, while his industry and activity were as great as those of his father, his insight keener, and his views more liberal. He endeavored to spare his subjects as far as was compatible with the immense army he maintained, and sought to raise the necessary revenues rather by improving the resources of the country than by additional taxation. He kept the charges of civil administration down to the lowest point consistent with efficiency, and the court establishment was very economical, though it avoided the extreme of shabbiness witnessed under Frederick William. His efforts to improve the administration and the bureaucracy were unceasing, and he succeeded in training a body of admirable public servants. In matters of religion Frederick exercised the greatest toleration. Equal liberty was granted in speaking and writing. The paramount defect of Frederick's administration, as future events proved, was the neglect of any effort to encourage independence and power of self-government among the people. Frederick died on

August 17, 1786, having increased his territories to an area of 75,000 square miles, with a population of five and a half millions.

He was followed by Frederick William II., who had neither the energy nor the insight that his position demanded. He was in turn succeeded by Frederick William III. who, in 1797, began a career that ended in 1840. He possessed many of the virtues that did him credit in his private capacity, but lacked the vigor that was at this juncture imperatively required from a ruler of Prussia. Frederick William IV. commenced his reign in 1840. He was a man of character and intelligence, began his reign promisingly by an amnesty for political offenders and by well-meant concessions to the dissatisfied Ultramontanes; but it soon became evident that he held too exalted an idea of the divine right of kings willingly to grant such a constitution as was required. Then followed the contest between the crown and the people, the various steps of which have been chronicled in the article GERMANY.

In 1858 William, prince of Prussia, became regent in consequence of the mental illness of his brother, and in 1861 he succeeded to the throne as William I. His accession was hailed as likely to increase both the liberalism of Prussia's internal institutions and the vigor of its external policy; and the second at least of these expectations was not disappointed. But at an early period of his reign the king became involved in a constitutional dispute with the House of Representatives, which declined to grant the supplies necessary for an extensive system of military reorganization. Bismarck, who became prime minister in 1862, refused to allow the crown to be hampered by parliamentary restrictions and raised the funds required in defiance of the attitude of the lower house.

Fully three-fifths of Prussia belong to the great north European plain and may be generally characterized as lowlands. In the southeast Prussia is separated from Austria and Bohemia by the Sudetic chain, which begins at the valley of the Oder and extends thence toward the northwest. This chain includes the Riesen Gebirge, with the highest mountain in Prussia (Schneekoppe, 5,266 feet), and subsides gradually in the hills of Lusatia. The Harz Mountains, however, beyond the Saxon plain, follow the same general direction and may be regarded as a detached continuation of the system. To the south of the Harz the Prussian frontier intersects the northern part of the Thuringian Forest, which is also prolonged toward the northwest by the Weser Hills and the Teutoburgian Forest. The southwest of Prussia is occupied by the plateau of the lower Rhine, including on the left bank the Hunsrück and the Eifel, and on the right the Taunus, the Westerwald, and the Sauerland. Between the lower Rhenish and Thuringian systems are interposed the Vogelsberg, the Rhön, and other hills belonging to the Triassic system of the upper Rhine. The Silesian mountains are composed chiefly of granite, gneiss, and schists, while the Harz and the lower Rhenish plateau are mainly of Devonian and Silurian formation. To the north of the Sauerland is the important Carboniferous system of the Ruhr, and there are also extensive coal-fields in Silesia. With the exception of the Danube Prussia is traversed by all the chief rivers of Germany, comprising almost the entire course of the Oder and the Weser. Nearly the whole of the German coast-line belongs to Prussia, and it possesses all the most important seaports, except the two most important of all, Hamburg and Bremen.

The climate of Prussia is more uniform than it would otherwise be by the fact that the average elevation increases from north to south. According to the most recent official returns, about 29 per cent. of the soil con-



sists of good loam or clay, 32 per cent. is mediocre or of loam and sand mixed, 31 per cent. is predominantly sandy, and 6 per cent. is occupied by bogs and marshes.

Prussia contains a greater proportion of woodland than any other large country in the south or west of Europe (France 17 per cent., Italy 12 per cent., Great Britain 3 per cent.), though not so large a proportion as Russia, Austria, and some of the minor German states.

The principal crop is rye, of which the ordinary bread of the country is made; it grows in all parts of the kingdom, especially in the north and east, and occupies about one-fourth of the whole tilled surface. Oats occupy an area equal to about half that devoted to rye, and are also grown most extensively in the northeastern districts. Wheat, which is chiefly cultivated in the south and west, does not cover more than a fourth as much ground as rye. Barley is most largely grown in Saxony and Silesia. Other grain crops are spelt (chiefly on the Rhine), buckwheat (Hanover and Schleswig-Holstein), and millet; maize is grown for fodder in some districts. The produce of grain scarcely covers the consumption and is supplemented by imports of rye and other cereals from Russia and Holland. Potatoes, used both as food and for the distillation of spirits, are cultivated over nearly as large an area as rye and are especially predominant in the eastern provinces. The common beet is extensively grown for the production of sugar in Saxony, Hanover, Silesia, Pomerania, and Brandenburg. Flax and hemp occupy considerable areas in East Prussia, Silesia and Hanover, while hops are raised chiefly in Posen and Saxony.

About one-half of the cultivable soil is in the possession of owners with properties exceeding 180 acres in extent and averaging 860 acres, while one-half of the total number of owners occupy only one-fortieth of the entire area. The manner of distribution varies greatly in different parts of the kingdom, large properties prevailing in the less fertile regions in the east and peasant-holdings in the west.

Although it is obvious that the recent formations of the north German plain can boast of little or no mineral wealth, Prussia still takes rank among the great mining states. Its produce of coal and iron exceeds that of any country in Europe, except Great Britain; in the production of zinc it is the foremost country in the world; and its stores of salt are very considerable. The two great deposits of coal are in the basin of the Ruhr on the west, where about 20,000,000 tons are raised annually, and in Upper Silesia, where the beds are still more extensive but the coal of a somewhat inferior quality. The greater part of the smaller but valuable coal-field of the Saar also belongs to Prussia, and other important beds occur in Lower Silesia, near Halle, and near Aix-la-Chapelle.

The other mineral products include manganese, nickel, pyrites, cobalt, quicksilver, alum, gypsum, and sulphuric acid. Good building-stone is common throughout the country, marble is found in Silesia, and roofing slates in the Devonian formations of the Rhine and the Harz. Chalk pits and cliffs abound in the Island of Rügen. The amber of the Baltic coast is picked up on the beach after a storm, and is also found by digging and dredging. Mineral springs are numerous among the mountains of Silesia, the Taunus, and the Eifel. The most generally known are those in the district of Wiesbaden, including Wiesbaden itself, Ems, Homburg Schlangenbad, and Schwalbach.

About 35 per cent. of the population are supported by industrial pursuits. The district of Düsseldorf is the busiest in Prussia, and Berlin and Elberfeld-Barmen are among the chief hives of industry on the Continent.

The principal manufactured products are woolen, linen, cotton, silk, and iron goods.

The metallic industries, as might be expected, flourish chiefly in the neighborhood of the coal-fields and have reached their highest development in the district of the Ruhr. Steel is made most extensively in the districts of Arnsberg (Westphalia) and Düsseldorf; at Essen in the latter is Krupp's celebrated cannon-foundry, with 20,000 workmen. Small iron and steel goods also come chiefly from the Westphalian and Rhenish districts; and the cutlery of the Solingen, the tools of Remscheid, and the needles of Aix-la-Chapelle enjoy a widespread reputation. Berlin is the chief seat of the manufacture of machinery and locomotives. Small arms are made at Suhl, Spandau, Potsdam, and Sömmerda (Erfurt). Articles in bronze, brass, and electro-plate are largely made at and exported from Berlin, Frankfort-on-the-Main, Iserlohn, and Altena, while gold and silver goods are produced chiefly at Berlin and Hanau. The manufacture covers the home demand, but about one-third of the necessary flax and hemp has to be imported. Jute is made at Bielefeld and Bonn. The manufacture of cotton has of late made great progress, though it is not so important in Prussia as in the kingdom of Saxony and in Alsace. The chief centers of this branch of industry are Düsseldorf, Münster, Elberfeld-Barmen, Hanover, Breslau, and Liegnitz. About 65 per cent. of the woolen yarn of Germany is made in Prussia, and woolen cloth of good quality is produced in the province of the Rhine, Silesia, Brandenburg, and Saxony. Carpets are made at Berlin and Düren in the Rhine province. Silk is manufactured at Crefeld, Elberfeld-Barmen, and other places near the Rhine. Tobacco and cigars are largely manufactured at Berlin and numerous other towns, and to some extent wherever the tobacco plant is cultivated.

The commerce of Prussia is greatly facilitated by its central position, which enables it to carry on a very extensive transit trade; but, as the returns are not separated from those of the other members of the Zollverein, it is impossible to more than guess at the annual value. The chief imports are coffee, tea, sugar, and other colonial products, grain, wine, textile fabrics, fruit, petroleum, and manufactured articles of various kinds. Among the principal exports are grain, cattle, wine, potatoes, woolen and linen goods, hides and leather, chemicals, iron and steel wares, lead, and zinc. The money-markets of Berlin and Frankfort-on-the-Main are among the most influential in Europe.

The first Prussian railway was laid in 1838, but the railway system did not receive its full development until the events of 1866 removed the obstacles placed in the way by Hanover. Most of the lines were easy of construction, and absorbed comparatively little capital. The great majority were laid by private companies, and the government confined itself to establishing lines in districts not likely to attract private capital. At present nine-tenths of the 13,800 miles of railway in Prussia are in the hands of government. The proportion of railway mileage in Prussia (five miles per 10,000 inhabitants) is nearly as high as in Great Britain, but the traffic is much less. The passenger traffic has not increased in proportion to the extension of the railway system and the growth of population, but the freight traffic has steadily advanced. The canal system of Prussia is little beyond its infancy, the total length of all the canals in the kingdom being a very small number as compared with either England or France. Among the most important are those uniting the Pregel with the Memel, and the Vistula with the Oder (*via* the Netze), and those bringing the Spree and Havel into communication with the Elbe on the one side and the

Oder on the other. Canals uniting the Ems and the Rhine, the Ems and the Weser, and the Weser and the Elbe, are still desiderata. On the other hand, Prussia has a large supply of navigable rivers.

Prussia has (1892) over 30,000,000 inhabitants—*i. e.* nearly two-thirds of the entire German empire, with about three-fifths of the population. The following are the provinces into which Prussia is divided:

	Area in sq. m.	Pop. in 1880.	Pop. in 1890.
East Prussia	14,446	1,933,936	1,958,132
West Prussia	9,964	1,405,893	1,433,480
Berlin (city)	25	1,122,330	1,579,244
Brandenburg	15,560	2,266,825	2,542,411
Pomerania	11,762	1,540,034	1,521,211
Posen	11,311	1,703,397	1,752,094
Silesia	15,743	4,007,925	4,223,807
Saxony	9,863	2,312,007	2,579,852
Sleswick-Holstein	7,360	1,127,149	1,217,393
Heligoland	¾	-----	2,086
Hanover	15,031	2,120,168	2,280,491
Westphalia	7,892	2,043,442	2,428,736
Hesse-Nassau	6,128	1,554,376	1,664,000
Rhenish Prussia	10,543	4,074,000	4,710,313
Hohenzollern	447	67,624	66,148
Total	136,075¾	27,279,111	29,959,388

Omitting Berlin and Heligoland, the density of population ranges between 131 (Pomerania) and 452 (Rhenish Prussia) per sq. m.

According to the census returns of 1880, 64.64 per cent. of the population of Prussia were Protestants, 34 per cent. Roman Catholics, and 1.33 Jews. A glance at a confessional map of Prussia shows that the center of the kingdom is solidly Protestant, the proportion of Roman Catholics increasing as the eye travels east or west and reaching its maximum on the Rhine and in the Slavonic provinces. East Prussia, however, with the exception of Ermland, is Protestant. The Roman Catholics outnumber the Protestants in the provinces of the Rhine (three to one), Posen, Silesia, and West Prussia. All religious bodies are granted freedom of worship, and civil rights are not conditional upon religious confession. In 1880 the Protestants numbered 17,633,279, the Roman Catholics, 9,206,283, and the Jews, 363,790.

For the work of education there are 34,000 elementary and 520 high schools in addition to numerous technical schools. The first named have an average attendance of 4,500,000 pupils.

Prussia possesses ten of the twenty German universities, attended by 15,000 matriculated students, or at the rate of one student for 2,125 inhabitants. The largest Prussian university is that of Berlin, while Breslau, Bonn, Göttingen, and Halle are equally leading. The oldest is the university of Griefswald, founded in 1456. Like the schools the universities are state institutions, and the professors are appointed and paid by government, which also makes liberal annual grants for apparatus and equipment. The full obligatory course of study extends over three, and in the case of medicine four years. It is, however, not unusual for nonmedical students also to spend four years at the university, and there is an agitation to make this compulsory. Students qualifying for a Prussian Government appointment are required to spend at least three terms or half-years (*Semester*) at a Prussian university.

Ranking with the universities are the large polytechnic colleges at Berlin, Hanover, and Aix-la-Chapelle, the mining academies of Berlin and Klausthal, and the academies of forestry at Eberswalde and Münden. Departments for the study of agriculture are attached to many of the universities. Music is taught at several conservatoria, the best known of which are at Berlin and Frankfort-on-the-Main.

The science and art of Prussia find their most conspicuous external expression in the academies of science and art at Berlin, both founded by Frederick I.; and each town of any size throughout the kingdom has its antiquarian, artistic, and scientific societies. Recognized schools of painting exist at Berlin and Düsseldorf, and both these towns, as well as Cassel, contain excellent picture galleries. The scientific and archæological collections of Berlin are also of great importance. Besides the university collections, there are numerous large public libraries, the chief of which is the royal library at Berlin, (1,000,000 vols.) (See GERMANY).

The finances of the Prussian Government are well managed, and a deficit is now a rare occurrence. The expenditure has been considerably relieved by the transference of the cost of the army and navy to the imperial treasury, while on the other hand, the customs-dues and several excise duties have been relinquished to the empire and an annual "matricular" contribution paid toward its expenses. The total debt in 1888 was, in round numbers, \$1,000,000,000. The revenue for 1889 was \$300,942,000, and the expenditures for the same period were \$306,480,000.

Local taxation in Prussia is often very high. The state income-tax is limited to 3 per cent. of the assessed income, but the communes and towns are allowed to make an arbitrary addition for local purposes, sometimes amounting to twice or thrice the sum paid to the state. This is chiefly owing to the fact that the state reserved for itself all taxation on real property, while imposing on the communes the principal share in maintaining the expensive system of public schools. Incomes below £45 (900 marks) are not now taxed, but this exemption is of very recent origin.

The Prussian army now forms about 75 per cent. of that of the German empire, of which it also furnished the model. (See GERMANY.) The first attempt at the foundation of a Prussian navy was made by the Great Elector, who established a small fleet of eight or ten vessels. This, however, was completely neglected by his successors, and the present marine establishment is of quite recent origin. The present imperial navy is simply the Prussian navy under a different name. (See GERMANY.)

PRUSSIA, in the original and narrower sense of the word, is a district in the northeastern corner of the modern kingdom of the same name, stretching along the Baltic coast for about 220 miles, and occupying an area of upward of 24,000 square miles. In spite of the contrast between the political and social conditions of the two districts, arising from the difference of their history, they were united in 1824 to form a single province. But, as might have been expected, the union did not work well, and it was dissolved in 1878, giving place to the modern provinces of East and West Prussia.

EAST PRUSSIA, the larger of the two provinces, has an area of 14,446 square miles, and is bounded by the Baltic Sea, Russia, and West Prussia.

WEST PRUSSIA (*Westpreussen*), with an area of 9,964 square miles, is bounded by the Baltic, East Prussia, Poland, Posen, Brandenburg, and Pomerania. It resembles East Prussia in its physical characteristics, but its fertility is somewhat greater and its climate not quite so harsh.

PRUSSIA, RHENISH (German, *Rheinpreussen*, *Rheinprovinz*, *Rheinland*), the most westerly province of the kingdom of Prussia, is bounded on the north by Holland, on the east by Westphalia, Hesse-Nassau, and Hesse-Darmstadt, on the southeast by the Rhenish Palatinate, on the south and southwest by Lorraine, and on the west by Luxemburg, Belgium and Holland. The small district of Wetzlar, in the midst of the prov-

ince of Hesse, also belongs to Rhenish Prussia, which, on the other hand, surrounds the Oldenburg principality of Birkenfeld. The extent of the province is 10,420 square miles, or nearly twice that of the kingdom of Saxony; its extreme length from north to south is nearly 200 miles, and its greatest breadth is just under 90. It includes about 200 miles of the course of the Rhine, which forms the eastern frontier of the province from Bingen to Coblenz, and then flows through it in a northwesterly direction.

The population of Rhenish Prussia in 1880 was 4,074,000, including 2,944,186 Roman Catholics, 1,077,173 Protestants, and 43,694 Jews. The great bulk of the population is of Teutonic stock, and about 250,000 are of Flemish blood. On the northwest frontier reside about 12,000 Walloons, who speak French or Walloon as their native tongue. The Rhine province is the most thickly populated part of Prussia, the general average being 390 persons per square mile, while in the government district of Düsseldorf the proportion rises to 754. Upward of half the population are supported by industrial and commercial pursuits, and barely a quarter by agriculture. There is a university of good standing at Bonn, and the success of the elementary education is borne witness to by the fact that only 0.19 per cent. of the Rhenish recruits are unable to read and write. For purposes of administration the province is divided into the five districts of Coblenz, Düsseldorf, Cologne, Aix-la-Chapelle, and Treves; Coblenz is the official capital, though Cologne is the largest and most important town. In the greater part of the province the Code Napoléon, introduced under the French régime, is still in force. Being a frontier province the Rhineland is strongly garrisoned, and the Rhine is guarded by the four strong fortresses of Cologne with Deutz, Coblenz with Ehrenbreitstein, Wesel, and Saarlouis. In the Prussian parliament the province of the Rhine is represented by twenty-seven members in the upper house and eighty-two in the lower.

The present province of Rhenish Prussia was formed in 1815 out of the duchies of Cleves, Berg, Upper Guelders, and Jülich, the ecclesiastical principalities of Treves and Cologne, the free cities of Aix-la-Chapelle and Cologne, and nearly 100 small independent lordships, knightships, and abbeys. The congress of Vienna assigned the whole of the lower Rhenish districts to Prussia.

PRUSSIAN BLUE is a blue pigment derived from prussic acid (so called because discovered in Prussia), and consists of two parts sesqui cyanide of iron and three parts of protocyanide of iron. In its soluble or basic form one part of sesqui oxide of iron is added. It is a beautiful deep blue color, and is extensively used in both painting and dyeing.

PRUSSIC ACID, the familiar name for a dangerously poisonous, though chemically feeble, acid, known scientifically as "hydrocyanic acid," or "cyanide of hydrogen," is here taken as a convenient heading under which to treat of cyanides generally. This generic term (from blue) is not meant to hint at any generic property; it is due simply to the fact that all cyanides, in an historical sense, are derivatives of a blue pigment which was discovered accidentally by Diesbach,

The foundations of our present knowledge of cyanides were laid by Scheele (1783), whose discoveries were subsequently (from 1811) confirmed and supplemented, chiefly in the sense of quantitative determinations, by Gay-Lussac. The sources of prussic acid are various; it is found in minute quantities in bitter almonds and in fruits of the peach and apricot families, and some mysterious cases of poisoning in older days from eating dessert flavored with extracts from these sources might

be correctly traced to the presence of prussic acid.

A weak solution of prussic acid is used in medicine in cases of bronchitis or affections of the mucous membrane of the throat or other portions of the body.

PRYNNE, WILLIAM, English author, polemic, and statesman, was born at Swainswick near Bath in 1600. He was educated at Bath grammar-school, and became a commoner of Oriel College, Oxford, in 1616, taking his B.A. in 1621: he was admitted a student of Lincoln's Inn in the same year, and in due time became a barrister. His studies led him deeply into legal and constitutional lore, and no less deeply into ecclesiastical antiquities. He was Puritan to the core, with a tenacious memory, a strength of will bordering upon obstinacy, and a want of sympathy with human nature in its manifold variety. His first book, *The Perpetuity of a Regenerate Man's Estate*, 1627, was devoted to a defense of one of the main Calvinistic positions, and *The Unloveliness of Love-locks and Health's Sickness*, 1628, were devoted to attacks upon prevailing fashions, conducted without any sense of proportion, and treating follies on the same footing as scandalous vices. After this the number of his writings is very great and embraces a wide range of subjects. He was several times embroiled with the government and while a member of parliament was accused of altering the text of a bill which had passed to committee.

Prynne died at Lincoln's Inn, October 24, 1669.

PRYTANIS (pl. *prytaneis*) was the title of certain officials in Greek states. They appear to have succeeded the kings at the time when the monarchical form of government was abolished throughout Greece. At Rhodes they continued to be the chief magistrates as late as the first century B.C., but in other states their functions dwindled. Though they were not priests, they had the charge of certain public sacrifices. Their headquarters were in the "prytaneum" or town-hall, the central point of a Greek state, where a fire was kept perpetually burning on the public hearth. When a colony was founded the fire in the prytaneum of the new city was kindled from the fire in the prytaneum of the mother-city, and if this colonial fire ever happened to be extinguished it was rekindled from the same source. At Athens in classical times the prytaneis were those fifty members of the council of five hundred who presided at the council meetings as well as at the popular assemblies.

PRZEMYSL, one of the principal towns of Galicia, Austria, and the seat of a Roman Catholic and of a Greek bishop, is situated on the river San, about 140 miles to the east of Cracow. The population of the town proper is 9,244, of the commune 20,040.

PSALMANAZAR, GEORGE, the assumed name of a pretended native of Formosa, who was in reality a Frenchman, and was born about 1679, probably in Languedoc. In 1704 he published a fictitious *Historical and Geographical Description of Formosa*. In 1707 he published *Dialogue between a Japanese and a Formosan*. There also appeared without date *An Inquiry into the Objections against George Psalmanazar of Formosa, with George Psalmanazar's Answer*. He published *Essays on Scriptural Subjects* (1753), contributed various articles to the *Ancient Universal History*, and completed Palmer's *History of Printing*. He died in London, May 3, 1763. His memoirs appeared in 1764 under the title *Memoirs of \* \* \* commonly known by the Name of George Psalmanazar*, but do not disclose his real name or the place of his birth.

PSALMS, BOOK OF, or PSALTER, the first book of the Hagiographa in the Hebrew Bible.

*Title and Traditional Authorship.*—The Hebrew title of the book is *têhillâm*, or "the book of hymns," or.

rather, "songs of praise." The name is not equally applicable to all psalms, and in the later Jewish ritual the synonym *hallel* specially designates two series of psalms, cxiii.-cxviii. and cxlv.-cl., of which the former was sung at the three great feasts, the encœnia, and the new moon, and the latter at the daily morning prayer. That the whole book is named "praises" is clearly due to the fact that it was the manual of the temple service of song, in which praise was the leading feature. Hippolytus tells us that in his time most Christians said "the Psalms of David," and believed the whole book to be his; but this title and belief are both of Jewish origin, and the title of the apocryphal "Psalter of Solomon" implies that the previously existing Psalter was ascribed to David. Jewish tradition does not make David the author of all the psalms; but as he was regarded as the founder and legislator of the temple psalmody (1 Chron., *ut sup.*; Ezra iii. 10; Neh. xii. 36, 45 *sq.*; Eccles. xlvi. 8 *seq.*), so also he was held to have completed and arranged the whole book, though according to Talmudic tradition he incorporated psalms by ten other authors, Adam, Melchizedek, Abraham, Moses, Heman, Jeduthun, Asaph, and the three sons of Korah. With this it agrees that the titles of the psalms name no one later than Solomon, and even he is not recognized as a psalmist by the most ancient tradition, that of the LXX., which omits him from the title of Ps. cxxvii. and makes Ps. lxxii. be written not by but of him. The details of the tradition of authorship show considerable variation; according to the Talmudic view Adam is author of the Sabbath psalm xcii., and Melchizedek of Ps. cx., while Abraham is identified with Ethan the Ezrahite (Ps. lxxxix.). But, according to older Jewish tradition, attested by Origen, Ps. xcii. is by Moses, to whom are assigned Pss. xc.-c., inclusive, according to a general rule that all anonymous pieces are by the same hand with the nearest preceding psalm whose author is named; and Ps. cx., which by its title is Davidic, seems to have been given to Melchizedek to avoid the dilemma of Matt. xxii. 41 *seq.*

The opinion of Jerome (*Pref. in Ps. Heb.*) and other Christian writers that the collector of the Psalter was Ezra, does not seem to rest on Jewish tradition.

**PSALTERY.** For the mediæval instrument of this name ("sautrie" or "cembalo"), see **PIANO-FORTE.**

**PSAMMETICHUS.** See **EGYPT.**

**PSELLUS**, the name of several Byzantine writers, of whom the following were the most important:

1. **MICHAEL PSELLUS** the elder, a native of Andros and a pupil of Photius. He flourished in the second half of the ninth century.

2. **MICHAEL CONSTANTINE PSELLUS** the younger was born at Constantinople in 1020, of a consular and patrician family. He appears to have been still alive in 1105 and perhaps in 1110.

**PSEUDONYMOUS LITERATURE.** See **BIBLIOGRAPHY.**

**PSKOFF**, a government of the lake-region of north-west Russia, which extends from Lake Peipus to the source of the Dwina, having St. Petersburg on the north, Novgorod, Tver, and Smolensk on the east, Vitebsk on the south, and Livonia on the west. It has an area of 16,678 square miles. Population 900,000.

**PSKOFF**, capital of the above government, is picturesquely situated on both banks of the broad Velikaya river, nine miles from Lake Pskoff and 171 miles by rail southwest of St. Petersburg. Population 22,000.

**PSYCHE.** See **CUPID.**

**PSYCHOLOGY.** *The Standpoint of Psychology.*—In the several natural sciences the scope and subject-

matter of each are so evident that little preliminary discussion on this score is called for. It is easy to distinguish the facts dealt with in a treatise on light from those that belong to one on sound; and even when the need arises to compare the results of two such sciences—as in the case, say, of light and electricity—there is still no difficulty—apart, of course, from any which the imperfect state of the sciences themselves may occasion. Theoretically, a standpoint is attainable from which this comparison can be made, in so far, say, as the facts of both sciences can be expressed in terms of matter and motion. But with psychology, however much it is freed from metaphysics, all this is different. It is indeed ordinarily assumed that its subject-matter can be at once defined: "It is what you can perceive by consciousness or reflection or the internal sense," says one, "just as the subject-matter of optics is what you can perceive by sight." Or, "psychology is the science of the phenomena of mind," we are told again, "and is thus marked off from the physical sciences, which treat only of the phenomena of matter." But, whereas nothing is simpler than to distinguish between seeing and hearing, or between the phenomena of heat and the phenomena of gravitation, a very little reflection may convince us that we cannot in the same fashion distinguish internal from external sense, or make clear to ourselves what we mean by phenomena of mind as distinct from phenomena of matter.

Paradoxical though it may be, we must then conclude that psychology cannot be defined by reference to a special subject-matter as such concrete sciences, for example, as mineralogy and botany can; and, since it deals in some sort with the whole of experience, it is obviously not an abstract science, in any ordinary sense of that term. To be characterized at all, therefore, apart from metaphysical assumptions, it must be characterized by the standpoint from which this experience is viewed. It is by way of expressing this that widely different schools of psychology define it as subjective, all other positive sciences being distinguished as objective. But this seems scarcely more than a first approximation to the truth, and, as we have seen incidentally, is apt to be misleading. The distinction rather is that the standpoint of psychology is what is sometimes termed "individualistic," that of so-called object-sciences being "universalistic," both alike being objective in the sense of being true for all, consisting of what Kant would call judgments of experience. For psychology is not a biography in any sense, still less a biography dealing with idiosyncrasies, and in an idiom having an interest and a meaning for one subject only, and incommunicable to any other. Locke, Berkeley, and Hume have been of late severely handled because they regarded the critical investigation of knowledge as a psychological problem; and set to work to study the individual mind simply for the sake of this problem. But none the less their standpoint was the proper one for the science of psychology itself; and, however surely their philosophy was foredoomed to a collapse, there is no denying a steady psychological advance as we pass from Locke to Hume and his modern representatives. By "idea" Locke tells us he means "whatsoever is the object of the understanding when a man thinks" (*i.e.* is conscious), and having, as it were, shut himself within such a circle of ideas he finds himself powerless to explain his knowledge of a world that is independent of it; but he is able to give a very good account of some of these ideas themselves. He cannot justify his belief in the world of things whence certain of his simple ideas "were conveyed" any more than Robinson Crusoe could have explored the continents whose products were drifted to his desert island, though he might perhaps survey the

island itself well enough. Berkeley accordingly, as Professor Fraser happily puts it, abolished Locke's hypothetical outer circle. Thereby he made the psychological standpoint clearer than ever—hence the truth of Hume's remark, that Berkeley's arguments "admit of no answer;" at the same time the epistemological problem was as hopeless as before—hence again the truth of Hume's remark that those arguments "produced no conviction." Of all the facts with which he deals, the psychologist may truly say that their *esse* is *percipi*, inasmuch as all his facts are facts of presentation, are ideas in Locke's sense, or objects which imply a subject. Before we became conscious there was no world for us; should our consciousness cease, the world for us ceases too; had we been born blind, the world would for us have no color; if deaf, it would have had no sounds; if idiotic, it would have had no meaning. Psychology, then, never transcends the limits of the individual; even the knowledge that there is a real world, as common-sense assumes, is, when psychologically regarded, an individual's knowledge, which had a beginning and a growth, and can have an end. In fact, for the psychologist it is not essentially knowledge, but presentations, partly possible, partly actual, in the mind of A, B, or C; just as this page is for the printer essentially "copy," and only for the reader essentially "discourse." But what the psychologist has to say about knowledge is, of course, itself knowledge, *i.e.*, assuming it to be correct; the knowledge about which he knows is, however, for him not primarily knowledge, but "states of consciousness."

But now, though this Berkeleyan standpoint is the standpoint of psychology—as we find it occupied, say, by J. S. Mill and Doctor Bain—psychology is not pledged to the method employed by Berkeley and by Locke. Psychology may be individualistic without being confined exclusively to the introspective method. There is nothing to hinder the psychologist from employing materials furnished by his observations of other men, of infants, of the lower animals, or of the insane; nothing to hinder him taking counsel with the philologist or even the physiologist, provided always he can show the psychological bearings of those facts which are not directly psychological. Nor, again, are we bound, because we take the individualistic standpoint as psychologists, to accept the philosophical conclusions that have been reached from it, unless, indeed, we hold that it is the right point of view for philosophical speculation. A psychologist *may* be an idealist in Berkeley's sense or in Fichte's, but he need not; he is just as free, if he sees reason, to call himself, after Hamilton, a natural realist; only psychology will afford him no safe warrant for the realism part of it. The standpoint of psychology, then, is individualistic; by whatever methods, from whatever sources its facts are ascertained, they must—to have a psychological import—be regarded as having place in, or as being part of, *some one's consciousness*. In this sense, *i.e.*, as presented to an individual, "the whole choir of heaven and furniture of earth" may belong to psychology, but otherwise they are psychological nonentities. The problem of psychology, in dealing with this complex subject-matter, is in general—first, to ascertain its constituent elements, and secondly, to ascertain and explain the laws of their combination and interaction.

*General Analysis of Mind; its Ultimate Constituents.*—As to the first, there is in the main substantial agreement: the elementary facts of mind cannot, it is held, be expressed in less than three propositions—I feel somehow, I know something, I do something. But here at once there arises an important question, *viz.*, What are we to understand by the sub-

ject of these propositions? Nobody nowadays would understand it to imply that every psychical fact must be ascertained or verified by personal introspection; perhaps no modern writer ever did understand this; at any rate to do so is to confound the personal with the psychological. We are no more confined to our own immediate observations here than elsewhere; but the point is that, whether seeking to analyze one's own consciousness or to infer that of a lobster, whether discussing the association of ideas or the expression of emotions, there is always an individual mind or self or subject in question. It is not enough to talk of feelings or volitions: what we mean is, that some individual, man or worm, feels, wills, acts—thus or thus. Obvious as this may seem, it has been frequently either forgotten or gainsaid. It has been forgotten among details or through the assumption of a medley of faculties, each treated as an individual in turn, and among which the real individual was lost. Or it has been gainsaid, because to admit that all psychological facts pertain to a psychological subject seemed to carry with it the admission that they pertained to a particular spiritual substance, which was simple, indestructible, and so forth; and it was manifestly desirable to exclude such assumptions from psychology, *i.e.*, from a science which aims only at a scientific exposition of what can be known and verified by observation. But, however much assailed or disowned, the conception of a mind or conscious subject is to be found implicitly or explicitly in all psychological writers whatever—not more in Berkeley, who accepts it as a fact, than in Hume, who accepts it as a fiction. This being so, we are far more likely to reach the truth eventually if we openly acknowledge this inexpugnable assumption, if such it prove, instead of resorting to all sorts of devious periphrases to hide it. Now wherever the word *Subject*, or its derivatives, occurs in psychology we might substitute the word *Ego* and analogous derivatives, did such exist. But subject is almost always the preferable term; its impersonal form is an advantage, and it readily recalls its modern correlative *Object*. Moreover, *Ego* has two senses, distinguished by Kant as pure and empirical, the latter of which is, of course, an object, while the former is subject always. By pure *Ego* or *Subject* it is proposed to denote the simple fact that everything mental is referred to a *Self*. This psychological conception of a self or subject, then, is after all by no means identical with the metaphysical conceptions of a soul or mind-atom, or of mind-stuff not atomic; it may be kept as free from metaphysical implications as the conception of the biological individual or organism with which it is so intimately connected.

We might now proceed to inquire more closely into the character and relations of the three states, modes, or acts of this subject, which are commonly held to be the invariable constituents of psychical life and broadly distinguished as cognitions, feelings, and conations. But we should be at once confronted by a doctrine much in vogue at present, which, strictly taken, amounts almost to a denial of this tripartite classification of the facts of mind—the doctrine, *viz.*, that *feeling* alone is primordial, and invariably present wherever there is consciousness at all. Every living creature, it is said, feels, though it may never do any more; only the higher animals, and these only after a time, learn to discriminate and identify and to act with a purpose. The doctrine, as might be expected, derives its plausibility partly from the vagueness of psychological terminology, and partly from the intimate connection that undoubtedly exists between feeling and cognition on the one hand and feeling and volition on

the other. As to the meaning of the term, it is plain that further definition is requisite for a word that may mean (a) a touch, as feeling of roughness; (b) an organic sensation, as feeling of hunger; (c) an emotion, as feeling of anger; (d) feeling proper, as pleasure or pain. But, even taking feeling in the last, its strict sense, it has been maintained that all of the more complex forms of consciousness are resolvable into, or at least have been developed from, feelings of pleasure and pain. The only proof of such position, since we cannot directly observe the beginnings of conscious life, must consist of considerations such as the following. So far as we can judge, we find feeling everywhere; but, as we work downward from higher to lower forms of life, the possible variety and the definiteness of sense-impressions both steadily diminish. Moreover, we can directly observe in our own organic sensations, which seem to come nearest to the whole content of infantile and molluscous experience, an almost entire absence of any assignable *quale*. Finally, in our sense-experience generally, we find the element of feeling at a maximum in the lower senses, and the intellectual element at a maximum in the higher. But the so-called intellectual senses are the most used, and use we know blunts feeling and favors intellection, as we see in chemists, who sort the most filthy mixtures by smell and taste without discomfort. If, then, feeling predominates more and more as we approach the beginning of consciousness, may we not say that it is the only *sine qua non* of consciousness? Considerations of this kind, however impressive when exhibited at length, are always liable to be overturned by some apparently unimportant fact which may easily be overlooked. Two lines, *e.g.*, may get nearer and nearer and yet will never meet, if the rate of approach is simply proportional to the distance. A triangle may be diminished indefinitely and yet we cannot infer that it becomes eventually all angles, though the angles get no less and the sides do. Now, before we decide that pleasure or pain alone may constitute a complete state of mind, it may be well to inquire: What is the connection between feelings of pleasure and pain and the two remaining possible constituents of consciousness, as we can observe them now? And this is an inquiry which will help us toward an answer to our main question, namely, that concerning the nature and connections of what are commonly regarded as the three ultimate facts of mind.

Broadly speaking, in any state of mind that we can directly observe, what we find is (1) that we are aware of a certain change in our sensations, thoughts, or circumstances, (2) that we are pleased or pained with the change, and (3) that we act accordingly. We never find that feeling directly alters—*i.e.*, without the intervention of the action to which it prompts—either our sensations or situation, but that regularly these latter with remarkable promptness and certainty alter it. We have not first a change of feeling, and then a change in our sensations, perceptions, and ideas; but, these changing, change of feeling follows. In short, feeling appears frequently to be an effect, which therefore cannot exist without its cause, though in different circumstances the same cause may produce a different amount or even a different state of feeling. Turning from what we may call the receptive phase of consciousness to the active or appetitive phase, we find in like manner that feeling is certainly not, in such cases as we can clearly observe, the whole of consciousness at any moment. True, in common speech we talk of liking pleasure and disliking pain; but this is either tautology, equivalent to saying we are pleased when we are pleased and pained when we are pained, or else it is an allowable abbreviation, and means that we like pleasurable *objects* and dislike

painful *objects*, as when we say, we like feeling warm and dislike feeling hungry. And feeling warm or feeling hungry, we must remember, is not pure feeling in the strict sense of the word. Such states admit, if not of description, yet at least of identification and distinction as truly as colors and sounds do. Within the limits of our observation, then, we find that feeling accompanies some more or less definite presentation which for the sake of it becomes the object of appetite or aversion; in other words, feeling implies a relation to a pleasurable or painful presentation, that, as cause of feeling and end of the action to which feeling prompts, is doubly distinguished from it. Thus the very facts that lead us to distinguish feeling from cognition and conation make against the hypothesis that consciousness can ever be all feeling.

But, as already said, the plausibility of this hypothesis is in good part due to a laxity in the use of terms. Most psychologists before Kant, and English psychologists even to the present day, speak of pleasure and pain as sensations. But it is plain that pleasure and pain are not simple ideas, as Locke called them, in the sense in which touches and tastes are—that is to say, they are never like these localized or projected, nor elaborated in conjunction with other sensations and movements into percepts or intuitions of the external. This confusion of feeling with sensations is largely consequent on the use of one word pain for certain organic sensations and for the purely subjective state. But, to say nothing of the fact that such pains are always more or less definitely localized—which of itself is so far cognition—they are also distinguished as shooting, burning, gnawing, etc., etc., all which symptoms indicate a certain objective quality. Accordingly all the more recent psychologists have been driven by one means or another to recognize two “aspects” (Bain), or “properties” (Wundt), in what they call a sensation, the one a “sensible or intellectual” or “qualitative,” the other an “affective” or “emotive,” aspect or property. The term “aspect” is figurative and obviously inaccurate; even to describe pleasure and pain as properties of sensation is a matter open to much question. But the point which at present concerns us is simply that when feeling is said to be the primordial element in consciousness, more is usually included under feeling than pure pleasure and pain, *viz.*, some characteristic or quality by which one pleasurable or painful sensation is distinguishable from another. No doubt, as we go downward in the chain of life, the qualitative or objective elements in the so-called sensations become less and less definite; and at the same time organisms with well-developed sense-organs give place to others without any clearly differentiated organs at all. But there is no ground for supposing even the *amœba* itself to be affected in all respects the same whether by changes of temperature or of pressure or by changes in its internal fluids, albeit all of these changes will further or hinder its life and so presumably be in some sort pleasurable or painful. On the whole, then, there are grounds for saying that the endeavor to represent all the various facts of consciousness as evolved out of feeling is due to a hasty striving after simplicity, and has been favored by the ambiguity of the term feeling itself. If by feeling we mean a certain subjective state varying continuously in intensity and passing from time to time from its positive phase (pleasure) to its negative phase (pain), then this purely pathic state implies an agreeing or disagreeing something which psychologically determines it. If, on the other hand, we let feeling stand for both this state and the cause of it, then, perhaps, a succession of such “feelings” may make up a consciousness; but then we are including two of our

elementary facts under the name of one of them. *The simplest form of psychical life, therefore, involves not only a subject feeling but a subject having qualitatively distinguishable presentations which are the occasion of its feeling.*

We may now try to ascertain what is meant by cognition as an essential element in this life, or, more exactly, what we are to understand by the term *presentation*. It was an important step onward for psychology when Locke introduced that "new way of ideas" which Stillington found alternately so amusing and so dangerous. By *idea* Locke tells us he meant true appearances in men's minds, or "whatsoever is the immediate object of perception, thought or understanding;" and it was so far a retrograde step when Hume restricted the term to certain only of these appearances or objects, or rather to these appearances or objects in a certain state, viz., as reproduced ideas or images. And, indeed, the history of psychology seems to show that its most important advances have been made by those who have kept closely to this way of ideas; the establishment of the laws of association and their many fruitful applications and the whole Herbartian psychology may suffice as instances (see HERBART). The truth is that the use of such a term is itself a mark of an important generalization, one which helps to free us from the mythology and verbiage of the "faculty-psychologists." All that variety of mental facts which we speak of as sensations, perceptions, images, intuitions, concepts, notions, have two characteristics in common: (1) they admit of being more or less attended to, and (2) can be reproduced and associated together. It is here proposed to use the term *presentation* to connote such a mental fact, and as the best English equivalent for what Locke meant by *idea* and what Kant and Herbart called a *Vorstellung*.

A presentation has then a two-fold relation,—first, directly to the subject, and secondly, to other presentations. By the first is meant the fact that the presentation is attended to, that the subject is more or less conscious of it; it is "in his mind" or presented. As presented to a subject a presentation might with advantage be called an object, or perhaps a psychical object, to distinguish it from what are called objects apart from presentation, *i.e.*, conceived as independent of any particular subject. Locke, as we have seen, did so call it; still, to avoid possible confusion, it may turn out best to dispense with the frequent use of *object* in this sense. But on one account, at least, it is desirable not to lose sight altogether of this which is after all the stricter as well as the older signification of *object*, namely, because it enables us to express definitely, without implicating any ontological theory, what we have so far seen reason to think is the fundamental fact in psychology. Instead of depending mainly on that vague and treacherous word "consciousness," or committing ourselves to the position that ideas are modifications of a certain mental substance and identical with the subject to which they are presented, we may leave all this on one side, and say that ideas are objects, and the relation of objects to subjects—that whereby the one is object and the other subject—is presentation. And it is because only objects sustain this relation that they may be spoken of simply as presentations.

As to the subjective relation of objects, the relation of presentation itself, we have merely to note that on the side of the subject it implies what, for want of a better word, may be called *attention*, extending the denotation of this term so as to include even what we ordinarily call inattention. Attention so used will thus cover part of what is meant by consciousness—so much of it, that is, as answers to being mentally active, active enough at least to "receive impressions." Attention on

the side of the subject implies intensity on the side of the object: we might, indeed, almost call intensity the matter of a presentation, without which it is a nonentity. As to the connection between these two, subjective attention and objective intensity—in that higher form of attention called voluntary we are aware (1) that concentration of attention increases or its abstraction diminishes the intensity of a presentation in circumstances where physically and physiologically there is nothing to prevent the intensity of the presentation from continuing uniform. Again, (2) in circumstances when psychologically we are aware of no previous change in the distribution of attention, we find the intensity of a presentation increased or diminished if certain physical concomitants of the presentation (*e.g.*, stimulus, nervous process, etc.), are increased or diminished. Thus, though this is a point we could hardly establish without the aid of psychophysics, we may conclude that the intensity of a presentation may be altered from two sides; that it depends, in other words, partly upon what we may perhaps call its physical intensity and partly on the amount of attention it receives.

The inter-objective relations of presentations, on which their second characteristic, that of revivability and associability depends, though of the first importance in themselves, hardly call for examination in a general analysis like the present. But there is one point still more fundamental that we cannot wholly pass by: it is—in part at any rate—what is commonly termed the unity or continuity of consciousness. From the physical standpoint and in ordinary life we can talk of objects that are isolated and independent and in all respects distinct individuals. The screech of the owl, for example, has physically nothing to do with the brightness of the moon; either may come or go without changing the order of things to which the other belongs. But psychologically, for the individual percipient, they are parts of one whole; special attention to one diminishes the intensity of presentation of the other and the recurrence of the one will afterwards entail the representation of the other also. Not only are they still parts of one whole, but such distinctness as they have at present is the result of a gradual differentiation. It is quite impossible for us now to imagine the effects of years of experience removed, or to picture the character of our infantile presentations before our interests had led us habitually to concentrate attention on some, and to ignore others, whose intensity thus diminished as that of the former increased. In place of the many things which we can now see and hear, not merely would there then be a confused presentation of the whole field of vision and of a mass of undistinguished sounds, but even the difference between sights and sounds themselves would be without its present distinctness. Thus the further we go back the nearer we approach to a total presentation having the character of one general *continuum* in which differences are latent. There is, then, in psychology, as in biology, what may be called a principle of "progressive differentiation or specialization;" and this, as well as the facts of reproduction and association, forcibly suggests the conception of a certain objective continuum forming the background or basis to the several relatively distinct presentations that are elaborated out of it—the equivalent, in fact, of that unity and continuity of consciousness which has been supposed to supersede the need for a conscious subject.

There is one class of objects of special interest even in a general survey, viz., movements or motor presentations. These, like sensory presentations, admit of association and reproduction, and seem to attain to such distinctness as they possess in adult human experience

by a gradual differentiation out of an original diffused mobility, which is little besides emotional expression. Of this, however, more presently. It is primarily to such dependence upon feeling that movements owe their distinctive character, the possession, that is, under normal circumstances, of definite and assignable psychical antecedents, in contrast to sensory presentations, which enter the field of consciousness *ex abrupto*. We cannot psychologically explain the order in which particular sights and sounds occur; but the movements that follow them, on the other hand, can be adequately explained only by psychology. The twilight that sends the hens to roost sets the fox to prowl, and the lion's roar which gathers the jackals scatters the sheep. Such diversity in the movements, although the sensory presentations are similar, is due, in fact, to what we might call the principle of "subjective or hedonic selection"—that, out of all the manifold changes of sensory presentation which a given individual experiences, only a few are the occasion of such decided feeling as to become objects of possible appetite (or aversion). The representation of what interests us comes to be associated with the representation of such movements as will secure its realization, so that—although no concentration of attention will secure the requisite intensity to a pleasurable object present only in idea—we can by what is strangely like a concentration of attention convert the idea of a movement into the fact, and, by means of the movement, attain the coveted reality.

And this has brought us round naturally to what is perhaps the easiest way of approaching the question: What is a *conation* or *action*? In ordinary voluntary movement we have first of all an idea or re-presentation of the movement, and last of all the actual movement itself—a new presentation which may for the present be described as the filling out of the re-presentation, which thereby attains that intensity, distinctness, and embodiment we call reality. How does this change come about? The attempt has often been made to explain it by a reference to the more uniform, and apparently simpler, case of reflex action, including under this term what are called sensori-motor and ideo-motor actions. In all these the movement seems to be the result of a mere transference of intensity from the associated sensation or idea that sets on the movement. But, when by some chance or mischance the same sensory presentation excites two alternative and conflicting motor ideas, a temporary block, it is said, occurs; and, when at length one of these nascent motor changes finally prevails and becomes real, then we have the state of mind called volition. But this assumption that sensory and motor ideas are associated before volition, and that the volition begins where automatic or reflex action ends, is due to that inveterate habit of confounding the psychical and the physical which is the bane of modern psychology. How did these particular sensory and motor presentations ever come to be associated? It is wholly beside the mark to answer that they are "*organically determined* psychical changes." In one respect all psychical changes alike are organically determined, inasmuch as all alike—so far, at least, as we at all know or surmise—have organic concomitants. In another respect no psychical changes are organically determined, inasmuch as physical events and psychical events have no common factors. Now the only psychological evidence we have of any very intimate connection between sensory and motor representation is that furnished by our acquired dexterities, *i.e.*, by such movements as Hartley styled secondary automatic. But then all these have been preceded by volition: as Mr. Spencer says, "the child learning to walk wills each movement before walking it." Surely, then, a

psychologist should take this as his typical case and prefer to assume that all automatic actions that come within his ken at all are in this sense secondarily automatic, *i.e.*, to say that either in the experience of the individual or of his ancestors, volition, or something analogous to it, preceded habit.

But, if we are thus compelled by a sound method to regard sensori-motor actions as degraded or mechanical forms of voluntary actions, instead of regarding voluntary actions as gradually differentiated out of something physical, we have not to ask: What happens when one of two alternative movements is executed? but the more general question: What happens when any movement is made in consequence of feeling? It is obvious that on this view the simplest *definitely purposive* movement must have been preceded by some movement simpler still. For any distinct movement purposely made presupposes the ideal presentation, before the actual realization, of the movement. But such ideal presentation, being a re-presentation, equally presupposes a previous actual movement of which it is the so-called mental residuum. There is then, it would seem, but one way left, *viz.*, to regard those movements which are immediately expressive of pleasure or pain as primordial, and to regard the so-called voluntary movements as elaborated out of these. The vague and diffusive character of these primitive emotional manifestations is really a point in favor of this position. For such "diffusion" is evidence of an underlying continuity of motor presentations parallel to that already discussed in connection with sensory presentations, a continuity which, in each case, becomes differentiated in the course of experience into comparatively distinct and discrete movements and sensations respectively.

But, whereas we can only infer, and that in a very roundabout fashion, that our sensations are not absolutely distinct but are parts of one massive sensation, as it were, we are still liable under the influence of strong emotion directly to experience the corresponding continuity in the case of movement. Such motor-continuum we may suppose is the psychical counterpart of that permanent readiness to act, or rather that continual nascent acting, which among the older physiologists was spoken of as "tonic action;" and as this is now known to be intimately dependent on afferent excitations so is our motor consciousness on our sensory. Still, since we cannot imagine the beginning of life but only life begun, the simplest picture we can form of a concrete state of mind is not one in which there are movements before there are any sensations or sensations before there are any movements, but one in which change of sensation is followed by change of movement, the link between the two being a change of feeling.

Having thus simplified the question, we may now ask again: How is this change of movement through feeling brought about? The answer, as already hinted, appears to be: By a change of attention. We learn from such observations as psychologists describe under the head of fascination, imitation, hypnotism, etc., that the mere concentration of attention upon a movement is often enough to bring the movement to pass. But, of course, in such cases there is neither emotional experience nor volition in question; such facts are only cited to show the connection between attention and movements. Everybody too has often observed how the execution of any but mechanical movements arrests attention to thoughts or sensations, and *vice versa*. Let us suppose, then, that we have at any given moment a certain distribution of attention between sensory and motor presentations; a change in that distribution means a change in the intensity of some or all of these, and change of intensity in motor presenta-



tions means change of movement. Such changes are, however, quite minimal in amount so long as the given presentations are not conspicuously agreeable or disagreeable. As soon as they are, we find pleasure to lead at once to concentration of attention on the pleasurable object; so that pleasure is not at all so certainly followed by movement as we find pain to be, save of course when movements are themselves the pleasurable objects and are executed, as we say, for their own sakes. In fact, pleasure would seem rather to repress movement, except so far as it is coincident either with a more economic distribution, or with a positive augmentation, of the available attention; and either of these, on the view supposed, would lead to increased but indefinite (*i.e.*, playful) movement. Pain, on the other hand, is much more closely connected with movement, and movement too which for obvious reasons much sooner acquires a purposive character. Instead of voluntary concentration of attention upon a painful presentation we find attention to such an object always involuntary; in other words, attention is, as it were, excentrated, dispersed, or withdrawn. If, therefore, the painful presentation is a movement, it is suspended; if it is a sensation, movements are set up which further distract attention, and some of which may effect the removal of the physical source of the sensation.

PSYCHOPHYSICS. See WEBER'S LAW.

PTARMIGAN. See GROUSE.

PTERODACTYLE. The extinct flying reptiles known as "Pterodactyles" are among the most aberrant forms of animals, either living or extinct. Since the beginning of this century, when Blumenbach and Cuvier first described the remains of these curious creatures, they have occupied the attention of naturalists, and various opinions have been expressed as to their natural affinities. The general proportions of their bodies (excepting the larger head and neck) and the modification of the forelimb, to support a membrane for flight, remind one strongly of the bats, but the resemblance is only superficial; a closer inspection shows that their affinities are rather with reptiles and birds.

PTOLEMIES, the Macedonian dynasty of sovereigns of Egypt. See EGYPT, and MACEDONIAN EMPIRE.

PTOLEMY (CLAUDIUS PTOLEMÆUS), celebrated as a mathematician, astronomer, and geographer. He was a native of Egypt, but there is an uncertainty as to the place of his birth; some ancient manuscripts of his works describe him as of Pelusium, but Theodorus Meliteniota, a Greek writer on astronomy of the twelfth century, says that he was born at Ptolemais Hermii, a Grecian city of the Thebaid. It is certain that he observed at Alexandria during the reigns of Hadrian and Antoninus Pius, and that he survived Antoninus.

We now proceed to notice briefly the contents of the *Almagest*. It is divided into thirteen books. Ptolemy in the first chapter, presupposing some preliminary notions on the part of the reader, announces that he will treat in order—what is the relation of the earth to the heavens, what is the position of the oblique circle (the ecliptic), and the situation of the inhabited parts of the earth; that he will point out the differences of climates; that he will then pass on to the consideration of the motion of the sun and moon, without which one cannot have a just theory of the stars; lastly, that he will consider the sphere of the fixed stars and then the theory of the five stars called "planets." All these things—*i.e.*, the phenomena of the heavenly bodies—he says he will endeavor to explain in taking for principle that which is evident, real, and certain, in resting

everywhere on the surest observations and applying geometrical methods. He then enters on a summary exposition of the general principles on which his *Synaxis* is based, and adduces arguments to show that the heaven is of a spherical form and that it moves after the manner of a sphere, that the earth also is of a form which is sensibly spherical, that the earth is in the center of the heavens, that it is but a point in comparison with the distances of the stars, and that it has not any motion of translation. With respect to the revolution of the earth round its axis, which he says some have held, Ptolemy, while admitting that this supposition renders the explanation of the phenomena of the heavens much more simple, yet regards it as altogether ridiculous. Lastly, he lays down that there are two principal and different motions in the heavens—one by which all the stars are carried from east to west uniformly about the poles of the equator; the other, which is peculiar to some of the stars, is in a contrary direction to the former motion and takes place round different poles. These preliminary notions, which are all older than Ptolemy, form the subjects of the second and following chapters. He next proceeds to the construction of his table of chords, of which we have given an account, and which is indispensable to practical astronomy. The employment of this table presupposes the evaluation of the obliquity of the ecliptic, the knowledge of which is indeed the foundation of all astronomical science. Ptolemy in the next chapter indicates two means of determining this angle by observation, describes the instruments he employed for that purpose, and finds the same value which had already been found by Eratosthenes and used by Hipparchus. This "is followed by spherical geometry and trigonometry enough for the determination of the connection between the sun's right ascension, declination, and longitude, and for the formation of a table of declinations to each degree of longitude. Delambre says he found both this and the table of chords very exact."

In book ii., after some remarks on the situation of the habitable parts of the earth, Ptolemy proceeds to make deductions from the principles established in the preceding book, which he does by means of the theorem of Menelaus. The length of the longest day being given, he shows how to determine the arcs of the horizon intercepted between the equator and the ecliptic—the amplitude of the eastern point of the ecliptic at the solstice—for different degrees of obliquity of the sphere; hence he finds the height of the pole and reciprocally from the same data he shows how to find at what places and times the sun becomes vertical and how to calculate the ratios of gnomons to their equinoctial and solstitial shadows at noon and conversely, pointing out, however, that the latter method is wanting in precision. All these matters he considers fully and works out in detail for the parallel of Rhodes.

Book iii. treats of the motion of the sun and of the length of the year. Ptolemy concludes this book by giving a clear exposition of the circumstances on which the equation of time depends.

Books iv. and v. are devoted to motions of the moon, which are very complicated; the moon, in fact, though the nearest to us of all the heavenly bodies, has always been the one which has given the greatest trouble to astronomers. Book iv., in which Ptolemy follows Hipparchus, treats of the first and principal inequality of the moon, which quite corresponds to the inequality of the sun treated of in the third book. As to the observations which should be employed for the investigation of the motion of the moon, Ptolemy tells us that lunar eclipses should be preferred, inasmuch as they give the moon's place without any error on the score of

parallax. The first thing to be determined is the time of the moon's revolution; Hipparchus, by comparing the observations of the Chaldæans with his own, discovered that the shortest period in which the lunar eclipses return in the same order was 126,007 days and one hour. In this period he finds 4,267 lunations, 4,573 restitutions of anomaly, and 4,612 tropical revolutions of the moon less  $7\frac{1}{2}^{\circ}$  q.p.; this quantity ( $7\frac{1}{2}^{\circ}$ ) is also wanting to complete the 345 revolutions which the sun makes in the same time with respect to the fixed stars. He concluded from this that the lunar month contains 29 days and  $31' 50'' 8''' 20''''$  of a day, very nearly, or 29 days 12 hours  $44' 3'' 20'''$ . These results are of the highest importance. (See ASTRONOMY.) In order to explain this inequality, or the equation of the center, Ptolemy makes use of the hypothesis of an epicycle, which he prefers to that of the eccentric.

The subject of parallaxes is continued in the sixth book of the *Almagest*, and the method of calculating eclipses is there given. The author says nothing in it which was not known before his time.

Books vii., viii. treat of the fixed stars. Ptolemy verified the fixity of their relative positions and confirmed the observations of Hipparchus with regard to their motion in longitude, or the precession of the equinoxes. The seventh book concludes with the catalogue of the stars of the northern hemisphere, in which are entered their longitudes, latitudes, and magnitudes, arranged according to their constellations; and the eighth book commences with a similar catalogue of the stars in the constellations of the southern hemisphere. The eighth book contains, moreover, a description of the milky way and the manner of constructing a celestial globe; it also treats of the configuration of the stars, first with regard to the sun, moon, and planets, and then with regard to the horizon, and likewise of the different aspects of the stars and of their rising, culmination, and setting simultaneously with the sun.

The remainder of the work is devoted to the planets. The ninth book commences with what concerns them all in general. The planets are much nearer to the earth than the fixed stars, and more distant than the moon. Saturn is the most distant of all, then Jupiter and then Mars. These three planets are at a greater distance from the earth than the sun. So far all astronomers are agreed. This is not the case, he says, with respect to the two remaining planets, Mercury and Venus, which the old astronomers placed between the sun and earth, whereas more recent writers have placed them beyond the sun, because they were never seen on the sun. He shows that this reasoning is not sound, for they might be nearer to us than the sun and not in the same plane, and consequently never seen on the sun. He decides in favor of the former opinion, which was indeed that of most mathematicians. The ground of the arrangement of the planets in order of distance was the relative length of their periodic times; the greater the circle, the greater, it was thought, would be the time required for its description. Hence we see the origin of the difficulty and the difference of opinion as to the arrangement of the sun, Mercury, and Venus, since the times in which, as seen from the earth, they appear to complete the circuit of the zodiac are nearly the same—a year. Delambre thinks it strange that Ptolemy did not see that these contrary opinions could be reconciled by supposing that the two planets moved in epicycles about the sun; this would be stranger still, he adds, if it is true that this idea, which is older than Ptolemy, since it is referred to by Cicero, had been that of the Egyptians. It may be added, as strangest of all, that this doctrine was held by Teon of Smyrna, who was a contemporary of Ptolemy or somewhat senior to him.

From this system to that of Tycho Brahe there is, as Delambre observes, only a single step.

Ptolemy is hardly less celebrated as a geographer than as an astronomer, and his great work on geography exercised as great an influence on the progress of that science as did his *Almagest* on that of astronomy. It became indeed the paramount authority on all geographical questions for a period of many centuries, and was only gradually superseded by the progress of maritime discovery in the fifteenth and sixteenth centuries. This exceptional position was due in a great measure to its scientific form, which rendered it very convenient and easy of reference; but, apart from this consideration, it was really the first attempt ever made to place the study of geography on a truly scientific basis.

**PUBLIC HEALTH.** State medicine as an organized department of administration is entirely of modern growth. By the common law of England the only remedy for any act or omission dangerous to health was an action for damages or an indictment for nuisance. (See NUISANCE.) At the same time the jurisdiction of the commissioners of sewers acted to a certain extent as a preventive means. Commissions of sewers were granted by the crown, at first in virtue of the general prerogative, afterward under the provisions of numerous statutes, the earliest dating from 1427. The powers of the commissioners included the removal of obstructions in the rivers, the making of fosses and drains, etc. Their jurisdiction, where still existing, is expressly preserved in the modern Public Health Acts. The indictment for nuisance still lies for many offenses which are now punishable in a summary manner under the powers of recent legislation. But for a long time it was the only, not as now a concurrent, remedy. Its obvious defect is that proceedings can only be taken after the mischief has been done. Old examples of nuisances dangerous to health and punishable at common law are the keeping of swine in a town, the dividing of a house in a town so that by reason of overcrowding it would be more dangerous in time of sickness or plague, and the carrying on of offensive trades, such as the melting of tallow. The court leet seems to have had some jurisdiction in sanitary matters, confined to the prevention of nuisances and the determination of the quality of provisions within its local limits. At a comparatively early date statutes were passed dealing with matters for which the common law had provided too cumbrous a remedy. The attention of parliament, though but to a slight extent, was directed to the health of London as early as the Statute of the City of London in 1285. The earliest legislative enactment affecting the public health generally appears to be forbidding the deposit of offensive matter in rivers and other waters, as well in the city of London as in other cities.

*United States.*—After the Civil War boards of health were established in the chief cities. Public health is under the control of the local authorities to a greater extent than in England. Each State has its board of health, the duties of which vary considerably—among others, in some States, being that of licensing medical practitioners. They also have the power of magistrates to a certain extent, in regard to the abatement of nuisances inimical to public well-being. In some States they have the authority to inspect the food supply, particularly animal food before being slaughtered. The local municipal boards keep records of births and deaths, and issue burial permits; they also have extensive powers in times of epidemics, and can make arrangements for the isolation or quarantine of infected people or goods. They have at all times police jurisdiction in the matter of sanitary affairs. By the Act of

Congress of February 25, 1799, officers of the United States are bound to observe the health laws of the States. A national board of health was created by the Act of March 3, 1879, c. 202. Its main duties are to give advice to local authorities and to carry on investigations in sanitary matters. It has certain jurisdiction in quarantine, and in epidemics of a peculiarly dangerous nature.

The scientific aspect of public health does not fall within the scope of the present article; it has been treated under the title HYGIENE.

*London.*—The metropolis is governed by a series of statutes, some peculiar to itself, others general Acts, repealed as to the rest of England, but separately preserved as to the metropolis by the Public Health Act, 1875. The limits of the metropolis for the purposes of public health depend primarily upon the Metropolis Management Act, 1855 (18 and 19 Vict. c. 120, s. 250, schedules A and B). The local authorities are the metropolitan board of works, the vestries and district boards, and (in the city of London) the commissioners of sewers. Asylums and hospitals are administered by the metropolitan asylums board. The water-supply is regulated by the Metropolis Water Acts, 1852 and 1871, gas by the Metropolitan Gas Act, 1860.

**PUBLIC LANDS.** (See HOMESTEAD). The public land system of the United States, including in its provisions the care, distribution, and disposition of the public domain, is a department, the importance of which, in its relations to the citizen, cannot be over-estimated. The title to the public domain has been acquired through treaties with foreign nations and Indian tribes, also by annexation and cessions of territory; the latter from some of the original thirteen States and from Texas. The total area of public lands surveyed in the United States, June 30, 1889, was 981,621,984 acres, distributed throughout Alabama, Arkansas, California, Colorado, Florida, Illinois, Indiana, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Missouri, Nebraska, Nevada, Ohio, Oregon, Wisconsin, Alaska, Arizona, Dakota, Idaho, Indian Territory, Montana, New Mexico, Utah, Washington, and Wyoming; the area of public and Indian lands unsurveyed at the same date was stated at 833,882,163 acres, though the estimate was of a general nature and affords no index to the disposable volume of land remaining, nor of the amount available for agricultural purposes. The most important event for many years in the administration of affairs connected with this system, was the opening of the Oklahoma country in the Indian Territory to settlement and entry. This was of date April 22, 1889, and was followed by efforts to secure the opening for settlement and entry of a tract of 3,600,000 acres bounded on the east by the Indian Territory, south by Texas, west by New Mexico, and north by Kansas and Colorado, and known as "No Man's Land." Oklahoma was organized as a Territory with extended boundaries in May, 1890, and has since shown a great development in population and wealth. In 1892 it is estimated to have 150,000 inhabitants.

The execution of plans for the distribution of the public lands, adopted at an early day in the history of the National government, was attended with results in no inconsiderable degree discouraging. "Land grabbing speculation and speculation were reduced to a system," says a writer on the subject, "producing a general demoralization of the service." The actual settlers and homeseekers were fleeced by the agents of the government, and the government itself systematically plundered by receivers long retained in office. Legislation, however, remedied these and other evils incident to the execution of the trust, and gradually the service improved.

Among the first grants made by the general government, at intervals from 1824 to 1866, were those to canals and river improvements. These grants aggregated 530,000,000 acres, located in the State of Alabama, for the improvement of the Tennessee, Coosa, Cahawba, and Black Warrior rivers; to Illinois for the construction of the Illinois and Lake Michigan canal; Indiana, for the construction of the Wabash and Erie canal; Iowa, for the improvement of the Des Moines river; Michigan, for the construction of St. Mary's ship canal and other waterways; to Ohio, for the Miami canal; and to Wisconsin, for the improvement of the Wisconsin and Fox rivers. In 1841 these conditions were improved upon and the system in a measure perfected by the passage of the Preëmption act, which provided that actual settlers, upon complying with certain regulations therein specified, should be entitled to precedence in the selection and purchase of government lands. This and subsequent legislation, the latter, including the Donation act, providing for the perfecting of titles to lands acquired by the United States, in the settlement of the boundary between the latter country and British Columbia, did much to simplify matters, as also to people the country and develop its resources—though still affording opportunities to the unprincipled for an abuse of the privileges conferred. Such has also been the case in the Homestead and Timber Culture laws. The former was adopted in 1865, and offers to any citizen of the United States, or who has filed his declaration of intention, one quarter section or less, of unappropriated public land, upon his furnishing proof that he is entitled thereto under the provisions of the act, that the entry is for his exclusive use, and for actual settlement and cultivation. The Timber Culture Act was passed in 1878, and vests title to 160 acres of public land, naturally barren of timber, in the person who plants trees thereon and keeps them healthy and growing for a period of eight years. The act also contains provisions with respect to citizenship of the applicant, and to the length of time during which he must reside on the tract, similar to those contained in the Homestead Act. The abuses which had the effect of attracting national attention and careful investigation were the taking up of homestead and timber lands in the names of claimants who existed in the imagination only of those who perpetrated the frauds. They were inaugurated during 1875 and continued until about 1883, and during that period thousands of acres of the public lands in Colorado, New Mexico, and other portions of the Southwest, were fraudulently diverted to the possession of cattle companies. Efforts have been made from time to time to put a period not only to these and other acts of speculation at the expense of those legitimately entitled to the benefits of the Homestead and Timber Culture acts, but also to prevent the holding of a large acreage in the United States by aliens. Little, however, has been accomplished. In nearly all the States there is no distinction made between citizens and aliens in respect to the ownership of lands, and legislation designed to limit foreign holdings, was introduced into the United States Senate in 1884, but failed.

Among the other grants made by the United States of the public lands, were those for the purpose of enabling States to construct levees, made mostly to Oregon, Michigan, Louisiana, and Florida, and grants of desert lands for purposes of reclamation, made to Montana, Oregon, Idaho, and Washington. These too have been the subject of fraudulent speculation. But the most prominent, important, and liberal grants of the government have been made to the railroads. The practice was begun in 1850 and terminated in 1874, but during

that period of a quarter of a century millions of acres have been disposed of to trans-continental and other railway corporations. A portion of the lands thus appropriated have been restored to the government by the vacation of the acts which conferred title, by forfeiture for failure on part of the railroad companies to comply with the conditions under which the grants were made, and by other congressional enactments—not, however, until nearly 20,000,000 acres had been certified to corporations benefited by such grants. During 1889, there were 70,141 patents for agricultural lands issued, 913 patents for mineral, and 155 for coal lands; 425,046,002 acres were certified under the law for the benefit of railroad companies; 259,721.45 acres patented to the States under the swamp-land grants; 132,350.61 approved under various grants to the States under educational grants, and 159,390.21 acres were patented on private land claims in severalty and scrip locations, in the various lands and Territories. At the close of the fiscal year there were pending selections amounting to 29,444,251.64 acres; 2,000,000 acres under swamp-land grants, and 1,795,521.60 acres for educational and internal and improvement purposes.

The business of the department is annually increasing in volume and importance, and its disposition is materially facilitated by the systematic methods employed in its transaction.

**PUBLIC RECORDS.** See **RECORDS, PUBLIC.**

**PUBLILIUS** (less correctly written **PUBLIUS**) **SYRUS**, a Latin writer of farces (*mimi*), flourished in the first century B.C. He was a native of Syria and was brought as a slave to Italy, but by his wit and talent he won the favor of his master, who freed and educated him. His farces, in which he acted himself, had a great success in the provincial towns of Italy and at the games given by Cæsar in 46 B.C.

**PÜCKLER-MUSKAU, HERMANN LUDWIG HEINRICH, PRINCE OF**, a German author, was born at Muskau, in Lusatia, on October 30, 1785. He died at Branitz on February 4, 1871, and in accordance with instructions in his will, his body was burned.

**PUDSEY**, a township of the West Riding of Yorkshire, is situated on an acclivity rising above the valley of the Aire and on the Great Northern Railway, four miles east of Bradford and six southwest of Leeds. The population of the district in 1881 was 12,314.

**PUEBLA**, or in full **LA PUEBLA DE LOS ANGELES**, a city of Mexico, formerly capital of the province of Tlaxcala, now of the State of Puebla, lies seventy-six miles southeast of Mexico, in 19° N. latitude, and 98° 2' W. longitude, at a height of 7,220 feet above the sea. By Humboldt Puebla was ranked as the most important city of Spanish America after Mexico, Guanajuato, and Havana, and in the matter of population it still stands third among the state capitals. Puebla has long been one of the great trading and manufacturing centers of the country, and it has recently become an important point in the rapidly-developing railway system, having lines to Apizaco on the railway from Vera Cruz to Mexico (twenty-eight miles), to Villa de Libres (fifty-eight miles), to San Martin (twenty-four miles), to Matamoros Izucar (thirty-one miles), and to San Juan de los Llanos. Cotton and woolen goods, leather, earthenware, soap, and glass are the leading manufactures. The population, which was about 80,000 in 1746, and 52,717 in 1793, and which greatly decreased during the revolutionary period, is now (1890) stated at 87,000.

Puebla was founded in 1533-34 by Sebastian Ramirez de Fuenleal, archbishop of Santo Domingo, and the Franciscan friar Toribio Motolinia. In 1550 it became the seat of the bishopric which had originally been founded in 1526 at Tlaxcala. The epithet "de los Angeles,"

which is now practically dropped, was in the seventeenth and eighteenth centuries the chief part of the name, which often appears simply as Angeles. It is associated with a popular belief that during the building of the cathedral two or three angels every night added as much to the height of the walls as the workmen had managed to add in the preceding day. In 1845 Santa Anna made an unsuccessful attempt to capture the city. On March 18, 1863, it was invested by the French under Forey, and on May 17th taken by storm.

**PUEBLO**, a city of the United States, and one of the most prosperous between the Rocky mountains and the Missouri river, is the capital of Pueblo county, Col. It is located on the Arkansas river, 100 miles south of Denver, 40 miles east of Cañon City, and is reached from all directions by the Denver and Rio Grande, Denver and New Orleans, Atchison, Topeka and Santa Fé, Rock Island, and other leading trans-continental railway lines. As a manufacturing city, railroad center, and in some other respects, Pueblo is second in importance to no city in Southern Colorado. It is the location of the Colorado Coal and Iron Company, Colorado Smelting Company, Colorado Press Brick Company, Colorado Bridge Company, leading industries of the West, and many other undertakings owned and conducted by home capital. These embrace foundries and machine shops, enterprises devoted to the manufacture of wire fence, cornices, brick, furniture, lumber, sash, doors and blinds, carriages, buggies and wagons, agricultural implements, mining machinery, etc., representing heavy investments and employing a force aggregating largely in number. It has two daily and two weekly papers, one private and two national banks, seven churches, a number of schools, graded and commercial, a large number of stores, eight hotels and two theaters. It is lighted by gas and electric lights, and a well-managed street railway system affords the means of rapid transit throughout the city. The population, 3,217 in 1880, was 24,558 in 1890.

**PUERPERAL FEVER.** See **SEPTICÆMIA.**

**PUERTO CABELLO**, a town and seaport in the South American republic of Venezuela, in the province of Carabobo, possesses one of the finest natural harbors in that part of the world. The entrance, about ninety feet deep, is so clear that no pilot is required; and in the outer bay (100 to 300 feet deep) there is safe anchorage. On a high rock to the southeast of the town is the Mirador of Solano, or castle of Puerto Cabello, which has often proved an obstacle to enemies advancing from the interior. The exports consist of coffee, cocoa, hides, goat and deer skins, bark, woods, indigo, and cotton, but only the first in large quantities. Germany and the United States are the chief recipients. Population, 15,000. Within six miles of the town there are four villages of from 200 to 1,500 inhabitants.

**PUERTO DE SANTA MARIA**, probably the "Menesthei Portus" of Ptolemy, commonly called **EL PUERTO** ("The Port"), a town of Spain, in the province of Cadiz, seven miles to the northeast of that city (twenty-one and a quarter miles by rail), near the mouth and on the right bank of the Guadaiete, which is here crossed by a suspension bridge. The population of the municipality in December, 1887, was 22,125.

**PUERTO PRINCIPE**, or now more correctly **CIUDAD DEL PRINCIPE**, a city at the head of the central department of the island of Cuba. Though for some time after the surrender of San Domingo to France in 1800 Principe was the seat of the central government and supreme courts of the Spanish West Indies, it is no longer a place of much importance. The population is estimated at 31,000.

**PUERTO RICO.** See **PORTO RICO.**

**PUFENDORF, SAMUEL**, German philosopher, jurist, and writer on international and national law, was born at Chemnitz, Saxony, January 8, 1632. His first work was *Elementa jurisprudentiæ universalis, libro duo*. The work was dedicated to Charles Louis, elector palatine, an enlightened prince and patron of science, who offered Pufendorf a chair of Roman law at Heidelberg, and when this was declined he created a new chair, that of the law of nature and nations, the first of the kind in the world. Pufendorf accepted it, and was thus in 1661, at the age of twenty-nine, placed in the most enviable of positions. He showed himself equal to his task, and by his science and eloquence proved himself to be an honor and ornament to the university. The keenly sarcastic tract *De statu imperii germanici, liber unus*, dates from this period of his life.

In 1670 Pufendorf was called to the university of Lund. The sojourn at Lund was fruitful. In 1672 appeared the *De jure naturæ et gentium, libri octo*, and in 1675 a résumé of it under the title of *De officio hominis et civis*. The treatise *De jure naturæ et gentium* is the first systematic work on the subject.

In 1677 he was called to Stockholm in the capacity of historiographer-royal. To this new period belong among others the work *On the Spiritual Monarchy of the Pope*, which was afterward inserted in his *Introduction to the History of the Principal States in Europe at the Present Day*, also the great *Commentariorum de rebus Suecicis, libri XXVI., ad expeditionem Gustavi Adolphi regis in Germaniam ad abdicationem usque Christiænæ* and a *History of Charles Gustavus*. In his historical works Pufendorf is hopelessly dry; but he professes a great respect for truth, and generally draws from archives. He died on October 26, 1694.

**PUFF-ADDER.** See VIPER.

**PUFF-BIRD**, the name first given, according to Swainson (*Zool. Illustrations*), by English residents in Brazil to a group of Birds known to ornithologists as forming the restricted Family *Bucconidæ*, but for a long time confounded, under the general name of Barbets, with the *Capitonidæ* of modern systematists, who regard the two Families as differing very considerably from one another.

**PUFFIN**, the common English name of a sea-bird, the *Fratricula arctica* of most ornithologists, known however on various parts of the British coasts as the Bottlenose, Coulterneb, Pope, Sea-Parrot, and Tammy-Norie, to say nothing of other still more local designations, some (as Marrott and Willock) shared also with allied species of *Alcidæ*, to which Family it has, until very lately, been invariably deemed to belong.

**PUGET, PIERRE**, born at Marseilles on October 31, 1622, painter, sculptor, architect, and engineer, is a rare instance of precocious genius and mature power. He died in 1694. At the age of fourteen he carved the ornaments of the galleys built in the port of his native city, and at sixteen the decoration and construction of a ship were intrusted to him.

Puget was the most vigorous representative of French sculpture in the eighteenth century; in spite of his visits to Paris and Rome his work never lost its local character; his *Hercules* is fresh from the galleys of Toulon; his saints and virgins are men and women who speak Provençal. His best work, the *St. Sebastian* at Genoa, though a little heavy in parts, shows admirable energy and life, as well as great skill in contrasting the decorative accessories with the simple surface of the nude.

**PUGIN, AUGUSTUS WELBY NORTHMORE**, architect, was born in Store street, London, England, March 1, 1812. Pugin was the designer of a large number of important Roman Catholic buildings, and also assisted Sir Charles Barry in the preparation of the designs for the

new Houses of Parliament Westminster. Early in 1852 he was attacked by insanity, which caused his death on September 14th, of the same year.

**PULCI, LUIGI**, an Italian poet of distinguished family, was born at Florence, December 3, 1431, and devoted his life to study and to literary composition. He was one of the most intimate friends of Lorenzo de' Medici and of Poliziano, from the latter of whom he derived no little assistance in the composition of his poem, *Il Morgante Maggiore* (Morgante the Giant). This celebrated work, a burlesque epic (in 28 cantos), of which Roland is the hero, is a vivacious parody of the romances of Carolingian chivalry, which had become (as Pulci thought) undeservedly popular in Italy. His mocking imagination took a pleasure in turning into ridicule the combats with giants, the feats of magicians, and all the incredible adventures that form the basis of the mediæval epic; and he manages to do it with a wonderfully pleasant and original naivete. But although the poem is essentially heroic-comic, it occasionally contains passages of the finest pathos. Pulci died in 1487.

**PULGAR, FERNANDO DE**, Spanish prose-writer of the latter part of the fifteenth century, born probably at Pulgar near Toledo. Pulgar's *Claros Varones de Castilla*, a series of sketches of forty-six of the most celebrated men of the reign and court of Henry IV., is of considerable interest both for its matter and for its style. He wrote, besides, a commentary on the ancient *Coplas de Mingo Revulgo*; and thirty-two of his *Letters* written to various persons of eminence, including some to the queen, are also extant.

**PULKOWA.** See OBSERVATORY.

**PULTENEY, WILLIAM, EARL OF BATH**, an English statesman and politician, was born in 1684. In 1705 he was brought into Parliament for Headon. This seat was held by him without a break until 1734, and though the family was then dispossessed for a time the supremacy was regained in the return of another Pultney in 1739. Throughout the reign of Queen Anne William Pultney played a prominent part in the struggles of the Whigs, and on the prosecution of Sacheverell he exerted himself with great zeal against that violent divine. When the victorious Tories sent his friend Robert Walpole to the Tower in 1712, Pultney championed his cause in the House of Commons and joined with the leading Whigs in visiting him in his prison-chamber. For these acts he was duly rewarded on the accession of George I. In the first ministry of the new king he held the post of secretary of war, a post which in the previous reign had been conferred upon St. John, Walpole, and Granville successively, and when the committee of secrecy on the Utrecht treaty was formed the list included the name of William Pultney. Two years later (July 6, 1716,) he became one of the privy council. He died July 7, 1764.

**PULTOWA.** See POLTAVA.

**PUMA**, a name probably of native origin, introduced into European literature by the early Spanish writers on South America (as Garcilaso de la Vega and Hernandez) for one of the largest feline animals of the New World. It is generally called "cougouar" by the French, "leon" by the Spanish Americans, and "panther" by the Anglo-American hunters of the United States. It is the *Felis concolor* of Linnæus and all subsequent systematic zoölogical authors.

The puma has an exceedingly wide range of geographical distribution, extending over a hundred degrees of latitude, from Canada in the north to Patagonia in the south, and was formerly pretty generally diffused in suitable localities from the Atlantic to the Pacific Ocean, but the advances of civilization have in recent

years considerably curtailed the extent of the districts which it inhabits. Though an expert climber, it is by no means confined to wooded districts, being frequently found in scrub and reeds along the banks of rivers, and even in the open pampas and prairies. Its habits much resemble those of the rest of the group to which it belongs; and, like the leopard, when it happens to come within reach of an abundant and easy prey, as the sheep or calves of an outlying farming station, it kills far more than it can eat, either for the sake of the blood only or to gratify its propensity for destruction. It rarely attacks man and when pursued escapes if possible by ascending lofty trees.

**PUMICE**, a highly porous light mineral substance of volcanic origin, resulting from the solidification of foam or scum formed by the escape of steam or gas on the surface of molten lava. It is principally found of a whitish or gray color, more rarely of a slaty blue or reddish tint. In composition it is allied to the obsidians, containing in every 100 parts about 72 of silica, 17 of alumina, 2 of iron oxide, and 9 of soda potash; and under the blowpipe it fuses to a white enamel. Its porosity renders it so exceedingly light that in the dry condition it floats readily on the surface of water, sinking only when thoroughly saturated. Owing to this property it is found very widely diffused over the ocean-bed, even at points far removed from volcanic vents, considerable blocks having been brought up in the dredgings of the *Challenger* at all the points of its sea-bottom exploration. It is obtained for industrial purposes in the regions of recent volcanoes—the Lipari Islands, Iceland, Auvergne, Teneriffe, etc.—and is highly valued as a smoothing and polishing material for the metals, marble, horn, wood, bone, ivory, and leather.

**PUMP**. See **MINING**, **PNEUMATICS** and **HYDRO-MECHANICS**.

**PUMPKIN**. See **GOURD** and **HORTICULTURE**.

**PUMPKIN**, a member of the gourd family, largely grown in America and Europe for domestic food, and as food for cattle. In some districts the term is applied to squashes, gourds, etc., while in others it is limited to the varieties of the plant itself; grown chiefly in the northern and eastern States of the United States. It is raised from the seed, which sprouts within a fortnight after having been planted, and grows into a hardy vine of a dozen or more feet in length covered with a prickly surface, and bearing large yellow flowers which mature into the fruit. The latter is either round or elongated in shape, yellow of color and grows to a large size. The flesh of the fruit is also yellow in color, generally tough and coarse-grained until cooked, when it is eaten as sauce or made into pies that are highly esteemed for their appetizing qualities and health-giving properties. Among the most desirable varieties for the table are the Vermont and Canadian pumpkins. They are oblong in form, generally round and deep yellow in color. The flesh is sweet and tender, and on some accounts this variety is preferred before all others, though the sugar pumpkin is considered by many as unsurpassed for pies, puddings, and other edible specialties of the household. The seeds of the pumpkin are small, white, and flat, and diuretic in their action, also valuable remedial agents in cases of tape-worm.

**PUNCHINELLO** (It., *Policinella*, *Pulcinella*), the most popular of the puppets, is of Italian origin, though its history is by no means free from obscurity. The earlier etymologists sought to trace the name to various mythical individuals, by whom, it was alleged, the type was first furnished. Galiani adopts the theory which derives it from the name of Puccio d'Aniello, a vintager of Acerra near Naples, who, having by his wit and

grotesque appearance vanquished some strolling comedians in their own sphere, was induced to join the troop, and whose place, by reason of his popularity, was supplied after his death by a masked actor who imitated his dress and manner.

Andrea Perrucci (1699) and Gimma assert with some show of authority that Silvio Fiorillo, a comedian named after his principal part Captain Matamoros (the Italian *Miles Gloriosus*), invented the Neapolitan Pulcinella. It was afterward improved by Andrea Calcese, surnamed Ciuccio, who died of the plague in 1656, and who, according to Gimma, imitated in the character the peasants of Acerra. This would place the origin of the Italian Pulcinella somewhere about the commencement of the seventeenth century, the original character appearing to have been that of a country clown, hook-nosed, shrill-voiced, cowardly, boastful, and often stupid, yet given at times to knavish tricks and shrewd sayings. In thorough accordance with this date, we find that the earliest known appearance of Polichinelle in France is at the commencement of the reign of Louis XIV., in the show of the puppet-playing dentist Jean Brioché. The date of its introduction into England has been disputed, Payne Collier being of opinion that Punch and King William came together, a second theory suggesting an earlier origin with the Huguenot refugees. The older Punchinello was far less restricted in his actions and circumstances than his modern successor. He fought with allegorical figures representing want and weariness as well as with his wife and with the police, was on intimate terms with the patriarchs and the seven champions of Christendom, sat on the lap of the queen of Sheba, had kings and dukes for his companions, and cheated the Inquisition as well as the common hangman. Powell seems to have introduced a trained pig which danced a minuet with Punch, and the French have occasionally employed a cat in place of the dog, Toby, whose origin is somewhat uncertain. A typical version of the modern play, with illustrations, was published by Payne Collier and Cruikshank in 1828.

**PUNCTUATION**. See **PALEOGRAPHY**.

**PUNJAB**, the most northern province of British India. Geographically the region called by this name is the triangular tract of country of which the Indus and the Sutlej (Satlaj) to their confluence form two of the sides, the third being the lower Himálaya hills between these two rivers. The British province now includes a large extent of country outside these boundaries, on all three sides—beyond the Indus to the range of hills running parallel to it on the west; beyond the Sutlej eastward to the Jumna (Jamna) and southward to a distance of sixty miles below Delhi; within the hills, a large highland tract on the east and another on the west, with the Kashmir and Chamba territories between. The British province stretches north and south from 35° 10' N. latitude at the head of the hill district of Hazára to 27° 40' at the south end of the Gurgáon district, and east and west from 69° 36' E. longitude on the Déra Ghází Khán and Sind frontier to 78° 55' on the Jumna. The length of the central line of communication across the province from Delhi to Peshawar by rail is 645 miles.

The name *Punjab* signifies “ [country of] five rivers,” the five rivers being the great tributaries of the **INDUS** (*q.v.*), namely, the Jhelum, Chináb, Rávi, Biás, and Sutlej. These are all rivers of large volume, but, on account of the great width of sandy channel in their passage through the plains, their changing courses, and shifting shoals, they are of very moderate value for steam navigation, though they all support a considerable boat-traffic.

Besides the great rivers, the distinguishing feature of the Punjab, there are some others deserving of notice.

The area of the Punjab proper, the triangular tract of country between the Indus and the Sutlej, is about 62,000 square miles; the whole area of the British province is 106,632, and of the feudatory states 35,817, making a total of 142,449 square miles. This area is for the most part a great alluvial plain.

Besides the rock-salt, the mineral products of the Punjab are not many. Limestone, good for building, is obtained at Chaniót, on the Chináb, and at a few other places. There are extensive alum-beds at Kálábágh, on the Indus.

As in other parts of India, there are commonly two harvests in the year. The spring crops are wheat, barley, gram, various vegetables, oil-seeds, tobacco, and a little opium; the autumn crops, rice, millets, maize, pulses, cotton, indigo, and sugar-cane. Tea is now extensively cultivated in the Kángra district. Flax has been produced successfully, but the cultivation has not been extended.

The forest area of the Punjab consists of 4,694 square miles reserved, under the management of the forest department, and 13,000 square miles under the district officers.

The rainfall in the Punjab varies greatly in different parts, and from year to year. The maximum (126.55 inches in the year) is at Dharmasala, on the face of the high north wall of the Kángra valley; the minimum (5.96) is in the Muzaffargarh district. In a country so open and so far from the sea there are extremes of heat and cold. A temperature of 128° Fahr. in the shade has been recorded, and a winter temperature of 25° at sunrise is not infrequent. At Lahore, on the grass, the thermometer has been known to fall to 17°.

Of the whole area of British Punjab (106,632 square miles) 36,755 square miles are cultivated, and 64,263 uncultivated, the remaining 5,614 being reckoned uncultivable. An area of 75,434 square miles (48,377,760 acres) is held by 33,020 village communities, formed of small proprietors having joint interests and joint responsibility for the land revenue, but cultivating each his own land.

Irrigation for large areas is from canals and from reservoirs, and for smaller areas from wells.

The population of the British province in 1881 numbered 18,850,437; of the feudatory states, 3,861,683; total, 22,712,120.

**PUPPETS.** See **MARIONETTES.**

**PURCELL, HENRY,** English musical composer, was born in 1658 in St. Ann's Lane, Old Pye street, Westminster. In 1690 he wrote the songs for Dryden's version of Shakespeare's *Tempest*, including "Full fathom five," and "Come unto these yellow sands," and the music for Betterton's *Prophetess* (afterward called *Dioclesian*) and Dryden's *Amphitryon*; and in 1691 he produced his dramatic masterpiece, *King Arthur*, also written by Dryden, and first published by the Musical Antiquarian Society in 1843.

Purcell's greatest work is undoubtedly his *Te Deum* and *Jubilate*, written for St. Cecilia's Day, 1694, the first English *Te Deum* ever composed with orchestral accompaniments. Purcell did not long survive the production of this great work. He died at his house in Dean's Yard, Westminster, on November 21, 1695.

**PURCHAS, SAMUEL,** compiler of works on travel and discovery, was born at Thaxted, Essex, in 1577. In 1613 he published *Purchas, his Pilgrimage or Relations of the World, and the Religions observed in all Ages*, which reached a fourth edition, much enlarged, in 1626; in 1619 *Purchas, his Pilgrim or Microcosmus, or the Historie of Man; relating the won-*

*ders of his Generation, varieties in his Degeneration, and necessity of his Regeneration*; and in 1625, in four volumes, *Purchas, his Pilgrimes; or Relations of the World in Sea Voyages and Lande Travels, by Englishmen and others*. He was also the author of the *King's Tower and Triumphal Arch of London*, a sermon on 2 Sam. xxii. 51, published in 1623. He died in September, 1626.

**PURGATORY** (*Purgatorium*). The Roman Catholic Church has no more than two declarations of supreme authority on the subject of its distinctive doctrine of purgatory. The first is that of the council of Ferrara-Florence, in which it was defined, as regards the truly penitent who have departed this life in the love of God before they have made satisfaction for their sins of commission and omission by fruits meet for repentance, that their souls are cleansed by purgatorial pains after death, and for their relief from these the suffrages of the living—the sacrifice of the mass, prayers, alms, and other offices of piety—are helpful. The second is that of the council of Trent, which runs as follows: "Since the Catholic Church, instructed by the Holy Spirit from the sacred writings and the ancient tradition of the fathers, hath taught in holy councils, and lastly in this œcumenical council, that there is a purgatory, and that the souls detained there are assisted by the suffrages of the faithful, but especially by the most acceptable sacrifice of the mass, this holy council commands all bishops to have a diligent care that the sound doctrine of purgatory delivered to us by venerable fathers and sacred councils be believed, maintained, taught, and everywhere preached."

Among the details of the doctrine, which have been the subject of much speculation among Catholics, may be specified the questions relating to the locality of purgatory and the nature and duration of its sufferings. On none of these points has anything authoritative been delivered. It is of course conceived of as having some position in space, and as being distinct from heaven, the place of eternal blessedness, on the one hand, and from hell, the place of eternal woe, on the other. But any theory as to its exact latitude and longitude (such, for example, as underlies Dante's description) must be regarded as the effort merely of the individual imagination. As regards the nature of its pains, there has been a constant disposition to interpret with strict literality the expressions of Scripture as to the cleansing efficacy of fire, but the possibility of interpreting them metaphorically has never been wholly lost sight of. With respect to their duration, it must be inferred from the whole praxis of indulgences as at present authorized by the church that the pains of purgatory are measurable by years and days; but here also everything is left vague.

**PURI** or **POOREE**, a district of British India in the Orissa division of the lieutenant-governorship of Bengal, lying between 19° 28' and 20° 16' N. latitude and 85° 0' and 86° 28' E. longitude, with an area of 2,472 square miles. Puri district is rich in historical remains, from the primitive rock-hewn caves of Buddhism—the earliest relics of Indian architecture—to the mediæval sun temple at Kanarak and the world-renowned shrine of Jagannath. The chief roads in the district are the Calcutta and Madras trunk road and the pilgrim road from Cuttack to Puri. The climate of Puri is dry and healthy, and the average rainfall is 55.80 inches.

The census of 1881 returned the population of Puri district at 888,487 (446,609 males and 441,878 females).

**PURI** or **POOREE**, chief town of the above district, and commonly known as Agannath, is situated on the Orissa coast in 19° 48' N. latitude and 85° 51' E. longitude. Its chief interest is centered in the sacred shrine

of Jagannath, a temple which dates from the twelfth century, and which lies at the southern extremity of the town. In 1881 the population of Puri was 22,095 (males 11,769, females 10,326), of whom 21,913 were Mohammedans.

PURIM (פרים), a feast of the later Jews, celebrated in honor of the deliverance of the nation from the schemes of Haman recorded in the book of Esther. The feast falls on the 14th and 15th of Adar, and is, in accordance with Esther ix. 22, of a joyous character, but quite secular in tone, with a great deal of hard drinking, the only quasi-religious features being the reading in the synagogue of the book of Esther and the section about Amalek, Exod. xvii. 8 *seq.* This celebration appears to have made its way among the Jews only gradually.

PURITANS. See ENGLAND, CHURCH OF; INDEPENDENTS, and PRESBYTERIANISM.

PURNIAH, a district of British India in the Bhagalpur division of the lieutenant-governorship of Bengal, occupying an area of 4,956 square miles, is situated between 25° 15' and 26° 37' N. latitude, and 87° and 88° 33' E. longitude.

The staple product of Purniah is rice, but jute and tobacco are also cultivated to a considerable extent. Its manufactures include indigo, cottons, woollens and silks, but the chief is that of indigo, which is mostly carried on in the south of the district. By the census of 1881 the population numbered 1,848,687 (937,080 males, 911,607 females).

PURNIAH, chief town and administrative headquarters of the above district, is situated on the east bank of the river Saura, in 25° 46' N. latitude, and 87° 30' E. longitude. It contains a population, according to the census of 1881, of 18,016.

PURPLE (πορφύρα), the name given by the ancients to a dye derived from various species of *Murex* and *Purpura*. (See MOLLUSCA, DYEING, and PHŒNICIA.) For the modern sources of the various shades of this color, see DYEING.

PURPURA, a disease characterized by the occurrence of purple-colored spots upon the surface of the body, due to extravasations of blood in the skin, accompanied occasionally with hemorrhages from mucous membranes. Difference of opinion has prevailed among physicians as to whether these symptoms are to be regarded as constituting a disease *per se*, since they are frequently seen in connection with various morbid conditions. Thus, in persons suffering from such diseases as rheumatism, phthisis, heart disease, cancer, Bright's disease, jaundice, as well as from certain of the infectious fevers, extravasations of the kind above mentioned are not infrequently present.

The treatment will bear reference to any causes which may be discovered as associated with the onset of the disease, such as unfavorable hygienic conditions, and nutritive defects should be rectified by suitable diet. The various preparations of iron seem to be the best medicinal remedies in this ailment, while more direct astringents, such as gallic acid, ergot of rye, turpentine, or acetate of lead, will in addition be called for in severe cases and especially when hemorrhage occurs.

PURSLANE, the vernacular equivalent of the botanical genus *Portulaca*. *P. oleracea* is a native of India, which has been introduced into Europe as a salad plant, and in some countries has spread to such an extent as to become a noxious weed. This is the case in certain parts of the United States, where the evil qualities of "pussly" have become proverbial. Like many other succulent plants, its juice is cooling and is used in tropical countries as a refrigerant in fever, while the bruised leaves are employed as an application in cases of local

inflammation. Some of the species, such as *P. grandiflora* and its varieties, are grown in gardens on rock-work owing to the great beauty and deep coloring of their flowers, the short duration of individual blossoms being compensated for by the abundance with which they are produced.

PUSEY, EDWARD BOUVERIE, English divine, originally Edward Bouverie, was born in Oxford in 1800.

His name will be chiefly remembered as the representative of a great religious movement which, whatever may be its ultimate issue, has carried with it no small part of the religious life of England in the latter half of the nineteenth century. His chief characteristic was an almost unbounded capacity for taking pains. His chief influence was that of a preacher and a spiritual adviser. His *Parish Sermons* reproduce the substance of patristic homilies in the massive style of the Caroline divines. His correspondence as a spiritual adviser was enormous; his deserved reputation for piety made him the chosen confessor to whom numbers of men and women unburdened their doubts and sins.

PUTNAM, a post-town in Windham county, Conn., twenty-five miles south of Worcester and thirty-three miles north of Norwich, on the Norwich and Worcester Railroad, where the latter intersects the Eastern Division of the New York and New England road. It is an attractively laid out and neatly built New England town, containing seven churches, a high school, and several school buildings in addition, one national bank, one savings bank, two newspaper offices, two hotels, together with five collar factories, two woolen mills, and other features of thrift and enterprise. The population, 2,000 in 1880, is now (1890) 6,511.

PUTNEY, a suburb of London, in the county of Surrey, is situated on the right bank of the Thames, about eight miles above London Bridge by the river and four and one-half miles west of Hyde Park Corner by road. Putney is included within the metropolitan area. The population of the registration sub-district (area, 2,235 acres) in 1871 was 9,439, and in 1881 it was 13,235.

PUTREFACTION. See FERMENTATION.

PUTTY is a kind of cement composed of fine powdered chalk intimately mixed with linseed oil, either boiled or raw, to the consistency of a tough dough. It is principally used by glaziers for bedding and fixing sheets of glass in windows and other frames, by joiners and painters for filling up nail-holes and other inequalities in the surface of wood-work, and by masons for bedding ashlar-work. The oxidation of the oil gradually hardens putty into a very dense adherent mass. When putty is required to dry quickly, boiled oil and sometimes litharge and other driers are used. "Putty powder" or "polisher's putty" is oxide of tin in a state of fine division used for the polishing of glass, hard metals, granite, and similar substances.

PUY, LE, or more precisely LE PUY EN VELAY, chief town of the department of Haute-Loire, France, 252 miles from Paris by rail and 270 in a direct line, rises in the form of an amphitheater to a height of 2,050 feet above the sea-level upon Mont Anis, the hill that divides the left bank of the Dolézon from the right bank of the Borne (a rapid stream which joins the Loire three miles below). The population of Puy in 1881 was 18,567. The trade is chiefly in cattle, woollens, grains, and vegetables. The principal manufacture is that of laces and blondes (in woolen, linen, cotton, silk, gold, and silver threads), which is carried on by 130,000 workmen in the neighborhood, the yearly turnover being \$5,000,000.

PUY DE DÔME, a department of central France, four-fifths of which belonged to Basse-Auvergne, one



sixth to Bourbonnais, and the remainder to Forez (Lyonnais), lies between  $45^{\circ} 17'$  and  $46^{\circ} 16'$  N. latitude and  $2^{\circ} 23'$  and  $4^{\circ}$  E. longitude. It is bounded on the north by Allier, on the east by Loire, on the south by Haute-Loire and Cantal, and on the west by Corrèze and Creuse. The chief town, Clermont-Ferrand, is 217 miles south of Paris in a direct line. The department contains important paper-mills, factories for lace and braid (in the mountains), for buntings, and camlets. Those for wool, cotton, and hemp contain 3,500 spindles and more than 400 looms. There are wool-carding works and factories for linens, cloths, and counterpanes—also silk-mills, tanneries, manufactories for chamois and other leathers, for caoutchouc, important sugar-works, starch-works, manufactures of edible pastes with a reputation as high as those of Italy, and manufactures of fruit-preserves. The saw-mills and the cheese industry in the mountains complete the list, which includes 201 establishments employing 75,553 persons. The department exports grain, fruits, cattle, wines, cheese, wood, and mineral waters. Traffic is carried on over 294 miles of Government roads, 9,591 miles of other roads, and 178 miles of railway. The department is crossed from north to south by the railway from Paris to Nîmes, and that of Vichy to Thiers; from west to east by that from Bordeaux to Lyons by Tulle, Clermont-Ferrand, and Thiers, with branches from Eygurande to Lagnac and from Vertaison to Billom. It is skirted on the northwest by the line from Montluçon to Gannat, with a branch line for goods to the mines of St. Éloi. Twenty thousand inhabitants of the department, belonging chiefly to the district of Ambert, leave it during winter and find work elsewhere as navvies, chimney-sweeps, pit-sawyers, etc. The department in 1881 contained 566,064 inhabitants and includes five arrondissements—CLERMONT-FERRAND (*q. v.*), Ambert (town, 3,940 inhabitants), Issoire (6,137), Riom (9,590), Thiers (10,583)—50 cantons, and 467 communes. It is attached to the bishopric of Clermont-Ferrand and to the Thirteenth Army Corps in the same town; the superior court is at Riom.

PYATIGORSK, a district town and watering-place of Caucasus, Russia, in the government of Terek, 124 miles by rail to the northwest of Vladikavkaz. It has now nearly 18,000 inhabitants (13,670 in 1882).

PYGMALION is the Greek form of a Phœnician name probably derived from the name of a god, פַּעַם (*C. I. S.*, par. i. t. i. p. 133). Pygmalion or, as Josephus writes, Phygmalion, brother of Dido (Elissa), has been spoken of in PHœNICIA. Another Pygmalion, son of Cilix and grandson of Agenor, King of Cyprus, is the subject of a famous story. He fell in love with an ivory statue he had made; Aphrodite granted life to the image, and Pygmalion married the miraculously born virgin, (Ovid, *Metam.*, x. 243 *seq.*).

PYGMIES. The name "pigmy" (Greek *πυγμαῖος*, from *πυγμή*) means one whose height is measured by the distance between the elbow and the knuckles of an ordinary man, or rather less than an ell. The pygmies appear in Homer (*Il.*, iii. 6) as a tiny folk who dwelt by the streams of Ocean in the far southern land whither the cranes fly at the approach of our northern winter. The cranes made war on them and slaughtered them. These battles between the pygmies and the cranes are often mentioned by later writers and are frequently represented on vases. Philostratus describes a picture of the sleeping Hercules beset by swarms of pygmies, as Gulliver was by the Lilliputians. Aristotle held that the pygmies were a race of little men inhabiting the marshes out of which he supposed the Nile to flow. Other writers localized them in various parts of the world. Ctesias describes at some length a race

of pygmies in the heart of India. They were black and ugly; the tallest of them were only two ells high; their hair and beards were so long that they served them as garments; they were excellent bowmen, and hunted hares and foxes with hawks, ravens, and eagles; their language and customs were those of the rest of the Indians, and they were very honest; their cattle were small in proportion.

PYM, JOHN, was born at Brymore, in Somerset, England, in 1584. His wife, Anna Hooker, died in 1620, and in the following year he entered parliament for the first time as member for Calne.

Pym's name was first prominently brought forward by his speech of November 8, 1621, directed against the Catholics.

After the dissolution Pym was confined for three months in his house in London. In the following parliament he pleaded for the execution of the penal laws against recusants and for the restoration of the silenced Puritan clergy. He was beaten at the time, but his defeat was full of promise for the future. It is much in a man's favor that he is ready to look a difficulty fully in the face. It is characteristic of Pym that nothing is heard of him either during the riotous proceedings in which this parliament closed or during the eleven years which passed without a parliament at all. He had neither the virtue nor the failings which accompany excitability of temperament.

With the Short Parliament Pym's three and a half years of authority begin.

With the dissolution of the Short Parliament Pym once more sinks out of sight. There is, however, good reason to suppose that the summer months of 1640 were for him a time of unusual activity, and that he was a leading spirit in those negotiations with the Scots the exact nature of which cannot now be traced. At all events in the end of August he was in close communication with the leaders of the opposition, and he then drew up, in coöperation with St. John, the petition in which twelve peers demanded the redress of grievances and the summoning of parliament. The rout of Newburn gave emphasis to the language of the peers, and on November 3, 1640, the Long Parliament met.

Pym's leadership of the Commons rested on his sympathy with the feelings of the House, combined with his skill in directing those feelings into a practical course.

The struggle within the House itself was the least part of Pym's labors. In meeting the army plot and the other intrigues of the court he had to develop the powers of a commissioner of police, to be as ready in collecting and sifting information as he was prompt in counteracting the danger which he feared. Charles' attempt to arrest Pym and four other members on January 4, 1642, embittered but did not produce the conflict. For some months there was much fencing between the two parties, and the Civil War was not begun till Charles raised his standard at Nottingham.

During the remaining months of Pym's life he was the most prominent leader of the war party in the House of Commons.

Pym prepared the way for the immediate victory of his party by summoning the Scots and by the financial measures which made the campaigns of 1644 and 1645 possible.

He did not, however, live to reap the harvest which was due to his efforts. Worn out by the strain of constant and agitating work, his health broke down, and on December 8, 1643, he died. His body was followed by both Houses when it was carried to be interred in Westminster Abbey.

PYRAMID. This name for a class of buildings,

though first taken from a part of the structure, and mistakenly applied to the whole of it by the Greeks, has now so far acquired a more definite meaning in its geometrical sense that it is desirable to employ it in that sense alone. A pyramid should therefore be understood as meaning a building bounded by a polygonal base and plane triangular sides which meet in an apex. Such a form of architecture is only known in Middle Egypt, and there only during the period from the IVth to the XIIth Dynasty (before 2000 B.C)—having square bases and angles of about  $50^\circ$ . In other countries various modifications of the tumulus, barrow, or burial-heap have arisen which have come near to this type; but these when formed of earth are usually circular, or, if square, have a flat top, and when built of stone are always in steps or terraces.

Turning now to the architecture of the buildings, their usual construction is a mass of masonry composed of horizontal layers of rough-hewn blocks, with a small amount of mortar; and this mass in the later forms became more and more rubbly, until, in the VIth Dynasty, it was merely a cellular system of retaining walls of rough stones and mud, filled up with loose chips, and in the XIIth Dynasty the bulk was of mud bricks. Whatever was the hidden material, however, there was always on the outside a casing of fine stone, elaborately finished, and very well joined; and the inner chambers were of similar good work. Indeed the construction was in all cases so far sound that, had it not been for the spite of enemies and the greed of later builders, it is probable that every pyramid would have been standing in good order at this day. The casings were not mere "vener" or "film," as they have been called, but were of massive blocks, usually greater in thickness than in height, and in some cases (as at South Dahshur) reminding the observer of horizontal leaves with sloping edges.

Inside of each pyramid, always low down, and usually below the ground-level, was built a sepulchral chamber; this was reached in all cases by a passage from the north, sometimes beginning in the pyramid face, sometimes descending into the rock on which the pyramid was built in front of the north side. This chamber, if not cut in the rock altogether (as in Menkaura's), or a pit in the rock roofed with stone (as in Khafra's), was built between two immense walls which served for the east and west sides, and between which the north and south sides and roofing stood merely in contact, but unbonded. The gable roofing of the chambers was formed by great sloping cantilevers of stone, projecting from the north and south walls, on which they rested without pressing on each other along the center ridge; thus there was no thrust, nor were there any forces to disturb the building; and it was only after the most brutal treatment, by which these great masses of stone were cracked asunder, that the principle of thrust came into play, though it had been provided for in the sloping form of the roof, so as to delay as long as possible the collapse of the chamber.

Of the architectural peculiarities of some particular pyramids some notice must now be given. The great pyramid of Gizeh (Khufu's) is very different in its internal arrangements from any other known. The greater number of passages and chambers, the high finish of parts of the work, and the accuracy of construction all distinguish it. The chamber which is most normal in its situation is the subterranean chamber; but this is quite unfinished, hardly more than begun. The upper chambers, called the "king's" and "queen's," were completely hidden, the ascending passage to them having been closed by plugging blocks, which concealed the point where it branched upward out of the roof of the

long descending passage. Another passage, which in its turn branches from the ascending passage to the queen's chamber, was also completely blocked up. The object of having two highly-finished chambers in the mass may have been to receive the king and his co-regent (of whom there is some historical evidence), and there is very credible testimony to a sarcophagus having existed in the queen's chamber, as well as in the king's chamber. The accuracy of work is such that the four sides of the base have only a mean error of six-tenths of an inch in length and twelve seconds in angle from a perfect square.

The second pyramid of Gizeh has two separate entrances (one in the side, the other in the pavement) and two chambers (one roofed with slabs, the other all rock-hewn); these chambers, however, do not run into the masonry, the whole bulk of which is solid so far as is known. This pyramid has a part of the original casing on the top; and it is also interesting as having the workmen's barracks still remaining at a short distance on the west side, long chambers capable of housing about 4,000 men. The great bulk of the rubbish from the work is laid on the south side, forming a flat terrace level with the base, and covering a steep rock escarpment which existed there. The waste heaps from the great pyramid were similarly tipped out over the cliff on its northern side. Thus the rubbish added to the broad platform which set off the appearance of the pyramids; and it has remained undisturbed in all ages, as there was nothing to be got out of it. The third pyramid was cased around the base with red granite for the sixteen lowest courses. The design of it has been enlarged at one bound from a small pyramid (such as those of the family of Khufu) to one eight times the size, as it is at present; the passages needed therefore to be altered. But there is no sign of gradual steps of enlargement: the change was sudden, from a comparatively small design to a large one. The basalt sarcophagus of this pyramid was ornamented with the panel decoration found on early tombs, unlike the granite sarcophagi of the two previous pyramids, which are plain. Unhappily it was lost at sea in 1838.

On the vexed question of inscriptions on the pyramids it will suffice to say that not one fragment of early inscription is known on the casing of any pyramid, either *in situ* or broken in pieces. Large quantities of travelers' "graffiti" doubtless existed, and some have been found on the casing of the great pyramid; these probably gave rise to the accounts of inscriptions, which are expressly said to have been in many different languages.

The mechanical means employed by the pyramid-builders have been partly ascertained. The hard stones, granite, diorite, and basalt were in all fine work sawn into shape by bronze saws set with jewels (either corundum or diamond), hollows were made (as in sarcophagi) by tubular drilling with tools like our modern diamond rock-drills (which are but reinvented from ancient sources), and small articles were turned in lathes fitted with mechanical tool-rests and jewel-pointed tools. The details of the questions of transport and management of the large stones remain still to be explained.

PYRENEES, a range of mountains stretching with a general trend  $18^\circ$  to the north of west between France and Spain, from Cape Creus, or more properly Cape Cerbera, on the Mediterranean to the Bay of Biscay. The length of the range is about 240 miles, the greatest breadth little more than fifty miles (exclusive of the lower parallel ranges on the Spanish side), and the area covered by it about 13,000 square miles. For the most part the crest of the main chain

constitutes the Franco-Spanish frontier; the principal exception to this rule is formed by the valley of Aran, which, belonging orographically to France but politically to Spain, is closed at the head by a transverse ridge running north and south and connecting the eastern and western halves of the chain.

PYRÉNÉES, the name of three departments in the south of France.

1. BASSES-PYRÉNÉES, a department of southwestern France, at the angle of the Bay of Biscay, was formed in 1790, two-thirds of it from Béarn and the rest from three districts of Gascony—Navarre, Soule, and Labourd—which together constitute the Basque region of France. The department lies between  $42^{\circ} 46'$  and  $43^{\circ} 36'$  N. latitude and between  $0^{\circ} 6'$  E. and  $1^{\circ} 47'$  W. longitude, and is bounded on the north by Landes and Gers, on the east by Hautes-Pyrénées (which has two enclaves, forming five communes, within this department), on the south by Spain, and on the west by the ocean.

The department is mainly agricultural, 287,719 of its inhabitants being dependent on this industry (Reclus). Forest management receives careful attention. The number of inhabitants employed in manufactures is 67,455. There are mines of anthracite, copper, iron, lead, zinc, silver, and kaolin in small quantity. The salt produced amounted to 9,663 tons and is used partly for the famous Bayonne hams (so-called, but really prepared in the neighborhood of Orthez). The department has valuable mineral springs. The population in 1881, was 432,999 (57 per square kilometer), almost entirely Catholic. There are five arrondissements—Pau, Bayonne, Oloron, Orthez (population of town, 4,567), and Mauléon (2,038), divided into 40 cantons, and 558 communes. Basses-Pyrénées constitutes the diocese of Bayonne, and is attached to the superior court of Pau and belongs to the district of the 18th Army Corps (Bordeaux).

2. HAUTES-PYRÉNÉES, a department of southern France, on the Spanish frontier, was formed in 1790, half of it being taken from Bigorre and the remainder from Armagnac, Nébouzan, Astarac, and Quatre Vallées, districts which all belonged to the province of Gascony, and is bounded on the south by Spain, on the west by Basses-Pyrénées, on the northwest by Landes, on the northeast by Gers, and on the east by Haute-Garonne. The formerly extensive forests have suffered considerably from the weather and other causes. Vines, trained upon trees as in Italy, yield on an average 2,464,000 gallons of wine annually. On the lower slopes chestnut trees and fruit trees take the place of the vines. There are various quarries of fine marble, which are sawn and worked at Bagnères, and numerous slate quarries. The mines of iron, nickel, lead, cobalt, manganese, and zinc are worked only irregularly. There is no coal, but a few hundred tons of peat are annually extracted. The mineral waters of Hautes-Pyrénées are numerous and much resorted to. The population in 1886 was 234,825. There are three arrondissements, those of Tarbes (chief town), Argelès (town, 1,682 inhabitants), and Bagnères de Bigorre (7,634 inhabitants), 26 cantons, 480 communes. Hautes-Pyrénées constitutes the diocese of Tarbes, and is attached to the superior court of Pau and to the 18th Army Corps (Bordeaux).

3. PYRÉNÉES-ORIENTALES, a department of southern France, bordering on the Mediterranean and the Spanish frontier, was formed in 1790 out of the old province of Roussillon and to some slight extent out of small portions of Languedoc. It lies between  $42^{\circ} 20'$  and  $42^{\circ} 56'$  N. latitude and  $1^{\circ} 43'$  and  $3^{\circ} 10'$  E. longitude and is bounded on the north by Ariège and Aude, on the east by the Mediterranean, on the south by Catalonia, and on the west by Ariège. The main source of wealth

of the department is its wine, of which 48,840,000 gallons were produced in 1881; some kinds are strongly alcoholic and others are in request as liquor wines (Rivesaltes, Banyuls). Market-gardening (artichoke, asparagus, tomatoes, melons) and fruit culture (peaches, apricots, plums, pears, quinces, pomegranates, almonds, apples, cherries, walnuts, chestnuts) yield abundant returns. The woods produce timber for the cabinet-maker, cork, and bark for tanning. In iron Pyrénées-Orientales is one of the richest departments in France. The greater part of the ore is transported to Aveyron, Gard, or Allier, but 25,000 tons are smelted in blast-furnaces and 1,800 in Catalonian forges within the department. In 1886 the population of Pyrenees-Orientales amounted to 211,187, the majority of whom were Catalans in speech and the rest Provençal. The chief towns of the three arrondissements are PERPIGNAN (*q.v.*), Céret (3,104 inhabitants), and Prades (3,687); there are 17 cantons and 231 communes. The department constitutes the diocese of Perpignan and is attached to the superior court and army corps of Montpellier.

PYRITES (from  $\pi\upsilon\rho$ , fire), a name applied to the native bisulphide of iron, which occurs as a yellow metallic mineral, sufficiently hard to emit sparks when struck with either flint or steel. Nodules of pyrites are common in the lower beds of Chalk, and fragments of these nodules have occasionally been found on prehistoric sites under circumstances which suggest that the mineral was used as a fire-producing medium at a very early period of human culture. Even in late historic times it was often employed instead of flint, as in some of the old wheel-lock guns, whence it came to be known in France as "pierre d'arquebuse." It was afterward found that pyrites might be made available as a source of sulphur, oil of vitrol, and other chemical products.

By modern mineralogists the term "pyrites" has been extended to a number of metallic sulphides, and it is therefore now used rather as a group-name than as the specific designation of a mineral. Hence the typical pyrites is often distinguished as "iron pyrites," while other members of the group are known as "copper pyrites," "cobalt pyrites," "arsenical pyrites," etc.

PYRMONT. See WALDECK.

PYROMETER, an instrument for measuring high temperatures.

The most convenient form of the instrument for general use is Jolly's. The two vertical tubes of the manometer are connected by an india-rubber tube properly strengthened by a cotton covering, and they can be made to slide vertically up and down a wooden pillar which supports them; they are provided with clamps for fixing them in any position and a tangent screw for fine adjustment. The connection between the bulb and the manometer is made by means of a convenient three-way tap. The scale of the instrument is engraved on the back of a strip of plane mirror before silvring, and the divisions are carried sufficiently far across the scale for the reflections of the two surfaces of the mercury to be visible behind the scale. Parallax can thus be avoided and an accurate reading obtained without the necessity of using a kathetometer. In order to allow for the expansion of the glass of the reservoir a weight-thermometer bulb is supplied with the instrument, made from another specimen of the same kind of glass, and the relative expansion of the mercury and the glass can thus be determined by the observer himself. The volume of the air-bulb and that of the capillary tube and the small portion of the manometer tube above the small back of glass, the point of which serves as the fiducial mark, are determined by the instrument-makers. A similar instrument with a bulb

which will resist higher temperatures may be used beyond the softening-point of glass.

PYROTECHNY is the art of producing pleasing scenic effects by means of fire. It is not held to include the manufacture of inflammable and explosive substances for other purposes. The use of fireworks for purposes of display is not a modern invention, for it appears to have existed in China in very ancient times; but the secret of constructing them remained unknown in Europe till about the thirteenth century, when the knowledge of gunpowder crept in from the East. In modern times the art has been gradually improved by the work of specialists, who have had the advantage of being guided by scientific knowledge. The value of such knowledge to the pyrotechnist is extremely great; for he must be governed by the principles of chemistry in the selection of his materials, and his various contrivances for turning them to the best account are subject to the laws of mechanics. As in all such cases, however, science is useless without the aid of practical experience and acquired manual dexterity.

The number of fire mixtures actually employed is very great; for the requirements of each variety of firework, and of almost each size of each variety, are different. Moreover, every pyrotechnist has his own taste in the matter of compositions. They are capable, however, of being classified according to the nature of the work to which they are suited. Thus there are rocket-fuses, gerbe-fuses, squib-fuses, star-compositions, etc.; and, in addition, there are a few which are essential in the construction of most fireworks, whatever the main composition may be. Such are the *starting-powder*, which first catches the fire, the *bursting-powder*, which causes the final explosion, and the *quick-match* (cotton wick, dried after being saturated with a paste of gunpowder and starch), employed for connecting parts of the more complicated works and carrying the fire from one to another. Of the general nature of fuses an idea may be had from the following two examples, which are selected at hazard from among the numerous recipes for making, respectively, tourbillion fire and green stars:

<i>Tourbillion.</i>	<i>Green Stars.</i>
Meal gunpowder.....24 parts.	Chlorate of potash....16 parts.
Niter .....10 "	Nitrate of baryta .....48 "
Sulphur .....7 "	Sulphur .....12 "
Charcoal.....4 "	Charcoal .....1 "
Steel filings.....8 "	Shellac .....5 "
	Calomel .....8 "
	Sulphide of copper....2 "

The following is a brief description of some of the forms of firework most employed:

*Fixed Fires.*—*Theater fires* consist of a slow composition which may be heaped in a conical pile on a tile or a flagstone and lit at the apex. They require no cases. Usually the fire is colored, green, red, or blue; and beautiful effects are obtained by illuminating buildings with it. It is also used on the stage; but, in that case, the composition must be such as to give no suffocating poisonous fumes. *Bengal lights* are very similar, but are piled in saucers, covered with gummed paper, and lit by means of pieces of match. *Marroons* are small boxes wrapped round several times with lind cord and filled with a strong composition which explodes with a loud report. They are generally used in *batteries*, or in combination with some other form of firework. *Squibs* are straight cylindrical cases about six inches long, firmly closed at one end, tightly packed with a strong composition, and capped with touch-powder. Usually, a little bursting-powder is put in before the ordinary composition, so that the fire is finished by an explosion. The character of the fire is, of course, sus-

ceptible of great variation in color, etc. *Crackers* are characterized by the cases being doubled backward and forward several times, the folds being pressed close and secured by twine. One end is primed; and when this is lit the cracker burns with a hissing noise, and a loud report occurs every time the fire reaches a bend. If the cracker is placed on the ground, it will give a jump with each report; so that it cannot quite fairly be classed among the fixed fireworks. *Roman candles* are straight cylindrical cases filled with layers of composition and stars, alternately. These stars are simply balls of some special composition, usually containing metallic filings, made up with gum and spirits of wine, cut to the required size and shape, dusted with gunpowder, and dried. They are discharged like blazing bullets several feet into the air, and produce a beautiful effect which may be enhanced by packing stars of differently colored fire in one case. *Gerbes* are choked cases; not unlike Roman candles, but often of much larger size. Their fire spreads like a sheaf of wheat. They may be packed with variously colored stars, which will rise thirty feet or more. *Lances* are small straight cases charged with composition like those used for making stars. They are mostly used in complex devices, for which purposes they are fixed with wires on suitable wooden frames. They are connected by *leaders*, i.e., by quick-match inclosed in paper tubes, so that they can be regulated to take fire all at the same time, singly, or in detachments, as may be desired. The devices constructed in this way are often of an extremely elaborate character; and they include all the varieties of *lettered designs*, of *fixed suns*, *fountains*, *palm-trees*, *waterfalls*, *mosaic work*, *Highland tartan*, etc.

*Rotating Fireworks.*—*Pin or Catherine wheels* are long paper cases filled with a composition by means of a funnel and packing-wire, and afterward wound round a disk of wood. This is fixed by a pin, sometimes vertically and sometimes horizontally; and the outer primed end of the spiral is lit. As the fire escapes the recoil causes the wheel to revolve in an opposite direction, and often with considerable velocity. *Pastiles* are very similar in principle and construction. Instead of the case being wound in a spiral, and made to revolve round its own centre point, it may be used as the engine to drive a wheel or other form of framework round in a circle. Many varied effects are thus produced, of which the *fire-wheel* is the simplest. Straight cases, filled with some fire-composition, are attached to the end of the spokes of a wheel or other mechanism capable of being rotated. They are all pointed in the same direction at an angle to the spokes, and they are connected together by leaders, so that each, as it burns out, fires the one next to it. The pieces may be so chosen that brilliant effects of changing color are produced; or various fire-wheels of different colors may be combined, revolving in different planes and different directions—some fast and some slowly. *Bisecting wheels*, *plural wheels*, *caprice wheels*, *spiral wheels*, are all more or less complicated forms; and it is possible to produce, by mechanism of this nature, a model in fire of the solar system.

*Ascending Fireworks.*—*Tourbillions* are fireworks so constructed as to ascend in the air and rotate at the same time, forming beautiful spiral curves of fire. The straight cylindrical case is closed at the center and at the two ends with plugs of plaster of paris, the composition occupying the intermediate parts. The fire finds vent by six holes pierced in the case. Two of these are placed close to the ends, but at opposite sides, so that one end discharges to the right and the other to the left; and it is this which imparts the rotary motion. The

other holes are placed along the middle line of what is the under-surface of the case when it is laid horizontally on the ground; and these, discharging downward, impart an upward motion to the whole. A cross-piece of wood balances the tourbillion; and the quick-match and touch-paper are so arranged that combustion begins at the two ends simultaneously and does not reach the holes of ascension till after the rotation is fairly begun. The *sky-rocket* is generally considered the most beautiful of all fireworks; and it certainly is the one that requires most skill and science in its construction. It consists essentially of two parts—the body and the head. The body is a straight cylinder of strong pasted paper and is choked at the lower end, so as to present only a narrow opening for the escape of the fire. The composition does not fill up the case entirely, for a central hollow conical bore extends from the choked mouth up the body for three-quarters of its length. This is an essential feature of the rocket. It allows of nearly the whole composition being fired at once; the result of which is that an enormous quantity of heated gases collects in the hollow bore, and the gases, forcing their way downward through the narrow opening, urge the rocket up through the air. The top of the case is closed by a plaster-of-paris plug. A hole passes through this and is filled with a fuse, which serves to communicate the fire to the head after the body is burned out. This head, which is made separately and fastened on after the body is packed, consists of a short cylindrical paper chamber with a conical top. It serves the double purpose of cutting a way through the air and of holding the *garniture* of stars, sparks, crackers, serpents, gold and silver rain, etc., which are scattered by bursting fire as soon as the rocket reaches the highest point of its path. A great variety of beautiful effects may be obtained by the exercise of ingenuity in the choice and construction of this garniture. Many of the best results have been obtained by unpublished methods which must be regarded as the secrets of the trade. The *stick* of the sky-rocket serves the purpose of guiding and balancing it in its flight; and its size must be accurately adapted to the dimensions of the case. In *winged* rockets the stick is replaced by cardboard wings, which act like the feathers of an arrow. A *girandole* is the simultaneous discharge of a large number of rockets (often from 100 to 200), which either spread like a peacock's tail or pierce the sky in all directions with rushing lines of fire. This is usually the final feat of a great pyrotechnic display.

**PYRRHUS.** The name of Pyrrhus, king of Epirus, owes its chief fame in history to the fact that with his invasion of Italy in the early part of the third century B.C. Greece and Rome for the first time came definitely into contact. Born about the year 318, and claiming descent from Pyrrhus, the son of Achilles, connected also with the royal family of Macedonia through Olympias, the mother of Alexander the Great, he became when a mere stripling king of the wild mountain tribes of Epirus, and learned how to fight battles in the school of Demetrius Poliorcetes (the Besieger) and of his father Antigonus. In 273 he was invited into the Peloponnesus to settle at the sword's point a dispute about the royal succession at Sparta. He besieged the city, but was repulsed with great loss. Next he went to Argos at the invitation of a political faction, and here in the confusion of a fight by night in the streets he met his death in his forty-sixth year from the hand of a woman, who hurled a ponderous roof-tile upon his head.

Pyrrhus was no doubt a brilliant and dashing soldier, but he was aptly compared "to a gambler who made many good throws with the dice, but could not make

the proper use of the game." There was something chivalrous about him which seems to have made him a general favorite. After his death Macedonia had for a time at least nothing to fear, and the liberty of Greece was quite at the mercy of that power.

**PYTHAGORAS AND PYTHAGOREANS.** Pythagoras is one of those figures which have so impressed the imagination of succeeding times that their historical lineaments are difficult to discern through the mythical haze that envelops them. The authentic details of his career are meager enough and merely approximate in character. He was a native of Samos, and the first part of his life may therefore be said to belong to that Ionian seaboard which had already witnessed the first development of philosophic thought in Greece. The exact year of his birth has been variously placed between 586 and 569 B.C., but 582 may be taken as the most probable date. There is thus little more than conjecture to fill out the first half of the philosopher's life. The historically important part of his career begins with his emigration to Crotona, one of the Dorian colonies in the South of Italy. Nothing is known with certainty of the reasons that led to this step, which he appears to have taken about the year 529; perhaps the ethical temper which can be traced in the Pythagorean school attracted the founder toward the sterner Dorian character. At Crotona Pythagoras speedily became the center of a widespread and influential organization, which seems to have resembled a religious brotherhood or an association for the moral reformation of society much more than a philosophic school. Pythagoras appears, indeed, in all the accounts more as a moral reformer than as a speculative thinker or scientific teacher; and it is noteworthy that the only one of the doctrines of the school which is definitely traceable to Pythagoras himself is the ethico-mystical doctrine of transmigration. The aim of the brotherhood was the moral education and purification of the community; and it seems to have been largely based upon a revival of the Dorian ideal of abstinence and hardihood along with certain other traits of a more definitely religious character, which were probably due to the influence of the mysteries. But many details of life and ritual, such as abstinence from animal food and from beans, celibacy, and even community of goods, have been fathered by the organized asceticism of a later period upon the original followers of Pythagoras. Ethics, according to the Greek and especially according to the Dorian conception, being inseparably bound up with the general health of the state, we are not surprised to find the Pythagoreans represented as a political league; nor is it wonderful that their following was among the aristocracy, and that they formed the staunchest supporters of the old Dorian constitutions. It is unfair, however, to speak of the league as primarily a political organization, wide though its political ramifications must latterly have become. Its entanglement with politics was in the end fatal to its existence. The authorities differ hopelessly in chronology, but according to the balance of evidence the first reaction against the Pythagoreans took place in the lifetime of Pythagoras himself after the victory gained by Crotona over Sybaris in the year 510. Dissensions seem to have arisen about the allotment of the conquered territory, and an adverse party was formed in Crotona under the leadership of Cylon. This was probably the cause of Pythagoras's withdrawal to Metapontum, which an almost unanimous tradition assigns as the place of his death in the end of the sixth or the beginning of the fifth century. The league appears to have continued powerful in Magna Græcia till the middle of the fifth century, when it was violently trampled out by the successful democrats. The meeting-houses of the Pytha-

goreans were everywhere sacked and burned; mention is made in particular of "the house of Milo" in Crotona, where fifty or sixty of the leading Pythagoreans were surprised and slain. The persecution to which the brotherhood was subjected throughout Magna Græcia was the immediate cause of the spread of the Pythagorean philosophy in Greece proper.

As the introduction of geometry into Greece is by common consent attributed to Thales, so all are agreed that to Pythagoras is due the honor of having raised mathematics to the rank of a science. We know that the early Pythagoreans published nothing, and that, moreover, they referred all their discoveries back to their master. (See PHILOLAUS.) Hence it is not possible to separate his work from his early disciples. We know that Pythagoras made numbers the basis of his philosophical system, as well physical as metaphysical, and that he united the study of geometry with that of arithmetic.

PYTHEAS of Massilia was a celebrated Greek navigator and geographer, to whom the Greeks appear to have been indebted for the earliest information they possessed, of at all a definite character, concerning the western regions of Europe, and especially the British Islands. The period at which he lived cannot be accurately determined; but it is certain that he wrote before Eratosthenes, who relied much upon his

authority, but before Dicæarchus, who was a pupil of Aristotle, and died about 285 B.C.

PYTHON, a genus of gigantic snakes inhabiting the tropical parts of Africa and Asia, and known in some parts of the British possessions by the name of "rock snakes." On account of their general appearance, beautifully-marked skin, large size, and similarity of habits they are frequently confounded with the true boas of the New World and misnamed "boa-constrictors." They differ from them, however, by having a double row of scutes under the tail, pits in the shields round the margins of the upper and lower jaws, and teeth in the intermaxillary bone.

Africa is inhabited by three species (*Python seba*, *P. regius*, and *P. natalensis*), and Asia by two (*Python molurus* and *P. reticulatus*), the former of these two species being found on the continent of India and in Ceylon, the latter in the large islands of the Archipelago and in the Malayan Peninsula. In Australasia and New Guinea similar snakes occur, but they are of much smaller size and differ in essential structural characters from the rock-snakes. These latter are among the largest of living reptiles; although their dimensions and strength have been much exaggerated, specimens of eighteen and twenty feet have been brought to Europe, and reliable statements of the occurrence of individuals which measured thirty feet are on record.

## Q.

**Q** was written in Greek with the straight stroke vertical, Ϟ, as in the Phœnician alphabet from which it was borrowed, and was called koppa, the equivalent of the Hebrew koph. It is found sparingly on some old inscriptions of Rhodes, of some of the Ægean islands, of Corinth and of Syracuse, and most frequently in the Chalcidian colonies of Sicily and Italy. But it was soon supplanted by kappa, and survived only in numeration as the representative of the number 90. It went to Rome with the Chalcidian alphabet of Cumæ, and was written at first with the vertical line; but the stroke soon became slant, so that the symbol got the form it still retains (Q).

There is a slight but real distinction of sound between the so-called palatal and velar *k*. The first is the ordinary *k*, for which the back of the tongue is raised against the back part of the hard palate. The second is produced by raising the tongue against the soft palate or *velum palati*, that is, rather farther back in the mouth. This sound has a tendency to be accompanied by a slight rounding of the lips; this causes an equally slight *w* sound after the *k*. It is probable that the velar *k* with this parasitic *w* was in use for a time in Greece, and that it was represented by the koppa; the symbol would otherwise have been totally unnecessary, also the koppa is generally followed by *u* or *o*, which on this view, is natural. We know that in Greece *kw* must have been an intermediate sound between *k* and *p* in words where *k* was labialized, such as ἔπομαι from root *sak* (see under K.) But this intermediate sound was not retained in language: either the *w* was dropped and the sound reverted to *k*, or *p* was produced by the assimilating force of the *w*; therefore all need for a symbol koppa vanished. But in Latin the middle step remained, as in *sequor*; therefore the symbol was needed. But the parasitic sound became a complete *w*; and to denote this *v* was regularly written after the *q*. Therefore even in Latin the symbol was really otiose, for *qv* would have been quite sufficient, and did actually suffice for the Umbrian and Oscan, which never possessed the *q*. In old inscriptions we find *q* alone when the following vowel is *u*, as in *Mircurios*, *pequnia*. In later times when *o* passed by weakening into *u*, a preceding *qu* was written *c*; thus *quom* became *cum*, to avoid the double *u* of *quum*. The *qu* of the Latin naturally passed on into the Romantic languages. It passed into the Teutonic languages in borrowed words, such as *quart*, but made its way into Teutonic words also; thus, in English, *cwén*, *cowellan* are now spelt *queen*, *quell*.

**QUADRILATERAL**, a military term applied to any combination of four fortresses mutually supporting each other, but especially to that of the four fortified towns of Mantua, Peschiera, Verona, and Legnago, the two former of which are situated on the Mincio and the two latter on the Adige. The real value of the Quadrilateral, which gave Austria such a firm hold on Lombardy, lay in the extraordinary natural strength of Mantua and in the readiness with which troops and supplies could

be poured into Verona from the north. (See "The Quadrilateral," in the *Cornhill Magazine*, 1862; and Professor Malfatti, *Il Quadrilatero*, Milan, 1866.)

**QUADRUMANA**. See MAMMALIA and APE.

**QUÆSTOR** was the title of a Roman magistrate whose functions, at least in the later times of the republic, were mainly financial. The origin of the quæstorship is somewhat obscure, but on the whole it was probably instituted simultaneously with the consulship in 509 B.C. The number of the quæstors was originally two, but this was successively increased to four (in 421 B.C.), eight (in 267 or 241 B.C.), and by Sulla (in 81 B.C.) to twenty. Caesar raised the number to forty (in 45 B.C.), but Augustus reduced it again to twenty, which remained the regular number under the empire.

**QUAGGA**, or **COUAGGA**, an animal of the genus *Equus* (see HORSE), nearly allied to the zebra, which formerly was met with in vast herds on the plains of South Africa between the Cape Colony and the Vaal river, but now, in common with most of the larger wild animals of that region, becoming extremely scarce, owing to the encroachment of European civilization. In length of ears and character of tail it more resembles the horse than it does the ass, although it agrees with the latter in wanting the small bare callosity in the inner side of the hind leg, just below the hock, characteristic of the horse. The color of the head, neck, and upper parts of the body is reddish-brown, irregularly banded and marked with dark brown stripes, stronger on the head and neck and gradually becoming fainter until lost behind the shoulder. There is a broad dark median dorsal stripe. The under surface of the body, the legs, and tail are nearly white, without stripes. The crest is very high, surmounted by a standing mane, banded alternately brown and white. Though never really domesticated, quaggas have occasionally been trained to harness.

**QUAIL**, a very well known bird throughout almost all countries of Europe, Asia, and Africa—in modern ornithology the *Coturnix communis* or *C. dactylisonans*. This last epithet was given from the peculiar three-syllabled call-note of the cock, which has been grotesquely rendered in several European languages, and in some parts of Great Britain the species is popularly known by the nickname of "Wet-my-lips" or "Wet-my-feet." The Quail varies somewhat in color, and the variation is rather individual than attributable to local causes; but generally the plumage may be described as reddish-brown above, almost each feather being transversely patched with dark brown interrupted by a longitudinal stripe of light buff; the head is dark brown above, with three longitudinal streaks of ochreous-white; the sides of the breast and flanks are reddish-brown, distinctly striped with ochreous-white; the rest of the lower parts are pale buff, clouded with a darker shade, and passing into white on the belly. The cock, besides being brighter in tint, not infre-

quently has the chin and a double-throat band of reddish or blackish brown, which marks are wanting in the hen, whose breast is usually spotted.

America has some fifty or sixty species of birds which are commonly deemed quails, though by some authors placed in a distinct family or sub-family, *Odontophorinae*. The best known is the Virginian quail, or colin, as it is frequently called—that being, according to Hernandez, its old Mexican name. It is the *Ortyx virginianus* of modern ornithology, and has a wide distribution in North America, in some parts of which it is known as the "partridge," as well as by the nickname of "Bob White," aptly bestowed upon it from the call-note of the cock. Many attempts have been made to introduce this bird to England (as indeed similar trials have been made in the United States with quails from Europe); but, though it has been turned out by hundreds, and has frequently been known to breed after liberation, its numbers rapidly diminish until it wholly disappears. The beautiful tufted quail of California, *Lophortyx californica* has also been tried in Europe without success.

**QUAKERS.** The Quakers, or as they call themselves the Society of Friends, are a body of Christians small in number but presenting several features of interest.

*History.*—The history of Quakerism in England may conveniently be divided into four periods: (1) from the first preaching of Fox in 1648 to the establishing of a church organization in 1666; (2) from that date to the Revolution of 1688; (3) from the Revolution to 1835; and (4) from 1835 to the present time.

1. **GEORGE FOX** (*q.v.*), the son of a weaver of Drayton in Leicestershire, was the founder of the Quakers. He began to preach in 1648, and in a few years gathered around him a great body of followers and a considerable number of itinerant preachers like himself, who zealously promulgated his doctrines. Among these Edward Burrough was the most remarkable. In 1655 these preachers numbered seventy-three. Fox and his fellow-preachers spoke whenever opportunity offered—sometimes in churches, sometimes in barns, sometimes at market-crosses. There is some evidence to show that the arrangement of this mission, as it would now be called, rested mainly with Fox, and that the expenses of it and of the foreign missions were borne out of a common fund.

Some of the early Quakers indulged in eccentricities and extravagances of no measured kind. The activity and zeal of the early Quakers were not confined to England; they passed into Scotland and Ireland. Fox and others traveled to America and the West Indian Islands; another reached Jerusalem, and testified against the superstition of the monks.

2. The second period in the history of Quakerism is marked by the introduction into the body, hitherto unorganized, of an organization and a discipline principally due to the mind and energy of Fox, by a more scholarly and learned air given to the Quaker productions by the writings of William Penn and Robert Barclay, and by the part which the Quakers played in the colonization of New Jersey and of Pennsylvania.

During the whole time between the rise of the Quakers and the passing of the Toleration Act they were the objects of an almost continuous persecution, which they endured with extraordinary constancy and patience.

The passing of the Conventicle Act gave fresh vigor to the persecution of Dissenters. But on March 15, 1671-72, King Charles II. issued his declaration for suspending the penal laws in matters ecclesiastical, and shortly afterward by pardon under the great seal re-

leased above 400 Quakers from prison, remitted their fines, and released such of their estates as were forfeited by *præmunire*.

3. With the cessation of persecution in 1689 the zeal of the Quaker body abated. Foreign missions had no existence except in the occasional travels of some wandering minister.

Excluded from political life by the constitution of the country, excluding themselves not only from the frivolous pursuits of pleasure but from music and art in general, with no high average of literary education (though they produced some men of eminence in medicine and science, as Doctor Fothergill and Doctor Dalton), the Quakers occupied themselves largely with trade, the business of their society, and the calls of philanthropy. In the middle and latter part of last century they founded several institutions for the more thorough education of their children, and entered upon many philanthropic labors.

*Doctrine.*—It is not easy to state with certainty the doctrines of a body which has never adopted any creed, and whose views have undoubtedly undergone from time to time changes more or less definite. But the accepted writings of its members and the statements as to doctrine contained in the *Book of Christian Discipline* of the society furnish materials.

The most characteristic doctrine of Quakerism is undoubtedly this—that there is an immediate revelation of the Spirit of God to each individual soul, that this light is universal and comes both to the heathen and to the Christian, and thereby the love and grace of God toward mankind are universal. It is almost needless to call attention to the direct antithesis between this doctrine of the Quakers and the various doctrines of election held by the Puritans, so that, if Quakerism be called the climax of Puritanism, it is so only as the rebound is the climax of the wave. From the doctrine of the sufficiency of the inward light proceed several other of the peculiar views of Quakers. They have denied the necessity and abstained from the practice of the sacraments of baptism and the Lord's supper. The one baptism, says Barclay (twelfth proposition), "is a pure and spiritual thing, to wit, the baptism of the spirit and fire \* \* \* \* of which the baptism of John was a figure which was commanded for a time, and not to continue for ever." "The communion of the body and blood of Christ," says the same author (thirteenth proposition), "is inward and spiritual, which is the participation of his flesh and blood by which the inward man is daily nourished in the hearts of those in whom Christ dwells, of which things the breaking of bread by Christ with his disciples was a figure."

The Quakers not only have no stated ministry, but they hold that no form of worship is so good as a patient waiting upon God in silence "by such as find no outward ceremony, no observations, no words, yea not the best and purest words, even the words of Scripture, able to satisfy their weary and afflicted souls."

The result of these doctrines on Quaker manners was notorious, and proved a continual source of objection to them on the part of their fellow-men, and frequently led to persecutions. They adopted the singular number in addressing a single individual, however exalted; and the "thou" and "thee" used to a magistrate or judge was often a cause of great irritation. They refused to say "good night," "good morrow," or "good speed;" they adopted a numerical nomenclature for the months of the year and the days of the week. They refused to bow or to remove their hats, and for this they suffered much. They forbore the drinking of healths, not merely as a vanity, but as "a provocation to drink more than did people good." They adopted a remarkable simplicity in



their marriages and their funerals. They used also great plainness in their houses and furniture and in their dress; and, by their tenaciously adhering to forms of attire which had fallen into disuse, their dress both for men and women became antique and peculiar, and Quakers were easily recognized as such by the garments they wore. Furthermore they discarded the usual symbols of grief on the death of their relations.

One point of morality on which the Friends have long insisted deserves notice. They require their members who may have been released from their debts by bankruptcy or composition, when able to pay their debts in full, to do so notwithstanding their legal discharge.

In the great doctrines of Christianity embodied in the apostles' creed the Quakers are in accord with their fellow-Christians; they believe in the Father, Son, and Holy Spirit, in the atonement by Christ, and in sanctification by the Spirit; they receive and believe the Scriptures as proceeding from the Spirit of God.

*Statistics of Quakerism.*—The number of Quakers in England and Wales in 1680 was probably about 40,000, and in 1806 about 32,000. In 1883 the total number of members in England, Wales, and Scotland was returned as 15,219 (193 were in Scotland), an increase of 106 on the previous year, and the number of habitual attenders of meetings of the body, not members, was 5,380, an increase of 150. In Ireland there were, in 1883, 2,812 Quakers. The Quakers in America number probably (including all bodies which claim to be Friends) from 50,000 to 60,000 or upward. Besides these there are in Norway about 200, in France from 70 to 80, in Germany from 50 to 60, and in Australia and New Zealand from 500 to 600 Quakers.

QUANTAMPOH, or KUNTAMPOH, a town of the Gold Coast region of western Africa, situated about eighty miles northeast of Coomassie in  $7^{\circ} 36'$  N. latitude and  $1^{\circ} 4'$  W. longitude. According to Captain Brandon Kirby, who was the first white man to reach the place, it had in 1881 a resident population of 15,000, and traders passed through it to the number of about 25,000.

QUARANTINE (Fr. *quarantaine*, a period of forty days) is, in the original sense of the term, a thing of the past in the United Kingdom and in several of the other states of Europe, as well as in America. Its interest is therefore largely historical. In common usage, the same word is applied to the modern substitutes for quarantine, although these are a complete departure in principle or theory from the indiscriminate system of detention of ships and men, unloading of cargo in lazarets, fumigation of susceptible articles, and the like, which used to be carried to great lengths on account of the plague and in connection with the Levantine trade.

*Substitute for Quarantine.*—The modern practice is to detain or refuse "pratique" to no ship unless there be a communicable form of sickness on board, or there had been such during the voyage. It is the duty of the officers of customs to question the captain as to the existence of any catching disease among the passengers or ship's company; if there be any evidence or suspicion of communicable infection, the officers of customs report the same to the port sanitary authorities, who have power to deal with the case.

*Quarantine or its Substitutes in European Countries.*—The principle of inspection, and of isolation of the sick, as stated above, was accepted with small reservation by the sanitary conference of Vienna in 1874, and it is now more or less consistently acted upon by all the larger European maritime states except Spain and Portugal. In times of cholera panic, quarantine of the original kind has been imposed against all arrivals from an "infected country" by ports of the Levant and Black

Sea, and by several Mediterranean states besides Spain. But it is only in the ports of the Iberian Peninsula that the old quarantine traditions remain in force from year to year; and it is only for them that any special account need be given.

*Land Quarantine.*—A land quarantine on a frontier is still enforced on account of cholera from time to time in southern Europe, *e.g.*, in 1884 by Italy against France at Ventimiglia and Modena, and by Spain against France in the passes of the Pyrenees, and in 1885 by Portugal against Spain. The experiment occasionally succeeds. A "sanitary cordon" is the rigorous isolation (by troops) of a pestilence-stricken place from the country around. It is a survival from the times of the plague, and is of no use in cholera.

*Principles of Quarantine.*—Plague, yellow fever, and Asiatic cholera are the three great spreading diseases which have been successively the subject of quarantine restrictions. For many years *plague* has ceased to have any practical interest in this connection.

In the draft of an international bill of health which was adopted by the international sanitary congress at Washington in 1881 smallpox and typhus are scheduled along with plague, yellow fever, and cholera. Although there are few countries where *smallpox* has not obtained a footing, yet every seaport finds it advisable to prevent the free entrance of fresh cases. Thus Denmark, in 1884, took precautions against the importation of smallpox from the Thames. It is mostly in Australia, New Zealand, the Cape, and other colonies that quarantine against smallpox is rigorously carried out. Except for a limited outbreak in Sydney in 1884, that disease has been absolutely excluded from the Australasian colonies, thanks to their admirable quarantine establishments. The case is very different at the Cape, owing to the existence of a virulent native center of variolous disease at no great distance in the interior.

As regards *typhus*, the principles of prevention are entirely different from those that apply to smallpox. To make quarantine effective against typhus, it is necessary to keep in mind that the specific fever may be vicarious to a common condition of filth and general misery. It is a modified form of the same principle of vicarious infection that, in the historical retrospect, gives us the key to the much more important problem of yellow fever, a disease which is to be regarded as a special form of typhus.

*Principles of Quarantine against Yellow Fever.*—The first requirement in the quarantine doctrine of yellow fever is to know where the disease is endemic—that is to say, where its poison exists in such a form that it may rise in exhalations from the harbor mud, alluvial foreshores, or wharves and shipping quarters in general, or may enter the bilges of ships with the water. There is a natural reluctance on the part of seafaring communities in the western hemisphere to admit that they harbor the seeds of yellow fever; but some of the endemic foci of the disease are beyond dispute. The principal are Havana and Rio de Janeiro.

Wherever the line be drawn between endemic and non-endemic ports of yellow fever, it is only the latter that can in reason seek to impose quarantine against the disease. Of such are now the ports on the Atlantic seaboard of the United States, the ports of the River Plate, and the whole European seaboard. There is an overwhelming mass of testimony that the real risk of importing the yellow-fever virus is always in the foul bilges of wooden ships, which had been lying in one of the endemic yellow-fever harbors. The poison is sucked in through the ship's seams; it ferments or multiplies in her bilges, rises as miasmata to infect the hold

or 'tween decks, sometimes clinging to cargo, and perhaps making no sign until the cargo is all out. Again, in temperate latitudes the virus may be imported and do no harm, unless it meet with a tract of exceptionally hot weather, such as happened at Swansea in 1865. According to this principle, all iron ships, which have little or no bilge-water, and all clean ships whatsoever, are practically free from the risk of importing an epidemic of yellow fever, even although one or more of their passengers or crew may have developed the malady on the voyage, having come on board in the stage of its incubation. The only question of practical consequence in the case of iron steamships arises in connection with the modern practice of carrying water-ballast in tanks or compartments of the ship's bottom.

*Principles of Quarantine against Cholera.*—The peculiar dangers of cholera diffusion arise from the vomited and purged matters which are characteristic of the common type of the malady. Under certain circumstances the discharges of the sick are infective; they are probably not infective as they come from the body; but even minute quantities of the choleraic matters, if they have fermented in the ground, or in boxes and bundles of foul linen, bedding, or clothes, may exhale a virus which is often suddenly prostrating in its action. Thus every person with cholera, or even with choleraic diarrhoea in times of epidemic, is a source whence many more may be poisoned. When the choleraic matters percolate into wells or reservoirs the poisoning may be on a great scale. Cholera with such infective properties is an exotic to the soil of Europe and probably of all countries except south-eastern Asia; and, if the infective discharges of cholera patients from the East were kept out of Western soil, no choleraic disease would be likely to become epidemic on the latter. But in the great majority of instances the quarantines against cholera have been "elaborate illustrations of leakiness." Island communities have the best chances of succeeding; but in the case of the British Islands the attempt has been abandoned as impracticable. In 1874 the international sanitary conference of Vienna adopted an abstract resolution by a large majority approximately in favor of the British practice, though the conference of Rome in 1885 was slightly reactionary. According to this practice a case of cholera is received into the country with much the same sort of assurance as a case of typhoid fever would be. The maxim for cholera is—Take care of the conditions, and the disease will take care of itself. The reason why cholera is more difficult to manage than typhoid fever is that it is peculiarly a disease of the poor; "poverty has always been the true quartermaster of cholera." The virus is transported (in the West at least) from place to place largely by emigrants, religious pilgrims (as in Russia), fugitives, tramps, or others hard pressed by circumstances; one of the most remarkable instances of that kind is its alleged transmission, in 1833, from Kansas across the Rocky Mountains to the Pacific by parties of Indians successively infected. The danger from the wandering poor is all the greater that they would be naturally unwilling under any circumstances to sacrifice their small belongings of clothes, bedding, and the like, which are often the real media of infection. It is not to be denied that the old-fashioned detention for a week or more in a lazaret has still something to recommend it for such poor classes of travelers; but the detention will be more likely to give vitality to any lurking virus of the disease than to extinguish it, unless the lazaret be particularly well found in all the conveniences of living.

**QUARANTINE, CATTLE.** The importation of

foreign cattle into England was forbidden at a comparatively early period. Thus 18 Car. II., c. 2 made such importation a common nuisance. In 1869 previous legislation was consolidated by the Contagious Diseases (Animals) Act, 1869, which applied to the United Kingdom. In 1878 this act was repealed and new provisions made by the Contagious Diseases (Animals) Act, 1878, amended by two acts passed in 1884. By this Act the privy council is empowered to make from time to time such general or special orders as they think fit for prohibiting the landing of animals brought from a foreign country. Foreign animals can be landed only at certain ports named by the privy council, and must be slaughtered on landing, unless they are intended for exhibition or other exceptional purposes, in which case they are subject to the quarantine rules given in the fifth schedule of the act. In the United States the importation of neat cattle is forbidden by the act of 1883, c. 121, except as allowed by the secretary of the treasury. The appropriation acts since 1881 have made annual grants of sums of \$50,000 to enable the secretary of the treasury to cooperate with State and municipal authorities in making regulations for the establishment of cattle quarantine stations. The cattle quarantine system of Canada is said to be one of the most perfect existing. In 1876 a quarantine of eight days was established, raised to ninety days in 1879. The chief Canadian act is 42 Vict. c. 23. The effect of the Canadian precautions has been that English orders in council have allowed Canadian cattle to be imported into the United Kingdom for breeding and exhibition purposes.

**QUARANTINE, WIDOW'S,** is the right of a widow to remain in the principal house belonging to her husband for forty days after his death. It is especially recognized in Magna Charta and in some of the State laws in the United States.

**QUARE IMPEDIT,** in English law, is a form of action by which the right of presentation to a benefice is tried. It is so called from the words of the writ formerly in use which directed the sheriff to command the person disturbing the possession to permit the plaintiff to present a fit person, or to show cause "why he hinders" the plaintiff in his right. The action is one of the few surviving real actions preserved. As a real action it could before the Judicature Acts have been brought only in the Court of Common Pleas.

**QUARLES, FRANCIS,** a sacred poet, born in 1592, enjoyed considerable celebrity in his own day, and some of his works have shared in the recent revival of interest in our older literature. The work by which he is best known, his *Emblemes*, was originally published in 1635, with grotesque illustrations, engraved by Marshall, and borrowed from the *Pia Desideria* of Hermann Hugo. The poems, which are diffuse meditations upon Scriptural texts, seem, in modern phrase, to have been "written up" to the illustrations, and are quite in keeping with their quaint mixture of sublime and familiar thoughts. Upon the outbreak of the civil war he wrote on the Royalist side, and died in 1644, in consequence, his widow suggests, of his harsh treatment by the king's enemies.

**QUARTER SESSIONS** (in full, **GENERAL QUARTER SESSIONS OF THE PEACE**) is the name given to a local court with civil and criminal jurisdiction. In England the court consists in counties of two or more justices of the peace, one of whom must be of the quorum (see **JUSTICE OF THE PEACE**), in cities and boroughs of the recorder alone. The quarter sessions are a court of record. The records in a county are nominally in the custody of the *custos rotulorum*, the highest civil officer in the county, practically in that of the clerk of

the peace, who is nominated by the *custos* and removable by the quarter sessions. In a city or borough he is appointed by the council and removable by the recorder. The original jurisdiction of quarter sessions seems to have been confined to cognizance of breaches of the peace.

QUARTZ, the name of a mineralogical species which includes nearly all the native forms of Silica. It thus embraces a great number of distinct minerals, several of which are cut as ornamental stones or otherwise used in the arts. For a general description of the species, see MINERALOGY, and for its chief varieties see AGATE, AMETHYST, FLINT, and JASPER. The crystallography of quartz has been fully investigated by Des Cloizeaux in his classical *Mémoire sur la cristallisation et la structure intérieure du Quartz*, Paris, 1855.

QUASSIA, the generic name given by Linnæus to a small tree of Surinam in honor of the negro Quassi or Coissi, who employed the intensely bitter bark of the tree as a remedy for fever. This bark was introduced into European medicine about the middle of the last century, and was officially recognized in the *London Pharmacopœia* of 1788. Quassia is used in medicine in the form of infusion and tincture as a pure bitter tonic and febrifuge, and in consequence of containing no tannin is often prescribed in combination with iron. An infusion of the wood sweetened with sugar is also used as a fly poison, and forms an effectual injection for destroying thread worms. Quassia also forms a principal ingredient of several "hop substitutes," for which use it was employed as long ago as 1791, when John Lindsay, a medical practitioner in Jamaica, wrote that the bark was exported to England "in considerable quantities for the purposes of brewers of ale and porter."

QUATERNIONS. The word quaternion properly means "a set of four." In employing such a word to denote a new mathematical method, Sir W. R. HAMILTON (*q.v.*) was probably influenced by the recollection of its Greek equivalent, the Pythagorean Tetractys, the mystic source of all things.

Quaternions (as a mathematical *method*) is an extension, or improvement, of Cartesian geometry, in which the artifices of coördinate axes, etc., are got rid of, *all* directions in space being treated on precisely the same terms. It is, therefore, except in some of its degraded forms, possessed of the perfect isotropy of Euclidian space.

From the purely geometrical point of view, a quaternion may be regarded as *the quotient of two directed lines in space*—or, what comes to the same thing, as *the factor, or operator, which changes one directed line into another*. Its analytical definition cannot be given here. This will be better understood by reference to a work on mathematics.

QUATREMÈRE, ÉTIENNE MARC, one of the most learned of modern Orientalists, was born in 1782. Employed in 1807 in the manuscript department of the imperial library, he passed to the chair of Greek in Ronen in 1809, entered the academy of inscriptions in 1815, taught Hebrew and Aramaic in the Collège de France from 1819, and finally in 1827 became professor of Persian in the School of Living Oriental Languages. He died in 1857.

QUEBEC, a province of Canada, in British North America, lying between 52° 30' and 45° N. latitude, and between 57° 7' and 79° 33' 20" W. longitude; and bounded on the north by Labrador and Hudson's Bay, on the east by Labrador and the Gulf of St. Lawrence, on the south by the Bay of Chaleurs, New Brunswick, and the States of Maine, New Hampshire, Vermont, and New York, and on the southwest and west by the river Ottawa and the Province of Ontario. Its length, from Lake Temiscamingue to Anse au Sablon in the

Straits of Belle Isle, is nearly 1,000 miles on a due east and west course, and from Lake Temiscamingue to Cape Gaspé it is 700 miles; its breadth is 300 miles, and the area 188,694 square miles (120,764,651 acres). The surface of the country is exceedingly varied and picturesque, embracing several ridges of mountains and lofty hills, diversified by numerous rivers, lakes, and forests. There are many islands of great fertility and beauty, cascades and falls of considerable height, and extensive tracts of cultivable land, rendering the scenery everywhere bold and striking. Mountain ranges extend from southwest to northeast, and run parallel to each other.

The whole country is exceptionally well watered, and abounds in numerous large rivers, bays, and lakes. The principal river is the ST. LAWRENCE (*q.v.*), which flows through the entire length of the province.

The principal lakes are Lake St. John, which possesses an area of 360 square miles; Lake Temiscamingue, 126 miles; St. Peter, Metapedia, Kempt, Megantic, Memphremagog, Pipmuakan, the northern part of Lake Champlain; Manouan, Grand Wayagamack, Asturagamicook, Piscatonque, Kakebonga, Mijizowaja, Keepawa, Papimonagace, Edward, Matawin, St. Louis, Massawipi, Pamusachiou, Graves, Grand, St. Francis, and hundreds of others of lesser note, and all stocked with fish. The chief bays along the coast are Chaleurs (in part), with its bold and precipitous cliffs; Malbaie, Mille Vaches, Ha Ha, etc. Quebec's principal islands are Anticosti, sterile and almost uninhabited; Bonaventure, an important fishing station to the east of Gaspé, and the Magdalen Islands, situated in the Gulf of St. Lawrence, about fifty miles north of Prince Edward Island. This group is inhabited by about 3,200 persons, mostly French fishermen. Other islands are the island of Montreal, St. Helen's, Jesus, the island of Orleans, twenty-two miles long, below Quebec; Grosse Isle, Isle aux Coudres, Hare, Bic Island—all in the St. Lawrence; and islands of Calumet and Allumette in the Ottawa River.

The climate of Quebec is variable. In winter the cold is generally steady, and the atmosphere is clear and bracing. The thermometer often registers 20° below zero. Snow lies on the ground from the end of November until the middle of April, affording good sleighing for five months of the year. The inhabitants enjoy with zest and spirit all the out-door sports common to the country, such as skating, curling, tobogganing, snow-shoeing, coasting, and sliding. In Montreal winter carnivals are held which attract from all parts of Canada and the United States thousands of spectators. Snow falls to a very great depth, and though the winds are often sharp they are not often raw or damp, nor is there any fog. The summer is warm and pleasant, and the extreme heat is indicated at 90°. The finest season of the year is the autumn, which lasts about six or eight weeks.

Vegetation develops rapidly in Quebec. Much of the country is well adapted for agricultural purposes, the soil being rich and loamy, and well suited for the growth of cereals, hay, and fruit crops, all of which ripen perfectly. Wheat, barley, oats, rye, flax, pulse, buckwheat, maize, potatoes, turnips, carrots, beets, parsnips, celery, and the various roots thrive well. The principal fruits are plums, apples, melons, grapes, strawberries, raspberries, blueberries, gooseberries, cranberries, currants, and cherries. Hay has always been considered a leading crop, and much of it is exported to the United States, where it finds a ready market. Farming is carried on extensively in the eastern townships, and in all parts of the country agriculture is prosecuted with more or less activity.

Dense forests cover enormous tracts of territory, and afford a principal means of revenue to the province, as well as a source of industry for the people. The chief trees are white and red pine, spruce, ash, elm, beech, birch, maple, butternut, black walnut, fir, poplar, cedar, oak, cherry, hickory, basswood, etc. Upwards of fourteen hundred varieties of plants may be found, of which two hundred possess medicinal virtues. Lumbering is extensively carried on, and large quantities of dressed lumber and square timber are annually shipped to England.

Shipbuilding, once a leading industry of the province, has fallen off considerably, steamships and iron vessels having superseded wooden ships in the carrying trade. Other industries are shingle-making, manufactures of wool and cloth, cheese and butter making, iron-working, sash, door, and blind factories, sugar-refining, boat-building, brewing and distilling, and the manufacture of edge tools, india-rubber goods, and boots and shoes.

Quebec derives great importance from its fisheries, which are extensive and valuable, particularly those of the St. Lawrence, which consist principally of cod, haddock, halibut, salmon, mackerel, shad, white fish, herrings, lobsters, and seals. In the lakes and rivers there are salmon, trout, and bass, and the sporting streams are among the best in the world. The right of fishing in inland waters belongs to the owners of the lands in front of or through which such waters flow. The Provincial Government holds a large number of ungranted lands bordering on rivers and lakes, and derives an income from the leasing of fishing privileges. A fish-breeding establishment is maintained by the Dominion Government at Tadousac, from which there are encouraging results.

Game is plentiful in Quebec, (wild duck, teal, wild geese, partridges, woodcocks, snipe, pigeons, plover, etc.) About 295 different birds exist. Of wild animals the principal are bears, wolves, cariboo, deer, lynxes, foxes, musk rats, minks, martens, squirrels, beavers, and hares.

Gold, iron, and copper ores abound in notable quantities. The former is found chiefly on the banks of the Chaudière in the county of Beauce. Copper is obtained in the eastern townships, and iron of superior quality abounds almost everywhere throughout the province. In some sections small quantities of lead are found.

Good wagon roads intersect the province wherever there is a settlement. Telegraphic lines are established throughout the province, each line of railway, besides the great roads, having special wires. The postal facilities are excellent, and regular mails penetrate every part. Railway communication is ample and extensive, the chief lines being the Grand Trunk, the Canadian Pacific, and the Intercolonial. The canal system is very complete, and commerce is greatly helped by the several waterways in operation. These are the Lachine Canal, extending from Montreal to Lake St. Louis; the Beauharnois Canal, uniting Lakes St. Francis and St. Louis; the Chambly Canal, uniting Lake Champlain with Richelieu river; and the Carillon and Grenville Canal.

The province is divided into sixty-three counties, with total area of 120,764,651 acres. The population was 1,191,516 in 1871; in 1881 it was 1,359,027 (in 1891 it had increased to 1,488,581). The prevailing religion is that of the Roman Catholic Church, of which there are seven dioceses, viz., the archdiocese of Quebec, and the diocese of Montreal, Three Rivers, St. Hyacinthe, Sherbrooke, Rimouski, and Chicoutimi. The Protestant dioceses are two in number—Quebec and Montreal.

The affairs of the province are administered by a lieutenant-governor, and an executive council composed

of six members with portfolios, assisted by a legislative assembly of sixty-five members, and a legislative council of twenty-four councilors. The latter hold their appointments for life, and the former are elected by the people every five years. The lieutenant-governor is appointed by the governor-general in council. Quebec returns to the Dominion House of Commons sixty-five representatives, and twenty-four appointees to the Dominion Senate.

QUEBEC, the ancient capital of Canada, and present capital of the province of Quebec, is situated on the northwest bank of the river St. Lawrence at its junction with the St. Charles, about 300 miles from the Gulf of St. Lawrence and 180 miles below Montreal, in  $46^{\circ} 49' 6''$  N. latitude and  $71^{\circ} 13' 45''$  W. longitude. It is the most picturesque and most strongly fortified city on the continent. The harbor of Quebec is spacious and capable of accommodating ships of the largest tonnage, and its docks and tidal basin, when completed, will rank among the most perfect works of the kind in the world. They are constructed of limestone and iron, and, including the graving dock on the Levis side of the river, will cost very nearly \$3,000,000. The harbor is protected toward the northeast by the island of Orleans, on either side of which there is an approach. The spring tides rise and fall about eighteen feet. Quebec is divided into upper and lower town—access to the former being obtained by a steep and winding street, several flights of narrow steps, and an elevator. In the lower town are situated the principal banks, merchants' offices, and wholesale and retail stores. The streets, with one or two exceptions, are narrow and irregular. In the upper town, where the streets are wider and well paved, are the better class of dwelling houses, the public buildings, most of the churches, the public walks and gardens, retail stores and small shops. To the west are the suburbs of St. John, St. Louis, and St. Roché. The latter occupies the lower plain, and is rapidly becoming a place of public importance. The other two suburbs are on the same level with the upper town. Southwest of St. John stretch the historic Plains of Abraham. On this battle-ground a column forty feet high has been erected to mark the spot where General Wolfe, in 1759, died victorious. In the governor's garden, which overlooks the St. Lawrence, is a stately monument sixty-five feet in height, which is dedicated to the memory of Wolfe and Montcalm. An iron pillar surmounted by a bronze statue, the gift of Prince Napoleon Bonaparte, stands on St. Foye road, and commemorates the achievements of the British and French troops in 1760. Four martello towers occupy commanding positions. A point of interest in the upper town is Dufferin Terrace, a magnificent promenade 1,400 feet long and 200 feet above the level of the river. Part of this terrace occupies the site of the old Château St. Louis, which was destroyed by fire in 1834. The view from the platform is very striking and beautiful. The Grand Battery also affords a fine prospect. Quebec was once the walled city of the north, but several of its ancient fortifications have been dismantled, and the old gates taken down. There are three gates now, instead of five as in former years, viz., St. Louis, Kent, and St. John's, each of which is very handsome and massive. Among the principal edifices are the parliamentary and departmental buildings—a stately pile situated on Grande Allée—the new court house now building, the post-office, custom-house, city hall, masonic hall, the Basilica, or Roman Catholic cathedral (an irregular cut-stone building 216 feet long by 180 feet wide, and containing many fine oil paintings), the archiepiscopal palace, the Anglican cathedral (a plain structure in the Roman style), the skating rink, and the hall of the Young Men's





Christian Association; four large markets supply the people with meat and country produce. There are eight Roman Catholic churches, five Church of England, two Presbyterian, one Methodist, one Baptist, one Lutheran, one Congregational, one Scandinavian, one French Protestant, and a Jewish synagogue, which is situated in the Masonic Hall. Laval University, which derives its name from the first bishop of Quebec, who founded in 1663 the seminary for the training of priests, is the principal educational establishment of the Roman Catholics. It was instituted in 1852 by a royal charter from Queen Victoria and a charter from Pope Pius IX. The building is large and spacious, and the university, which is held in high esteem, is well equipped with apparatus, a library of over 85,000 volumes, a museum, geological specimens, and a picture gallery. Laval has a strong staff of professors, lay and clerical, and the faculties are theology, law, medicine, and arts. In connection with this institution are the grand seminary founded in 1663, where theology is taught, and the minor seminary for literature and philosophy. Laval Normal and Model School, the Ursuline Convent—a very large establishment for the education of young ladies, founded in 1641—the Convent of the Good Shepherd, and several nunneries complete the list of Roman Catholic educational institutions. Morrin College (Presbyterian) was founded by Doctor Morrin, and is affiliated with M'Gill University. Other Protestant schools are the boys' high school, the girls' high school, a number of academies, and public and private schools, all in a state of efficiency. There is no free public library in the city, but the Literary and Historical Society—the oldest chartered institution of the kind in Canada, founded by Lord Dalhousie in 1824—the Canadian Institute, the Geographical Society, the Young Men's Christian Association, the Advocates' Library, and the Parliamentary Library have valuable collections of books. The principal benevolent institutions are the marine hospital, the Hôtel Dieu, founded in 1639 by the duchess of Aiguillon, the general hospital (1693), the Finlay Asylum, the Jeffrey Hale Hospital, the Church of England Female Orphans' Asylum, the Ladies' Protestant Home, St. Bridget's Asylum, Grey Nunnery, and the lunatic asylum at Beauport. Nine daily newspapers are published at Quebec, six of which are in the French language. A good supply of water is afforded from Lake St. Charles, but the city has suffered so severely from devastating fires in the past that in 1883 the common council ordered an additional pipe to be laid at a cost of half a million of dollars. Quebec is well lighted with gas and the electric light. Connection is had with all parts of Canada and the United States by several railway lines, and the city is at the head of ocean steamship navigation to Europe. There are two lines of street cars. The head offices of three banks are situated in Quebec, viz., the Quebec Bank, the Union Bank of Lower Canada, and La Banque Nationale. Besides these there are two savings banks, the Post Office Savings Bank, and the agencies of the Bank of Montreal, the Bank of British North America, and the Merchants' Bank. The population of the city in 1871 was 59,699; in 1881, 62,446; in 1891, 63,090.

QUEDAH or KEDAH. See MALAY PENINSULA.

QUEDLINBURG, an ancient town of Prussian Saxony, in the district of Magdeburg, is pleasantly situated on the Bode, near the northwest base of the Harz Mountains. It is still partly surrounded by a turreted wall. The population in 1885 was 19,323, almost all Protestants.

QUEEN ANNE'S BOUNTY is the name applied to a perpetual fund of the first-fruits and tenths granted by a charter of Queen Anne, and confirmed by statute in

1703, for the augmentation of the livings of the poorer Anglican clergy.

QUEEN CHARLOTTE ISLANDS, a group of islands lying off the west coast of British Columbia, to which they belong. They were so called by Captain Dixon, who visited them in the "Queen Charlotte" in 1787, and spent more than a month on the coasts. They are composed of two chief islands, Graham Island to the north and Moresby Island to the south, separated by a very narrow channel; but around these, especially in the south, are innumerable smaller islands. The whole group has the form of a wedge with the point toward the south. The extreme length is about 180 miles, and the greatest breadth sixty miles. The total area cannot be determined, as the longitude of the west coast has not yet been definitely ascertained.

QUEENSBERRY, JAMES DOUGLAS, SECOND DUKE OF, was born at Sanquhar Castle, Scotland, December 18, 1662, and educated at the university of Glasgow, after which he spent some time in foreign travel. He sided with the prince of Orange at the Revolution. In recognition of his services he received a pension of \$3,000 per annum, and on May 26, 1708, was created a British peer by the title of duke of Dover. On February 9, 1709, he was appointed third secretary of state. He died July 6, 1711.

QUEEN'S COUNTY, an inland county in the province of Leinster, Ireland, is bounded northwest and north by King's county, east by Kildare and a detached portion of King's county, south by Carlow and Kilkenny, and west by Tipperary. Its greatest length from east to west is about thirty-five miles, and its greatest breadth from north to south about thirty miles. The area is 424,854 acres, or about 663 square miles.

*Agriculture.*—The climate is dry and salubrious. Originally a great extent of the surface was occupied with bog, but by draining much of it has been converted into good land. For the most part it is very fertile except in the hilly districts toward the north, and there is some remarkably rich land in the southeast.

Agriculture forms the chief occupation, but the manufacture of woolen and cotton goods is carried on to a small extent.

*Administration.*—The county is divided into eleven baronies, and contains 53 parishes and 1,156 townlands.

*Population.*—Within the last forty years the population has diminished by more than one-half. In 1841 it numbered 153,930, which in 1871 had diminished to 79,765, and in 1891 to 64,639. The following were the largest towns:—Mountmellick (3,126), Maryborough (2,872), Portarlinton (partly in King's county) (2,357), and Mountrath (1,865).

QUEENSLAND, a British colony, the northeastern portion of Australia, is situated between New South Wales and Torres Strait, and between the Pacific Ocean and the Northern Territory of South Australia. Its southern boundary is about 29° S. latitude, its western is 141° E. longitude, from 29° to 26° S. latitude, and 138° E. thence to the Gulf of Carpentaria; its northern is about 9° S. including the Torres Straits islands. In extreme length it is 1,400 miles; in breadth, 1,000. Its area is 669,520 square miles, or about five and one-half times that of the United Kingdom.

*Minerals.*—Gold is found in alluvial deposits and in quartz veins. The most important of the former were near the northern Palmer river, but auriferous quartz now almost monopolizes the digger's attention. The recognized gold workings are over 7,000 square miles. Gold is often found mixed with silver, copper, or lead.

*Agriculture.*—Until the last few years little cultivation was to be seen. Labor was supposed to pay better

in other employments. Still there can be grown in Queensland corn of all varieties, hay, English vegetables, sweet potatoes, melons, cassava, cocoa, indigo, arrow-root, ginger, coffee, rice, tobacco, cotton, spices, cinchona, cocoa-nut, bread-fruit, and sugar-cane, with the fruits of England, India, and China. Lucerne is much grown for stud stock, where winter food is needed. Bananas, oranges, grapes, pine-apples, mangoes, guavas, tamarinds, and dates thrive well. Coffee is being extensively produced.

Pastoral farming is still the leading industry of the colony, and is rapidly extending over all districts.

*Administration.*—The governor is appointed by the queen. The executive council has eight members, the legislative council thirty-three, and the assembly fifty-five. The term of parliament is five years.

*Population.*—The estimated population in 1890 was 406,658, males largely predominating.

*History.*—The Portuguese may have known the northern shore nearly a century before Torres, in 1605, sailed through the strait since called after him, or before the Dutch landed in the Gulf of Carpentaria. Captain Cook passed along the eastern coast in 1770, taking possession of the country as New South Wales. Flinders visited Moreton Bay in 1802. Oxley was on the Brisbane in 1823, and Allan Cunningham on Darling Downs in 1827. Sir T. L. Mitchell in 1846–7 made known the Maranoa, Warrego, and Barcoo districts. Leichhardt in 1845–7 traversed the coast country, going round the gulf to Port Essington, but was lost in his third great journey. Kennedy followed down the Barcoo, but was killed by the blacks while exploring York Peninsula. Burke and Willis crossed western Queensland in 1860. Landesborough, Walker, M'Kinlay, Hann, Jack, Hodgkinson, and Favence continued the researches. Squatters and miners have opened new regions. Before its separation in 1859 the country was known as the Moreton Bay district of New South Wales. A desire to form fresh penal depots led to the discovery of Brisbane river in December, 1823, and the proclamation of a penal settlement there in August, 1826. The convict population was gradually withdrawn again to Sidney, and the place was declared open to free persons only in 1842. The first land sale in Brisbane was on August 9, 1843. An attempt was made in 1846, under the ministry of Sir James Graham and Mr. Gladstone, to establish at Gladstone on Port Curtis the colony of North Australia for ticket-of-leave men from Britain and Van Diemen's Land. Earl Grey's Government under strong colonial appeals arrested this policy, and broke up the convict settlement. In 1841 there were 176 males and 24 females; in 1844, 540 in all; in 1846, 1,867. In 1834 the governor and the English rulers thought it necessary to abandon Moreton Bay altogether, but the order was withheld. The first stock belonged wholly to the colonial Government, but flocks and herds of settlers came on the Darling Downs in 1841. In 1844 there were 17 squatting stations round Moreton Bay and 26 in Darling Downs, having 13,295 cattle and 184,651 sheep. In 1849 there were 2,812 horses, 72,096 cattle, and 1,077,983 sheep. But there were few persons in Brisbane and Ipswich. The Rev. Dr. Lang then began his agitation in England on behalf of this northern district. Some settlers, who sought a separation from New South Wales, offered to accept British convicts if the ministry granted independence. In answer to their memorial a shipload of ticket-of-leave men was sent in 1850. In spite of the objection of Sydney, the Moreton Bay district was proclaimed the colony of Queensland on December 10, 1859. The population was then about 20,000, and the revenue £6,475. Little trade, no manufactures, wretched roads,

defective wharfage, struggling townships, and poor schools marked that epoch. Political liberty occasioned a general advance. The first parliament, with the ministry of Mr. (now Sir R. G. W.) Herbert, organized a good school system, carried an effective land bill, and established real religious equality. While the pastoral interest rapidly grew, the agricultural and trading classes got firm footing. The revelation of gold and copper treasures increased the prosperity. But a reaction followed; wool prices fell, cotton-growing ceased, early sugar-cane efforts failed and trouble succeeded excessive speculation in land and mines. A steady application to legitimate pursuits, however, soon restored confidence; and the colony as its resources have gradually developed, has continued to advance and prosper.

QUEENSTOWN, formerly COVE OF CORK, a market town and seaport in the county of Cork, Ireland, is picturesquely situated, thirteen miles east-southeast of Cork, on the south side of Great Island, on the slope of an eminence rising somewhat abruptly above the inner Cork harbor. It consists chiefly of terraces, rising above each other, and inhabited by the wealthier classes. On account of the mildness of the climate it is much frequented by valetudinarians in winter. Previous to the American War the Cove of Cork was a very small fishing village, but within the last fifty years it has rapidly increased. It received its present name on the occasion of the visit of Queen Victoria in 1849. The harbor, which is four miles long by two broad, and is defended by the Carlisle and Camden Forts at its entrance, and by Fort Westmoreland on Spike Island, can afford shelter to a very large fleet of vessels. The port is the calling station for the American mail steamers. The population of Queenstown in 1871 was 10,334, and in 1891 it was 9,123.

QUERCITRON is a yellow dye-stuff obtained from the bark of the quercitron oak, *Quercus tinctoria*. The tree is a native of the United States, but is now also cultivated in France and South Germany. The dye-stuff is prepared by grinding the bark in mills after it has been freed from its black epidermal layer, and sifting the product to separate the fibrous matter, the fine yellow powder which remains forming the quercitron of commerce. The ruddy-orange decoction of quercitron contains quercitannic acid and an active dyeing principle, quercitrin. The latter substance is a glucoside, and in aqueous solution under the influence of sulphuric acid it splits up into a rich tinctorial principle, quercetin, and a variety of sugar called isodulcite.

QUERÉTARO, a city of Mexico, capital of the state of the same name, lies on a plateau 5,900 feet above the sea, 152½ miles northwest of Mexico by the Central Mexican Railway. The population of the city (1892) is 36,000.

Querétaro was captured by the Spaniards in 1536, and made a city in 1655. In 1848 it was the seat of a congress by which peace between Mexico and the United States was ratified, and in 1867 the emperor Maximilian, unable to hold it against the republicans under Escobedo, was made prisoner and shot on the Cerro de las Campanas to the north of the town.

QUERN. See FLOUR.

QUESNAY, FRANÇOIS, was one of the most eminent economists of the eighteenth century. He was born at Mérey, near the village of Montfort l'Amaury, about twenty-eight miles from Paris, on June 4, 1694. He died in 1774, having lived long enough to see his great pupil, Turgot, in office as minister of finance. Quesnay had married in 1718, and had a son and a daughter; his grandson by the former was a member of the first Legislative Assembly.



**QUESNEL, PASQUIER**, Roman Catholic theologian, was born in Paris on July 14, 1634, and, after graduating in the Sorbonne with distinction in 1653, joined the Congregation of the Fathers of the Oratory in 1657, receiving priest's orders in 1659. Quesnel died at Amsterdam on December 2, 1719. A complete list of his works is given by Moreri.

**QUETELET, LAMBERT ADOLPHE JACQUES**, astronomer, meteorologist, and statistician, was born at Ghent, February 22, 1796, and educated at the lyceum of that town. From 1834 he was perpetual secretary of the Brussels Academy, and published a vast number of articles in its *Bulletin*, as also in his journal *Correspondence Mathématique et Physique* (eleven vols., 1825-39). He died on February 17, 1874.

**QUETTA**, a valley in Baluchistan, and the most northern district in the province. It embraces an area of about ninety square miles, and is situated near the Afghan frontier. The town of Quetta is surrounded by a mud wall; in its center, on an artificial mound, is a fort which commands a very fine and extensive view of the neighboring valley.

**QUEVEDO VILLEGAS, FRANCISCO**, the greatest satiric writer of Spain, was born in 1580 at Madrid. As a satirist and humorist Quevedo stands in the first rank of Spanish writers; his other literary work does not count for much. His style indeed is not absolutely pure, and already belongs to the period of decadence. Quevedo, who ridiculed so well the bad taste of "cultism," fell himself into another fault and created the style called "conceptism," which hunts after ambiguous expressions and "double entendres." But though involved and overcharged with ideas, his style is of singular force and originality; after Cervantes he is the greatest Spanish writer of the seventeenth century. He died September 8, 1645.

**QUEZAL**, or **QUESAL**, the Spanish-American name for one of the most beautiful of birds, abbreviated from the Aztec or Maya *Quetzal-totoll*, the last part of the compound word meaning fowl, and the first, also written *Cuetzal*, the long feathers of rich green with which it is adorned. The Quetzal is one of the **TROGONS**, and was originally described by Hernandez, whose account was faithfully copied by Willughby.

The Quetzal is hardly as big as a turtle-dove. The cock has a fine yellow bill and a head bearing a rounded crest of filamentous feathers; lanceolate scapulars overhang the wings, and from the rump spring the long flowing plumes which are so characteristic of the species, and were so highly prized by the natives prior to the Spanish conquest that no one was allowed to kill the bird when taken, but only to divest it of its feathers, which were to be worn by the chiefs alone. These plumes, the middle and longest of which may measure from three feet to three feet and a half, with the upper surface, the throat, and chest are of a resplendent golden-green, while the lower parts are of a vivid scarlet. The middle feathers of the tail, ordinarily concealed, as are those of the Peacock, by the uropygials, are black, and the outer white with a black base. In the hen the bill is black, the crest more round and not filamentous, the uropygials scarcely elongated, and the vent only scarlet. The eyes are of a yellowish-brown.

**QUEZALTENANGO**, a city of Guatemala, capital of the province of its own name, lies on the Sigüila in a fertile district about twenty-five or thirty miles to the west of Lake Atitlan, on the high road between the city of Guatemala and the Mexican province of Chiapas. It has a cathedral and other public buildings, carries on the manufacture of cotton and wool, and contains from 20,000 to 30,000 inhabitants, mostly Indians.

**QUIETISM**, a peculiar form of **MYSTICISM** (*q.v.*) within the modern Catholic Church, mainly associated with the names of Madame **GUYON** and **MIGUEL DE MOLINOS**, (*q.v.*) See also **FÉNELON**.

**QUILIMANE**, or **KILIMANE** (the former being the Portuguese spelling), a Portuguese town on the east coast of Africa, at the head of a district of the province of Mozambique, lies twelve miles inland from the mouth of the river Quilimane or Qua Qua. The whole site is low and unhealthy, and the Portuguese have done next to nothing to improve it. The total population is between 6,000 and 7,000.

**QUILL**. See **FEATHERS** and **PEN**.

**QUILLOTA**, a town of Chili, at the head of a district in the province of Valparaiso, lies thirty miles by rail northeast of Valparaiso, on the south or left bank of the Aconcagua, about twenty miles from its mouth. It is one of the oldest towns in the country, and since the opening of the railway in 1863 it has grown so that in population (13,000 in 1890) it is exceeded only by the capital and six other towns. It is famous for the quality of its chirimoyas (*Anona Cherimolia*) and lucumas; and in the neighborhood there are rich copper mines. In 1822 and 1851 it suffered from earthquakes.

**QUILON**, a seaport town in Quilon district, Travancore state, Madras presidency, India, between the towns of Trevandrum and Aleppi, in 8° 54' N. latitude and 76° 37' E. longitude. It is a healthy town, and contained in 1881 a population of 13,588.

**QUIMPER**, or **QUIMPER-CORENTIN**, a town of France, formerly the capital of the county of Cornouailles, and now the chief town of the department of Finistère, is situated 158 miles northwest of Nantes and 68 miles southeast of Brest on the railway between those towns. With its communal population of 17,171, Quimper ranks in Finistere next to Brest and Morlaix.

**QUINAULT, PHILIPPE**, a dramatist of merit, and the only European writer who made the opera libretto a work of literature, was born at Paris on June 3, 1635. He died on November 26, 1688.

**QUINCE**. The common quince is a native of Persia and Anatolia, and perhaps also of Greece and the Crimea, but in these latter localities it is doubtful whether or not the plant is not a relic of former cultivation. The fragrance and astringency of the fruit of the quince are well known, and the seeds are used medicinally for the sake of the mucilage they yield when soaked in water, a peculiarity which is not met with in pears. This mucilage is analogous to, and has the same properties as, that which is formed from the seeds of linseed. The common quince and its varieties are very largely used as "dwarfing" stocks on which choice pears are engrafted. The effect is to restrain the growth of the pear, increase and hasten its fruitfulness, and enable it to withstand the effects of cold. The common Japan quince, *Pyrus* or *Cydonia japonica*, is grown in gardens for the sake of its flowers, which vary in color from creamy white to rich red, and are produced during the winter and early spring months. *C. Maulei*, a recently introduced shrub from Japan, bears a profusion of equally beautiful orange-red flowers, which are followed by fruit of a yellow color and agreeable fragrance, so that, when cooked with sugar, it forms an agreeable conserve, as in the case of the ordinary quince. The fruit of the ordinary Japan quince is quite uneatable.

**QUINCY**, a city of the United States, the county seat of Adams county, Ill., occupies a limestone bluff 125 feet above low-water mark on the east bank of the Mississippi at the extreme western point of the State. The river is crossed here by the great bridge of the Hannibal and St. Joseph Railroad. Quincy Bay, an arm

of the river, is the finest natural harbor for steamboats on the upper Mississippi. By water Quincy is 160 miles above St. Louis, and by rail 263 miles southwest of Chicago *via* Galesburg. Commanding an extensive view, being well built, having excellent waterworks, and forming an important center in the railway system of the region, Quincy is both an attractive and a prosperous place, with very miscellaneous industries. Among the public buildings are the court-houses, St. John's cathedral (1877), a medical college (1873), a city library, and several hospitals and asylums. The population in 1860 was 13,718; in 1870, 24,052 (1,073 colored); in 1880, 27,268 (1,508 colored) and in 1890, 31,494. Laid out in 1825 or about three years after the arrival of the first white settler, Quincy was made a town in 1834, and a city in 1839.

QUINCY, a township and seaport of the United States, in Norfolk county, Mass., on a small bay of its own name in the south of Massachusetts Bay and seven miles south-southeast of Boston by rail. It is best known for its great granite quarries, in connection with which was constructed in 1827 the first (horse) railway in the United States, and as the birthplace of Gov. John Hancock and Presidents John Adams and John Quincy Adams. Among the principal buildings—chiefly situated in the village, which lies on an elevated plain near the center of the township—are the granite town-house, the so-called Adams Temple (a church erected in 1828), beneath the portico of which are the tombs of the two Presidents Adams, the Adams Academy, a home for infirm sailors, a public library, and the mansions of the Quincy and Adams families, whose estates occupied the greater portion of the township. Quincy, which till 1792 formed part of Braintree, had 5,017 inhabitants in 1850, 6,779 in 1860, 7,442 in 1870, 10,570 in 1880, and 16,723 in 1890.

QUINCY, JOSIAH, JR., born in Boston, Mass., 1744, is the most eminent of a well-known family whose founder emigrated to New England in 1633. At the time of his death, at the age of thirty-one, he had won distinction as a lawyer, and his place was secured in history as among the most eloquent, the most clear-sighted, and the most devoted of the men who led the American colonists in the measures preliminary to the revolution. In 1770 he wrote *An Address of the Merchants, Traders and Freeholders of Boston* in favor of a non-importation Act, asserting, about the same time, in a newspaper article, that Americans would "know, resume, assert, and defend their rights" by the "arts of war" if the "arts of policy" should fail. In December, 1773, he took an active and leading part in the town-meeting which virtually ordered the destruction of the cargoes of the tea-ships in Boston harbor. He sailed a few months afterward for England with the approval of the leading revolutionists, to present, though unofficially, to the ministry and other public men, the grievances and the determination of the colonists. After six months failing health—he had long been threatened with consumption—compelled him to return home, and he died on shipboard as the vessel was entering the harbor of Gloucester, Mass., April 26, 1775.

QUINET, EDGAR, eminent French author and politician, was born at Bourg-en-Bresse, in the department of the Ain, France, on February 17, 1803.

As a writer his chief fault is want of concentration, as a thinker and politician vagueness and want of practical determination. His work is very extensive and abounds in passages of great beauty. But no single book of his can be called a masterpiece, and none is of such a kind that the reader feels the subject to have been thoroughly treated in accordance with a definite

and consistent principle or series of principles. As a politician he acted with the extreme Radicals, yet universal suffrage, the cardinal doctrine of Radicalism, disgusted him as unreasonable in its principle and dangerous in its results. He continued to write till his death, which occurred at Versailles on March 27, 1875.

QUININE, the most important of the active principles contained in cinchona bark. The quinine of commerce is the neutral sulphate, containing seven and one-half molecules of water of crystallization. When crystallized from alcohol, or when dried over sulphuric acid, it contains only two molecules.

Two other sulphates are known. The one contains a single equivalent of acid, and in commerce bears the name of acid sulphate or soluble sulphate of quinine; it is soluble in eleven parts of water, but with considerable difficulty in absolute alcohol. The other sulphate contains two equivalents of sulphuric acid, is very soluble in cold water, but quite insoluble in ether; it is not an article of commerce. Both these sulphates crystallize with seven molecules of water.

Although quinine is manufactured in the United States, a large portion has been imported from Europe since the high duty levied on its manufacture has been removed. There is considerable difficulty in obtaining trustworthy statistics as to the extent of the manufacture of quinine. The largest sale that has taken place in America appears to have been in 1883, when 1½ tons were put up to auction, and in the same year 16,000 ounces were sold in London and a similar quantity at Berlin.

*Physiological Action.*—Quinine arrests the movements of the white corpuscles of the blood, rendering them round and darkly granulate, and, by preventing them from making their exit from the blood-vessels, diminishes or arrests the formation of pus in inflammation and causes contraction of the spleen when that organ is enlarged. It acts upon the cerebro-spinal nervous system giving rise to headache and a sense of tension in the brain; these symptoms may be removed by the addition of hydrobromic acid or prevented by the use of the hydrobromide of quinine. It acts through the sympathetic nervous system on the heart, and is thus capable of restraining all the animal processes which develop heat, organic changes, or muscular action. It is antagonistic to atropine in its physiological action.

The use of quinine in medicine dates from its discovery in 1820. Its chief value is as an antiperiodic, especially in intermittent fevers, but also in other diseases, when they assume a periodic character, such as neuralgia, asthma, hooping cough, etc. In blood poisoning, whether arising from natural or traumatic causes, it has been found of great utility. Its curative powers in sunstroke have been repeatedly proved in the East Indies, and a dose of quinine will often cut short an attack of catarrh if taken in the early stage. In malarial districts persons have been exposed to miasmatic influence without danger after taking a dose or two of five grains of quinine once or twice a day. In the smallest medicinal doses it is purely tonic, in larger ones stimulant; but it differs from other medicines of the same class in the stimulant action being longer sustained. In larger doses it acts as a sedative, and in excessive doses it is poisonous. In some individuals it produces an erythematous eruption, and it is also known to act as an oxytocic. Large doses also sometimes produce deafness, and act injuriously in all inflammatory states of the mucous membrane.

The other alkaloids of cinchona bark—quinidine, cinchonidine, and cinchonine—also possess similar properties, quinidine being even more effectual than quinine; but cinchonine appears to produce nausea and

gastric disturbance. This is also the case with the cinchona febrifuge prepared from *C. succirubra*.

QUINSY. See TONSILITIS.

QUINTANA, MANUEL JOSÉ, Spanish poet and man of letters, was born at Madrid on April 11, 1772, and died at Madrid on March 11, 1857.

QUINTILIAN (M. FABIVS QUINTILIANVS) was born in the obscure Spanish town of Calagurris (Calahorra), on the Ebro, in the country of the Vacones, not later than 35 A.D. His father taught rhetoric, with no great success, at Rome, and Quintilian must have come there at an early age to reside, and must have there grown up to manhood. The years from sixty-one to sixty-eight he spent in Spain, probably attached in some capacity to the retinue of the future emperor Galba, with whom he returned to the capital. For at least twenty years after the accession of Galba he was at the head of the foremost school of oratory in Rome, and may fairly be called the Isocrates of his time. He also gained some, but not a great, repute as a pleader in the courts. For a member of a learned profession his circumstances were easy. Vespasian created for him a professorial chair of rhetoric, liberally endowed with public money, and from this time he was unquestionably, as Martial calls him, "the supreme controller of the restless youth." About the year 88 Quintilian retired from teaching and from pleading, to compose his great work on the training of the orator (*Institutio Oratoria*). After two years' retirement he was intrusted by Domitian with the education of two grand-nephews, whom he destined as successors to his throne. Quintilian gained the titular rank of consul, and probably died not long before the accession of Nerva, (96 A.D.)

QUINTUS SMYRNÆVS, a late epic poet of Greece, sometimes called Quintus Calaber because his poem was discovered at Otranto in Calabria. Next to nothing is known of him. He appears to have lived in the latter part of the fourth century, shortly before Nonnus.

QUITO, the capital of the republic of Ecuador, South America, an archbishopric, and the chief town of a department, lies 14' of latitude south of the equator, and in 79° 45' W. longitude, at a height of 9,520 feet above the sea. The houses, mostly of sun-dried brick, are usually low and squat, and not a chimney is to be seen. The public buildings are also of a massive and heavy looking Spanish type. In the principal square are the cathedral, with a fine marble porch, the government house, with a colonnade running the whole length

of the façade, and the palace of the nuncio. But the finest building in Quito is the college of the Jesuits, part of which is occupied by the university, an institution long rendered interesting to Englishmen by the presence of the venerable botanist, Dr. William Jameson. There is a public library in the city of 20,000 volumes, and a polytechnic school was instituted in 1872. The local manufactures are confined to coarse cotton and woolen stuffs, thread, lace, hosiery, silk, and a certain amount of jewelry. About 1870 the population was estimated by Doctor Jameson at between 30,000 and 40,000; it is now (1892) said to exceed 50,000.

QUOITS. This pastime resembles the ancient discus-throwing which formed one of the five games of the Greek pentathlon. The modern quoit, however, is a far lighter missile, and consists of a circular iron ring to be thrown or pitched in play at a fixed object. This ring is flattened, having a thick inner edge and thin outer one. The latter is slightly indented at a given spot to receive the tip of the player's forefinger without cutting it. There is no limit to the weight of a quoit, but this should be specified before commencing a match. The diameter is restricted to eight inches over all. Two iron pins, called "hubs," are driven into the ground at a certain distance apart, generally nineteen yards. There may be one or more players a side, and each has two quoits. These he may throw successively; or else each player throws one only at a time and a second round follows in the same order, as may have been agreed on. The throwing takes place the reverse way after each round. Each player attempts to make his quoit pitch on the hub or pin so that the head of the latter passes through the circular opening in the center of the missile. Such a success is termed a "ringer," and two is scored. Quoits of opposite sides alighting equidistant from the pin do not score at all. If a player has both his quoits nearer the pin than any of his opponents he scores two; while if only one be nearer he is entitled to count one to his credit.

QUO WARRANTO, in English law, is the name given to an ancient prerogative writ calling upon any person usurping any office, franchise, liberty, or privilege belonging to the crown to show "by what warrant" he maintained his claim. It lay also for non-user or misuser of an office, etc. If the crown succeeded, judgment of forfeiture or ouster was given against the defendant.

## R.

**R** was written in Greek originally as P, following the Phœnician form; sometimes, however, a triangle takes the place of the semicircle; not frequently also a short stroke appears where we have the lower limb on the right hand; the reason of this addition is not plain: it can hardly have been a diacritical mark to distinguish R from P (as G from C at Rome) because the latter symbol in Greece always kept its two vertical lines (Ϝ), the curved line (P) appearing first in the Roman alphabet.

The sounds denoted by the same symbol *r* differ considerably. First, there is the true consonantal *r*—our English *r* in *reed*, etc.—produced by raising the tip only of the tongue toward the front palate; the voice escapes by this aperture, the side passages between the tongue and the palate being closed; the mechanism, therefore, is just the opposite to that which produces *l* (see letter L). Secondly, there is the vowel *r*; this is due to the space between the tip of the tongue and the palate being sufficiently great to allow the voice to escape without any friction; the difference between this and consonantal *r* is parallel to that between *u* and *w*, or between *i* and *y*. This vowel-sound, though not heard regularly in any modern language, is not infrequent in several in certain combinations; for example, it is quite possible to articulate “father” as “fath-*r*,” where the *r* alone forms a syllable and is therefore vocalic. This vowel-sound was a regular sound in Sanskrit, and was probably also heard in the parent language; but in the derived languages (except Sanskrit) it became consonantal *r* with an independent vowel preceding or following; thus a presumed original “krd” (=heart), where *r* denotes the vocalic *r*, gave in Sanskrit “hrd,” in Greek *κρᾶδ-ίη*, in Latin “cor(d).” Thirdly, *r* may denote a trill,—that is to say, a sound produced by the vibration of the tongue when laid loosely against the palate and set in motion by a strong current of breath or voice. When the point of the tongue is laid loosely in this way against the palate just behind the gums and made to trill as voice passes over it, we hear the Scotch and the French *r*, each of which is a trill, not a consonantal *r*. The same sound, but unvoiced, is heard in the French “théâtre,” etc., and is also the Welsh *rh*. A similar trill at the back part of the palate gives the Northumbrian “burr.”

RAAB (Hungarian *Γγῶρ*), the capital of an Hungarian province of the same name, lies at the influx of the Raab into a branch of the Danube, seventy miles to the southeast of Vienna. The inhabitants, who numbered 20,980 in 1880, manufacture cloth and tobacco, and carry on a considerable trade in grain and horses.

RAB, RABBI, RABBAN, RABBONI, RABBENU, Jewish titles of honor. *Rab* (רב), “lord,” “master,” “teacher,” is the title prefixed to the name of such a Babylonian teacher of the Law or expounder of the Mishnah as, though authorized to “judge” and to decide other religious questions, has not been ordained, or fully ordained, in Palestine. *Rabbi* (רבי, ῥαββεί.

Matt. xxiii. 7, etc.), “my teacher,” is the title of a teacher fully ordained in Palestine. *Rabbān*, “our teacher,” or “our lord,” but also “their,” *i.e.*, all Israel’s teacher (רבִּין, later form of רַבִּים), was the title of the prince (president of the synedrium) from the time of Gamliel I. (the Gamaliel of St. Paul) and onward.

RAB, when the title is not followed by an individual name, denotes *par excellence* Abbā Arēkhā (Arikha), so called either from the place Arēkhā in Babylonia, or because of his high stature, or his eminence as a man and scholar. Abbā Arēkhā was the most successful teacher of the Law and interpreter of the Mishnah in Babylonia.

RABBI, when the title is not followed by a proper name, denotes *par excellence* Rabbi Yehudah Hannasi, the principal editor of the Mishnah.

The Hellenistic RABBONI (ῥαββουνει, John xx. 16) is the Aramaic *ribboni* used by a slave of his master, a son of his father, a wife of her husband, a worshiper of his God. (Compare the similar variation of the vowel in pisho = πᾶσχα.)

RABBENU signifies “our teacher” *par excellence*, and means in Palestine R. Yehudah Hannasi, and in Babylonia Rab (*i.e.*, Abbā Arēkhā).

RABA (ROBO)—*i.e.*, RAB ABA B. YOSEPH B. HAMA (Hōmō)—was, like his teacher Rabbāh and his fellow-pupil Abayye, a scion of the house of Eli, on whom rested the double curse of poverty and that none of them should reach old age. According to T. B., *Rosh Hasshanah*, 18a, he sought to remove this curse, if not by sacrifices and offering, then by the study of the Law, while Abayye also practiced works of charity. Rābā was rabbi and judge of the congregation and head of the school (*methibtā*) of Mahūzā. He lived in the middle of the fourth Christian century, and became on the death of his fellow-pupil Abayye head of the famous academy of Pumbadithā, which was only closed in 1040. He was noted, like his predecessor, for his genius.

RABAD (רַבֵּב). Under this abbreviation five Jewish scholars are known, all of whom, singularly enough, lived during the twelfth century.

I. RAB AB-BETH-DIN, *i.e.*, the chief rabbi *par excellence*. His real name was R. Abraham b. Yishak of Narbonne. He was the teacher of the most distinguished rabbis of Provence.

II. R. ABRAHAM B. DAVID (Dāūd, רַבֵּב) HALLEVI of Toledo, the historiographer, who suffered martyrdom in 1180. His chief-work has been printed innumerable times, and repeatedly with historical additions from earlier sources.

III. R. ABRAHAM B. DAVID, disciple and son-in-law of Rabad I. This is the “great Rabbi of Posquières,” the only opponent whom Maimonides thought a match for himself. He died in 1198.

IV. R. ABRAHAM B. DAVID, author of the commentary on the *Sepher Yesirah*. His commentary has been printed innumerable times with the work itself,

the *editio princeps* at Mantua in 1562, 4to. Part of its preface was done in Latin by Rittangelius, (Amsterdam, 1642, 4to.)

V. R. ABRAHAM B. DAVID. He wrote *Strictures (Hassagoth)* on Rashi on the Pentateuch. This little and most interesting book was either written by a Sepharadi or Provençal, and lies in MS. (Add., 377, 3, 1) in the Cambridge University Library. No other copy is known.

RABAN (רַבָּאֵן)—*i.e.*, RABBENU ELI'EZER B. NATHAN of Mainz—was one of the most famous Halakhic teachers of the twelfth century. He lived at Mainz and corresponded with Rashi's son-in-law, Rabbenu Meir b. Shemuel, and his three distinguished sons, RASHBAM (*q.v.*), Ribam (R. Yishak b. Meir) and Rabbenu Tham (R. Ya'akob). His great Halakhic work, *צפנת פענח*, or *סבן העזר*, is commonly called by the combination of the author's initials which heads this article, the Book of Rābān, and was printed at Prague in 1610 fol.

RABANUS MAURUS. See HRABANUS MAURUS.

RABĀT. (RIBĀT,) RBĀT, or ARBĀT, also known as NEW SALLEE, a city of Morocco, on the coast of the Atlantic, 130 miles south of Cape Spartel at the mouth of the Bú Rakrak, which separates it from Sallee proper on the northern bank. It is a commercial town of about 26,000 to 30,000 inhabitants, occupying a rocky plateau and surrounded by massive but dilapidated walls, strengthened by three forts on the seaward side.

RABBA, a town of Nupi or Nufi, on the bank of the Kworra (Niger), opposite the island of Zagozhi, in 9° 6' N. latitude and 200 miles above the confluence of the Kworra and the Binue. At the time of Lander's visit in 1830 it was a place of 40,000 inhabitants and one of the most important markets in the country. In 1851 Dr. Barth reported it "in ruins," and in 1867 Rohlf found it with only 500 inhabitants.

RABBAH—*i.e.*, RAB ABBAH BAR NAHMANI—was of the house of Eli, on whom the curse rested that none of them should reach a high age. Like Rābā, he tried to remove this curse (T. B., *Rosh Hasshanah*, 18a; see RABA). He was twenty-two years head of the academy of Pumbadithā, from which he fled in the year 330, pursued by a troop of the Persian king (Shāpūr II.), and perished miserably in a jungle (T. B., *Bobo Mets'io*, leaf 86a).

RABBI. See RAB.

RABBIT. This animal is, with the hare, a member of the Rodent genus *Lepus*, which contains about twenty-five other species spread over the greater part of the world, and whose more important characters have already been referred to.

The rabbit (*Lepus cuniculus*), speaking for the present of the wild race only, is distinguished from the hare externally by its smaller size, shorter ears and feet, by the absence or reduction of the black patch at the tip of the ears so characteristic of the hare, and by its grayer color. The skull is very similar to that of the hare, but is smaller and lighter, and has a slenderer muzzle and a longer and narrower palate. Besides these characteristics, however, the rabbit is sharply separated from the hare by the fact that it brings forth its young naked, blind, and helpless; to compensate for this, it digs a deep burrow in the earth in which they are born and reared, while the young of the hare are born fully clothed with fur, and able to take care of themselves in the mere shallow depression or "form" in which they are born. The weight of the rabbit is from 2½ to 3 pounds, although individuals perfectly wild have been recorded up to more than 5. Its general habits are too well known to need a detailed description here. It breeds

from four to eight times a year, bringing forth each time from three to eight young. Its period of gestation is about thirty days, and it is able to bear when six months old. It attains to an age of about seven or eight years.

RABELAIS, FRANÇOIS, the greatest of French humorists and one of the few great humorists of the world, was born at Chinon on the Vienne in the province of Touraine. The date of his birth is wholly uncertain; it has been put by tradition and by authorities long subsequent to his death as 1483, 1490, and 1495.

With regard to his birth, parentage, youth, and education everything depends upon tradition, and it is not until he was according to one extreme hypothesis thirty-six, according to the other extreme twenty-four, that we have solid testimony respecting him. In the year 1519, on April 5th, the François Rabelais of history emerges. The monks of Fontenayle Comte bought some property (half an inn in the town), and among their signatures to the deed of purchase is that of François Rabelais. Before this all is cloudland. From Seuilly at an unknown date tradition takes him either to the university of Angers or to the convent school of La Baumette or La Basmette, founded by good King René in the neighborhood of the Angevin capital. Rabelais was in all probability disgusted with the cloister—indeed his great work shows this beyond doubt.

In 1532, and probably rather early than late in that year, he moved from Montpellier to Lyons. Here he plunged into manifold work, literary and professional. He was appointed before the beginning of November physician to the hôtel Dieu, with a salary of forty livres per annum. He edited for Sebastian Gryphius, in the single year 1532, the medical *Epistles* of Giovanni Manardi, the *Aphorisms* of Hippocrates, with the *Ars Parva* of Galen, and an edition of two supposed Latin documents, which, however, happened unluckily to be forgeries. These three works were dedicated in order to his three chief friends of Touraine and Poitou, André Tiraqueau, the bishop of Maillezais, and Bouchard. We also have a Latin letter written on December 1, 1532, to a certain Bernard de Salignac, otherwise unknown.

It is certain that at this time Lyons was the center and to a great extent the headquarters of an unusually enlightened society, and indirectly it is clear that Rabelais became intimate with this society. A manuscript distich, which was found in the Toulouse library, on the death of an infant named Theodule, whose country was Lyons and his father Rabelais, would seem to show that he here entered into other connections than those of friendship. Absolutely nothing, however, is known about the child and its mother; it is enough to say that the existence of the former would have been by the manners and morals of the time very easily condoned. But what makes the Lyons sojourn of the greatest real importance is that at this time probably appeared the beginnings of the work which was to make Rabelais immortal. It is necessary to say "probably," because the strange uncertainty which rests on so much of his life and writings exists here also. There is no doubt that both Gargantua and Pantagruel were popular names of giants in the Middle Ages, though, curiously enough, no mention of the former in French literature much before Rabelais' time has been traced. In 1526, however, Charles de Bordigné, in a satiric work of no great merit, entitled *La Légende de Pierre Faifeu*, has the name Gargantua with an allusion, and in 1532 (if not earlier) there appeared at Lyons *Les Grandes et Inestimables Chroniques du Grand et Énorme Géant Gargantua*. This is a short book on the plan of the later burlesques and romances of the

Round Table. Arthur and Merlin appear with Grantosier, as he is here spelled, Galemelle (Gargalelle), Gargantua himself, and the terrible mare. But there is no trace of the action or other characters of *Gargantua* that was to be, nor is the manner of the piece in the least worthy of Rabelais. No one supposes that he wrote it, though it has been supposed that he edited it and that in reality it is older than 1532, and may be the direct subject of Bordigné's allusion six years earlier. What does, however, seem probable is that the first book of *Pantagruel* (the second of the whole work) was composed with a definite view to this chap book and not to the existing first book of *Gargantua*, which was written afterward, when Rabelais discovered the popularity of his work and felt that it ought to have some worthier starting-point than the *Grandes Chroniques*. The earliest known and dated edition of *Pantagruel* is of 1533, of *Gargantua* 1535, though this would not be of itself conclusive, especially as we actually possess editions of both which, though undated, seem to be earlier. But the definite description of Gargantua in the title as "Père de Pantagruel," the omission of the words "second livre" in the title of the first book of *Pantagruel* while the second and third are duly entitled "tiers" and "quart," the remarkable fact that one of the most important personages, Friar John, is absent from book ii., the first of *Pantagruel*, though he appears in book i. (*Gargantua*), and many other proofs show the order of publication clearly enough. There is also in existence a letter of Calvin, dated 1533, in which he speaks of *Pantagruel*, but not *Gargantua*, as having been condemned as an obscene book. Besides this, 1533 saw the publication of an almanac, the first of a long series which exists only in titles and fragments, and of the amusing *Prognostication Pantagrueline* (still, be it observed, *Pantagrueline*, not *Gargantuine*). Both this and *Pantagruel* itself were published under the anagrammatic pseudonym of "Alcofribas Nasier," shortened to the first word only in the case of the *Prognostication*.

This busy and interesting period of Rabelais' life was brought to a close apparently by his introduction or reintroduction to Jean du Bellay. They had been, it has been said, schoolfellows, but Bellay does not appear among the list of Rabelais' friends in the first years of his emancipation. From 1534, however, he and the other members of his family appear as Rabelais' chief and constant patrons during the remainder of his life. It was just before Christmas that Jean du Bellay, passing through Lyons on an embassy to Rome, engaged Rabelais as a physician. The visit did not last very long, but it left literary results in an edition of a description of Rome by Marliani which Rabelais published in September, 1534. It is also thought that the first edition of *Gargantua* may have appeared this year.

Up to this time Rabelais, despite the condemnation of the Sorbonne referred to above, had experienced nothing like persecution or difficulty. Even the spiteful or treacherous act of Dolet, who, in 1542, reprinted the earlier form of the books which Rabelais had just slightly modified, seems to have done him no harm. But the storm of persecution which, toward the end of the reign of Francis I., was fatal to Dolet himself and to Despériers, while it exiled and virtually killed Marot, did not leave Rabelais scatheless. There is no positive evidence of any measures taken or threatened against him; but it is certain that he passed nearly the whole of 1546 and part of 1547 at Metz in Lorraine as physician to the town at the salary of 120 livres, that Sturm speaks of him as having been "cast out of France by the times" (with the exclamation *φεῦ τῶν χρόνων*) in a contemporary letter, and that he himself in a letter,

also contemporary, though it is not clear whether it is of 1546 or the next year, gives a doleful account of his pecuniary affairs and asks for assistance. At Francis' death, on March 31, 1547, Du Bellay went to Rome, and at some time not certain Rabelais joined him. He was certainly there in February, 1549, when he dates from Du Bellay's palace a little account of the festivals given at Rome to celebrate the birth of the second son of Henry II. and Catherine de' Medici. This account, the *Sciomachie* as it is called, is extant. In the same year a monk of Fontevault, Gabriel du Puits-Herbault, made in a book called *Theotimus* the first of the many attacks on Rabelais. It is, however, as vague as it is violent, and it does not seem to have had any effect. Rabelais had indeed again made for himself protectors whom no clerical or Sorbonist jealousy could touch. The *Sciomachie* was written to the cardinal of Guise, whose family were all-powerful at court, and Rabelais dedicated his next book to Odet de Chatillon, afterward cardinal, a man of great influence. Thus Rabelais was able to return to France, and was presented to the livings of Madon and St. Christophe de Jambet. It may, however, surprise those who have been accustomed to hear him spoken of as "curé de Meudon" and who have read lives of him founded on legend to find that there is very little ground for believing that he ever officiated or resided there. He certainly held the living but two years, resigning it in January, 1552, along with his other benefice, and it is noteworthy that at the episcopal visitation of 1551 he was not present. To this supposed residence at Meudon and to the previous stay at Rome, however, are attached two of the most mischievous items of the legend, though fortunately two of the most easily refutable. It is said that Rabelais met and quarreled with Joachim Du Bellay the poet at Rome, and with Ronsard at Meudon and elsewhere, that this caused a breach between him and the Pléiade, that he satirized its classicizing tendencies in the episode of the Limousin scholar, and that Ronsard after his death avenged himself by a libelous epitaph. The facts are these. Nothing is heard of the quarrel with Du Bellay or of any meeting with him, nothing of the meetings and bickerings with Ronsard, till 1699, when Bernier tells the story without any authority. The supposed allusions to the Pléiade date from a time when Ronsard was a small boy, and are mainly borrowed from an earlier writer still, Geoffroy Tory. Lastly, the epitaph read impartially is not libelous at all but simply takes up the vein of the opening scenes of *Gargantua* in reference to Gargantua's author. There is indeed no reason to suppose that either Ronsard or Du Bellay was a fervent admirer of Rabelais, for they belonged to a very different literary school; but there is absolutely no evidence of any enmity between them or even of any acquaintanceship which could have given rise to enmity.

Some chapters of Rabelais' fourth book had been published in 1548, but the whole did not appear till 1552. The Sorbonne censured it and the parliament suspended the sale, taking advantage of the king's absence from Paris. But it was soon relieved of the suspension. This is the last fact we know about Rabelais. It is supposed that he died in 1553, but actual history is quite silent, and the legends about his deathbed utterances—"La farce est jouée," "Je vais chercher un grand peut-être," etc.—are altogether apocryphal. The same may be said of the numerous silly stories told of his life, such as that of his procuring a free passage to Paris by inscribing packets "Poison for the king," and so forth.

RABENER, GOTTLIEB WILHELM, German satirist, was born in 1714 near Leipsic, and died March 22, 1771.

RABIES. See HYDROPHOBIA.

RABUTIN, ROGER DE, COMTE DE BUSSY, commonly known as BUSSY-RABUTIN (and for shortness, BUSSY), is perhaps the most characteristic figure among the lesser noblesse of France in the seventeenth century, as La Rochefoucauld is among the greater. Bussy, however, except in point of gallantry and literary power, chiefly illustrated the evil sides of the character. He was born in 1618 and died in 1693.

RACCOON. This name, familiar to all readers of works on American natural history, is borne by a small carnivore belonging to that section of the order which contains the bears, weasels, badgers, etc. (see MAMMALIA). The raccoon resembles in many respects a diminutive bear, both in its general build and in the proportions of its skull and teeth, which last are broad, blunt, and rounded, and more suited for a semi-vegetarian than for an exclusively animal diet. Its other more important zoölogical characteristics, with an account of its systematic position, have been already noted in the article just referred to. The common North American raccoon (*Procyon lotor*) is a clumsy, thickly-built animal, about the size of a badger, with a coat of long, coarse, grayish-brown hairs, short ears, and a bushy black and white ringed tail. Its range extends over the whole of the United States, and stretches on the west northwards to Alaska, and southwards well into Central America, where it attains its maximum size. The following notes on the habits of the raccoon are extracted from Dr. C. Hart Merriam's charming work on the mammals of the Adirondacks (northeast New York):

"Raccoons are omnivorous beasts, and feed upon mice, small birds, birds' eggs, turtles and their eggs, frogs, fish, crayfish, molluscs, insects, nuts, fruits, maize, and sometimes poultry. Excepting alone the bats and flying-squirrels, they are the most strictly nocturnal of all our mammals, and yet I have several times seen them abroad on cloudy days. They haunt the banks of ponds and streams, and find much of their food in these places, such as crayfish, mussels, and fish, although they are unable to dive and pursue the latter under water, like the otter and mink. They are good swimmers, and do not hesitate to cross rivers that lie in their path.  
\* \* \* The raccoon hibernates during the severest part of the winter, retiring to its nest rather early, and appearing again in February or March, according to the earliness or lateness of the season. It makes its home high up in the hollow of some large tree, preferring a dead limb to the trunk itself. It does little in the way of constructing a nest, and from four to six young are commonly born at a time, generally early in April in this region. The young remain with the mother about a year."

The South American species, *Procyon cancrivorus*, the crab-eating raccoon, is very similar to *P. lotor*, but differs by its much shorter fur, larger size, proportionally more powerful teeth, and other minor characteristics. It extends over the whole of South America, as far south as the Rio Negro, and is very common in all suitable localities. Its habits are similar to those of the North American species.

RACHEL, the stage name of a French actress, whose true name was ELIZABETH FÉLIX, and who was the daughter of Jacob Félix and Esther Haya, Alsatian Jews, who traveled on foot through France as peddlers. She was born, according to one account, on March 24, 1820, according to another, on February 28th of the following year, in a small inn in Mumpf in the canton of Aargau, Switzerland. At Rheims she and her eldest sister Sophia, afterward known as Sarah, joined a troupe of Italian children who made their living by singing in the cafés. In 1830 they came to Paris, where

they sang in the streets, Rachel giving such patriotic songs as the *Parisienne* and the *Marseillaise*. Choron, a famous teacher of singing, was so impressed with the talents of the two sisters that he undertook to give them gratuitous instruction, and after his death in 1833 they were received into the Conservatoire. Rachel made her first appearance at the Gymnase in the *Vendéenne* in 1837. On June 12th of the following year she succeeded, after great difficulty, in making her début at the Théâtre Français, appearing as "Camille" in *Les Horaces*, when, attention having been directed to her remarkable genius by Jules Janin in the *Débats* and Madame de Gerardin in the *Presse*, it at once received universal recognition. She appeared successively as "Émilie" in *Cinna*, "Hermione" in *Andromaque*, "Ériphile" in *Iphigénie*, "Monime" in *Mithradate*, and "Aménaïde" in *Tancrède*; but it was in *Phèdre* which she first played on January 21, 1843, that her peculiar gifts were most strikingly manifested. In modern plays she created the characters of "Judith" and "Cleopatra" in the tragedies of Madame de Girardin, but her most successful appearance was in 1849 in *Adrienne Lecouvreur*. In 1840 she visited London, and in 1855 she made a tour of the United States. She died of consumption at Cannet, near Cannes, on January 4, 1858.

RACINE, a city of the United States, the county seat of Racine county, Wis., lies twenty-three miles by rail south of Milwaukee, and occupies a plateau projecting for about six miles into Lake Michigan, forty feet above its level. The city contains an elaborate school system, embracing in the curriculum taught all branches necessary to a complete classical, scientific, and commercial education, and affording every facility and equipment adapted to the requirements of the service. Besides being the location of Racine (Episcopal) College, founded in 1852, and a Roman Catholic academy, the city contains a high-school building, graded schools, also a number of commodious and handsomely-appointed church edifices, county court house, orphan asylum, and other public buildings, three large hotels, three national banks, one or two public halls, and is lighted by gas and electricity. The city is the seat of extensive manufacturing industries, including carriages, wagons, plows, threshing-machines, portable steam-engines, fanning-mills, leather, blinds and sashes, school furniture, wire, linseed oil, baskets, etc.; is engaged in the lumber trade, and general commerce. The harbor is open to vessels drawing fifteen feet. Racine, first settled in 1834, was incorporated in 1848, four years after the first steamer had entered the port. The population was 7,822 in 1860, 9,880 in 1870, 16,031 in 1880, and 21,014 in 1890.

RACINE, JEAN, the most accomplished, if not the greatest, tragic dramatist of France, was born at La Ferté Milon in the old duchy of Valois in the month of December, 1639. He was sent to the Collège de Beauvis at an early age, and in October, 1658, was entered at the Collège d'Harcourt. In November, 1661, he went to Uzès, Languedoc, to live with an uncle, through whose influence it was hoped Racine would be able to secure a benefice. Two years later he returned to Paris, where he gave himself to letters and courtiership.

The first but the least characteristic of the dramas by which Racine is known, *La Thébaïde*, was finished by the end of 1663, and on Friday, June 20, 1664, it was played by Molière's company at the Palais Royal theater.

We have no definite details as to Racine's doings during the year 1664, but in February, 1665 he read at the Hôtel de Nevers before La Rochefoucauld, Madame de la Fayette, Madame de Sévigné, and other scarcely less redoubtable judges the greater part of his second

acted play, *Alexandre le Grand*, or, as Pomponne (who tells the fact) calls it, *Porus*. He was now for the first time proposed as a serious rival to Corneille. In reply to criticisms of his work Racine wrote a savage letter and pamphlet, but was persuaded by Boileau to suppress the latter together with a preface to both which he had prepared with a view to publishing them together. In this respect Boileau was certainly Racine's good angel, for no one has ventured to excuse the tone of these letters. The best excuse for them is that they represent the accumulated resentment arising from a long course of "excommunications."

After this disagreeable episode Racine's life for ten years and more becomes simply the history of his plays, if we except his liaisons with the actresses Mademoiselle du Parc and Mademoiselle de Champmeslé (which are undoubted, though there is not much to be said about them) and his election to the Academy on July 17, 1673. Mademoiselle du Parc (Marquise de Gorla) was no very great actress, but was very beautiful, and she had previously captivated Molière. Racine induced her to leave the Palais Royal company and join the Hôtel. She died in 1668, and long afterward the infamous Voison accused Racine of having poisoned her. Mademoiselle de Champmeslé was plain and stupid, but an admirable actress and apparently very attractive in some way, for not merely Racine but Charles de Sévigné and many others adored her. She was cruel to none, but for five years before his marriage Racine seems to have been her *amant en titre*. Long afterward, just before his own death, he heard of her mortal illness and speaks of her to his son without a flash of tenderness; the series of his dramatic triumphs began with *Andromaque*, and this play may perhaps dispute with *Phèdre* and *Athalie* the title of his masterpiece. It is much more uniformly good than *Phèdre*, and the character of "Hermione" is the most personally interesting on the French tragic stage. *Andromaque* was succeeded, at the distance of not more than a year, by a play which, taken in conjunction with his others, is perhaps the best proof of the theatrical talent of Racine—the charming comedietta of *Les Plaideurs*. We do not know exactly when it was played, but it failed completely. The piece, however, was suddenly played at court a month later; the king laughed, and its fortunes were restored. It was followed by a very different work, *Britannicus*, which appeared on December 13, 1669. The next play of Racine, *Bérénice*, has, except *Phèdre*, the most curious history of all. Henrietta of Orleans proposed (it is said without letting them know the double commission) the subject to Corneille and Racine at the same time, and rumor gives no very creditable reasons for her choice of the subject. Her death, famous for its disputed causes and for Bossuet's sermon, preceded the performance of the two plays, both of which, but especially Racine's, were successful. *Bajazet* was first played on January 4, 1672. As a play, technically speaking, it has great merit, but the whole thing is not only French but ephemerally French—French of the day and hour; and its ingenious scenario and admirable style scarcely save it. This charge is equally applicable with the same reservations to *Mithridate*, which appears to have been produced on January 13, 1673, the day after the author's reception at the Academy. His next attempt, *Iphigénie*, was a long step backward and upward in the direction of *Andromaque*. It is not that the characters are eminently Greek, but that Greek tragedy gave Racine examples which prevented him from flying in the face of the propriety of character as he had done in *Bérénice*, *Bajazet* and *Mithridate*, and that he here called in, as in *Andromaque*, other passions to the aid of the mere sighing

and crying which form the sole appeal of these three tragedies. It succeeded brilliantly and deservedly, but, oddly enough, the date of its appearance is very uncertain. It was assuredly acted at court in the late summer of 1674, but it does not seem to have been given to the public till the early spring of 1675, the usual time at which Racine produced his work. The last and finest of the series of tragedies proper was the most unlucky. *Phèdre* was represented for the first time on New Year's Day, 1677, at the Hôtel de Bourgogne. Within a week the opposition company or "troupe du roi" launched an opposition *Phèdre* by Pradon. This singular competition, which had momentous results for Racine, and in which he to some extent paid the penalty of the *lex talionis* for his own rivalry with Corneille, had long been foreseen. It has been hinted that Racine had from the first been bitterly opposed by a clique, whom his great success irritated, while his personal character did nothing to conciliate them. His enemies at this time had the powerful support of the duchess of Bouillon, one of Mazarin's nieces, a woman of considerable talents and imperious temper, together with her brother the duke of Nevers and divers other personages of high position. These persons of quality, guided, it is said, by Madame Deshoulières, a poetess of merit whom Boileau unjustly depreciated, selected Pradon, a dramatist of little talent but of much facility, to compose a *Phèdre* in competition with that which it was known that Racine had been elaborating with unusual care. Pradon, perhaps assisted, was equal to the occasion, and it is said that the partisans on both sides did not neglect means for correcting fortune. It was of no value, but the measures of the cabal had been so well taken that the finest tragedy of the French classical school was all but driven from the stage, while Pradon's was a positive success. He now broke off his dramatic work entirely, and in the remaining twenty years of his life wrote but two more plays, and those under special circumstances, and of quite a different kind. He now married, became irreproachably domestic, and almost ostentatiously devout.

The almost complete silence in the literary sphere which Racine imposed on himself after the comparative failure, shameful not for himself but for his adversaries, of *Phèdre* was broken once or twice even before the appearance of the two exquisite tragedies in which under similar circumstances he took leave of the stage. The most honorable of these was the reception of Thomas Corneille on January 2, 1685, at the Academy in the room of his brother. The discourse which Racine then pronounced turned almost entirely on his great rival, of whom he spoke even more than becomingly. But it was an odd conjunction of the two reigning passions of the latter part of his life—devoutness and obsequiousness to the court—which made him once more a dramatist. Madame de Maintenon had established an institution, first called the Maison Saint Louis, and afterward the Maison de Saint Cyr, for the education of poor girls of noble family. The tradition of including acting in education was not obsolete. At first the governess, Madame de Grignon, composed pieces for representation, but, says Madame de Caylus, a witness at first hand and a good judge, they were "detestable." Then recourse was had to chosen plays of Corneille and Racine, but here there were obvious objections. The favorite herself wrote to Racine that "nos petites filles" had played *Andromaque* "a great deal too well." She asked the poet for a new play suited to the circumstances, and, though Boileau advised him against it, it is not wonderful that he yielded. The result was the masterpiece of *Esther*, with music by Moreau, the court composer and organist of Saint Cyr.



Although played by schoolgirls and in a dormitory, it had an enormous success. Almost immediately the poet was at work on another and a still finer piece of the same kind, and he had probably finished *Athalie* before the end of 1690. The fate of the play, however, was very different from that of *Esther*. It was printed in March, 1691, and the public cared very little for it. Thenceforward Racine was practically silent, except for four *cantiques spirituelles*, in the style and with much of the merit of the choruses of *Esther* and *Athalie*. Disease of the liver appears to have been the immediate cause of his death, which took place on April 12, 1699.

**RACKETS.** Like tennis, this game of ball is of French origin, and its name is derived from "raquette," the French term for the bat used in the pastime. In the United Kingdom it is not so universally pursued as cricket and football, and is essentially an indoor game, which is played only in prepared and covered courts. Such buildings have been erected at many of the large public schools, at the universities, and in garrison towns.

The usual dimensions of a "close" court are 80 feet by 40 feet for four-handed matches, while 60 feet by 30 feet are sufficient for a single match.

The game is played with no other implements but bats and balls. The striking portion of the former is oval-shaped and strung tightly across with catgut. The handle is of pliant ash covered with leather in order to give the hand a tight grip. The balls are about  $1\frac{1}{4}$  inches in diameter, and very hard in order to rebound evenly and quickly.

The game has been introduced into the United States, but is rarely played.

**RADAUTZ**, a town in the Austrian duchy of Bukovina, is situated on the Suczava, about fifteen miles from the frontier of Moldavia. It was formerly the seat of a Greek bishopric, removed to Czernowitz in 1786, and possesses a cathedral with the tombs of several Moldavian princes. It contains a government stud, and manufactures paper, glass, machinery, beer, and brandy. In 1880 Radautz had 11,162 inhabitants and between 12,000 and 15,000 in 1890.

**RADBERTUS**, head of the Benedictine abbey of Corbie, near Amiens, from 844 to 851, was born at or near Soissons toward the close of the eighth century, and became a monk of Corbie in 814, when he assumed the cloister name of PASCHASIUS. In 844 he was chosen abbot, but as a disciplinarian he was more energetic than successful, and in 851 he resigned the office. In his official capacity he took part in the synod of Chiersy which condemned Gottschalk. Of the closing period of his life nothing is known, except that it was one of great literary activity. His work includes an *Expositio in Mattheum*, in twelve books, a favorable specimen of the exegesis of that period, and the *Liber de Corpore et Sanguine Christi*, a pious and popularly written treatise, designed to prove that the elements in the sacrament are completely changed.

**RADCLIFFE**, a town of Lancashire, England, is situated on the river Irwell, crossed by a bridge of two arches, and on the Lancashire and Yorkshire railway, seven miles northwest of Manchester, and two southwest of Bury. Cotton-weaving, calico-printing, and bleaching are the principal industries, and there are extensive collieries in the neighborhood. The town is governed by a local board of health established in 1866. The area of the urban sanitary district is 2,453 acres, with a population in 1871 of 11,446; in 1881 of 16,267 and in 1890, estimated at 20,000.

**RADCLIFFE, ANN WARD**, novelist, was born in London on July 9, 1764. She was the author of three novels unsurpassed of their kind in English literature,

*The Romance of the Forest* (1791), *The Mysteries of Udolpho* (1794), *The Italian* (1797). She wrote two other novels before any of these, the *Castles of Athlin and Dunbayne* (1789) and the *Sicilian Romance* (1790), but they attracted no special attention and deserve none, although in them she works with the same romantic materials—dreadful castles, wild adventures, terrible characters. One other was written after the famous three, but not published till 1826, three years after her death—*Gaston de Blondville*, interesting as an elaborate study of costume and scenery, and valuable as a monument of her accurate archæological learning, but comparatively tedious as a story, though not without passages in her best style. She died in February, 1823.

**RADETZKY, JOHANN J. W. A. F. C., COUNT OF RADETZ**, field-marshal of Austria, was born at Trzebnitz in Bohemia in 1766, to the nobility of which province his family belonged. He entered a cavalry regiment in 1784 and served under Joseph II. and Laudon against the Turks in 1788 and 1789. In 1793 his regiment was sent to the lower Rhine, and from this time onward Radetzky was engaged in the wars which were continued (with intermission) between Austria and France, for the next twenty years. In 1796 he was adjutant to General Beaulieu, over whom Bonaparte won his first victories in Italy. In 1799, when the Austrians with Suwaroff's help reconquered Northern Italy, he distinguished himself at the battles of Novi and the Trebbia, and after the defeat of Marengo he was removed from Italy to Germany, and there took part in the still more disastrous engagement of Hohenlinden. In 1805 Radetzky, now major-general, was back in Italy, serving under the archduke Charles in the successful campaign of Caldiero, the fruits of which were lost by Mack's capitulation at Ulm and the fall of Vienna. In 1809 he fought at Wagram. He entered Paris with the allied sovereigns in March, 1814, and returned with them to the congress of Vienna, where he appears to have acted as an intermediary between Metternich and the czar Alexander, when these great personages were not on speaking terms. During the succeeding years of peace he disappeared from the public view and narrowly escaped being pensioned off in 1829. The insurrection of the Papal Legations in 1831 brought him, however, into active service again; and on the retirement of General Frimont he was placed in command of all the Austrian forces in Italy, receiving in 1836 the dignity of field-marshal. He retired from service in 1857, and died at the age of ninety-two in the following year.

**RADHANPUR**, a petty state of India, within the group of states under the supervision of the political superintendent of Palanpur; it is situated in the north-western corner of Gujarat, close to the Runn of Cutch, Bombay presidency, and lies between  $33^{\circ} 26'$  and  $23^{\circ} 58'$  N. latitude and between  $71^{\circ} 28'$  and  $72^{\circ} 3'$  E. longitude. The country is an open plain without hills and with few trees, square in shape, and about thirty-five miles across. Including the pergunnahs of Munjpur and Sami, it contains an area of 1,150 square miles with a population (1881) of 98,129 (males 50,903, females 47,226), the majority being Hindus. Though subject to very great extremes of heat and cold, the climate is healthy. The estimated yearly revenue of the state is from £50,000 to £60,000. Its chief products are cotton, wheat, and all the common varieties of grain; the only manufacture of any importance is the preparation of a fine description of saltpeter.

**RADHANPUR**, chief town of the state and the seat of the nawab, had a population of 14,722 in 1881. The nearest railway station is at Kharagoda, forty miles distant.

**RADIATA.** This term was introduced by Cuvier in 1812 to denote the lowest of his four great animal groups or "embranchements." He defined them as possessing radial instead of bilateral symmetry, and as apparently destitute of nervous system and sense organs, as having the circulatory system rudimentary or absent, and the respiratory organs on or coextensive with the surface of the body; he included under this title and definition five classes—Echinodermata, Acalepha, Entozoa, Polypi, and Infusoria. Lamarck (*Hist. nat. d. Anim. s. Vertèbres*) also used the term, as when he spoke of the Medusæ as *radiata medusaria et anomala*; but he preferred the term Radiaria, under which he included Echinodermata and Medusæ. On radiate symmetry, see MORPHOLOGY. Compare also CUVIER, ANIMAL KINGDOM, ECHINODERMATA, CORALS, etc.

**RADIATION AND CONVECTION.** When a red-hot cannon ball is taken out of a furnace and suspended in the air it is observed to cool, *i.e.*, to part with heat, and it continues to do so at a gradually diminishing rate till it finally reaches the temperature of the room. But the process by which this effect is produced is a very complex one. If the hand be held at a distance of a few inches from the hot ball on either side of it or *below* it, the feeling of warmth experienced is considerable; but it becomes intolerable when the hand is held at the same distance *above* the ball. There is, in fact, a column of air very irregularly heated by contact with the ball, and rising, in obedience to hydrostatic laws, in the colder and denser air around it. This conveyance of heat by the motion of the heated body itself is called *convection*; the process by which heat is lost indifferently in all directions is called *radiation*.

To illustrate how the third method by which heat can be transferred, *viz.*, *conduction*, let the cannon ball be again heated and at once immersed in water until it just ceases to be luminous in the dark, and be immediately hung up in the air. After a short period it again becomes red-hot all over, and the phenomenon then proceeds precisely as before, except that the surface of the ball does not become so hot as it was before being plunged in the water. This form of experiment, which requires that the interior shall be very considerably cooled before the surface ceases to be self-luminous, does not succeed nearly so well with a copper ball as with an iron one, on account of the comparatively high conductivity of copper.

In conduction there is a passage of heat from hotter to colder parts of the same body; in convection an irregularly heated fluid becomes hydrostatically unstable, and each part carries its heat with it to its new position. In both processes heat is conveyed from place to place. But it is quite otherwise with radiation. That a body cools in consequence of radiation is certain; that other bodies which absorb the radiation are thereby heated is also certain; but it does not at all follow that what passes in the radiant form is heat. It is undoubtedly a transference of energy which was in the form commonly called heat in the radiating body, and becomes heat in a body which absorbs it, but it is transformed as it leaves the first body and retransformed when it is absorbed by the second.

**RADIOMETER**, a form of the now obsolete cross-staff, formerly used by navigators to obtain the altitude and angles of stars, etc.; used in the calculation of latitude and longitude.

**RADISH.** A vegetable indigenous to the temperate zone, used as an edible, and as food for stock.

**RADNOR**, an inland county of South Wales, is bounded east by Hereford and Shropshire, north by Montgomery, west by Cardigan, and south by Breck-

nock. Its greatest length from north to south is about thirty miles, and its greatest breadth from east to west about thirty-three miles. The area is 276,552 acres, or 432 square miles. The greater part of the surface of the country is hilly, and the center is occupied by a mountainous tract called Radnor Forest, running nearly east and west, its highest summit reaching 2,163 feet. The hills for the most part present smooth and rounded outlines, but the valley of the Wye is famed for its beauty. The higher ranges are covered with heath, but there is good pasturage on the lower slopes. The smaller elevations are frequently clothed with wood. Lead and copper are said to exist, but not in quantities sufficient to pay the working. There are saline, sulphurous, and chalybeate wells at Llandrindod.

The climate is somewhat damp, and, in the spring, cold and ungenial. The greater part of the country is suitable only for pasturage, but there is some good arable land in the valleys in the southern and south-eastern districts, which produces excellent crops of turnips, oats, and Welsh barley, the soil being chiefly open shaley clay, although in the east there is an admixture of red sandstone soils. The inhabitants are dependent almost solely on agriculture, the manufactures being confined chiefly to coarse cloth, stockings and flannel for home use. The county is intersected by several lines: the Central Wales Railway runs southwest from Knighton to Llandovry; another line runs southeastward by Rhayader and Builth, and joins the Hereford line, which passes by Hay and Talgarth; while another branch line passes by Kington to New Radnor.

Radnor comprises six hundreds, but contains no municipal borough. It has one court of quarter sessions, and is divided into six petty and special sessional divisions. It returns one member to the House of Commons. The population, in 1871, was 25,430; in 1881 it was 23,528. The present population (1890) is estimated at 27,000.

**RADOM**, a government of Poland, occupying a triangular space between the Vistula and the Pilica, and bounded on the north by Warsaw and Siedlce, on the east by Lublin, on the south by Austrian Galicia and Kielce, and on the west by Piotrków. The area is 4,765 square miles. The population, 644,830 in 1882, and in 1890 about 650,000, is Polish for the most part, one-seventh being Jews. The chief occupation is agriculture, the principal crops being wheat, oats, rye, potatoes, and beetroot (for sugar). Corn is exported and potatoes largely used for distillation. In 1879 there were 148 manufacturing establishments (197 in 1883), employing 1,708 hands, with an aggregate production of 2,121,000 rubles (\$1,060,000), the more important being tanneries, flour-mills, sugar-works, and several machinery and iron-works. These last are suffering, however, from want of wood-fuel, and many of them have recently been closed. Trade is not very extensive, the only channel of commerce being the Vistula. The educational institutions include two lycées or gymnasias and two progymnasias (all at Radom), with 813 male and 287 female pupils, a normal school, a theological seminary at Sandomir, and 170 primary schools, 112 in villages, with 8,465 scholars.

**RADOM**, capital of the above government, situated on the Mleczna, a tributary of the Radomka, sixty-five miles south from Warsaw, is one of the best-built provincial towns of Poland. Lublin street has a number of fine shops, and there are two well-kept public gardens. The manufactures are unimportant, but trade has been lately increasing.

**RAEBURN, SIR HENRY**, portrait-painter, was born at Stockbridge, a suburb of Edinburgh, on March 4, 1756, the son of a manufacturer of the city. In 1822

he was knighted by George IV., and appointed His Majesty's limner for Scotland. He died at Edinburgh, July 8, 1823.

RAFF, JOSEPH JOACHIM, composer and orchestral conductor, was born near Zurich May 27, 1822, and educated chiefly at Schwyz. When in 1843 he sent some MSS. to Mendelssohn, that warm encourager of youthful talent felt justified in at once recommending him to Breitkopf & Härtel of Leipsic, who published a large selection of his early works. Soon after this he became acquainted with Liszt, who gave him much generous encouragement. In 1859 he married Doris Genast, an actress of high repute, and thenceforward devoted himself with renewed energy to the work of composition, displaying an inexhaustible fertility of invention tempered by an amount of technical skill which stamped even his lightest works with the dignity to which the union of natural talent with high artistic cultivation can alone give birth. He resided chiefly at Wiesbaden till 1877, when he was appointed director of the Hoch-Conservatorium at Frankfort, an office which he retained until his death, June 25, 1882.

RAFFLES, SIR THOMAS STAMFORD, the son of a captain in the West India trade, was born at sea off the coast of Jamaica on July 5, 1781. Returning with his mother to England, he was placed in a boarding-school at Hammersmith, where he remained till the age of fourteen, when he entered the East India House as an extra clerk. In 1808 he had to visit Malacca to recruit his shattered strength; here he began his elaborate researches into the history, laws and literature of the Hindu and Malay races. In zoölogy he took special interest, and on his return to England became founder and first president of the Zoölogical Society.

Having received knighthood, Sir Stamford Raffles set out for Sumatra as lieutenant-governor of Bencoolen, in March, 1818. In 1819 he induced the marquis of Hastings to annex Singapore. In 1820 he sent home a large collection of preserved animals, now in the museum of the London Zoölogical Society, described in the *Transactions* of the Linnean Society. He died of apoplexy at his house near London on July 5, 1826.

RAFN, CARL CHRISTIAN, Danish archæologist, was born in Brahesborg, Fünen, on January 16, 1795, and died at Copenhagen on October 20, 1864. He is chiefly known in connection with the controversy as to the question of the discovery of America by the Norsemen.

RAGATZ, or RAGAZ, a watering-place in Switzerland, in the canton of St. Gall, with a station on the railway to Coire, sixty-four miles southeast of Zurich, stands 1,700 feet above the sea at the mouth of the magnificent gorge through which the impetuous Tamina forces its way to the Rhine; its baths are supplied with mineral water from the hot springs of Pfäfers, which issue from the right side of the ravine two and one-half miles higher up. As the tourist center for one of the most picturesque districts of Switzerland, Ragatz has greatly increased since the middle of the century. It had then only 650 inhabitants; in 1870 there were 1,825, in 1880 1,996, and in 1890 about 2,500, while the annual number of visitors is about 50,000.

RAGLAN, FITZROY JAMES HENRY SOMERSET, BARON, English general, was the eighth and youngest son of the fifth duke of Beaufort by Elizabeth, daughter of Admiral the Hon. Edward Boscawen, and was born on September 30, 1788. He entered the army in 1804. From 1818 to 1826 he sat in the House of Commons as member for Truro. In 1819 he was appointed secretary to the duke of Wellington as master-general of the

ordnance, and from 1827 till the death of the duke in 1852 was military secretary to him as commander-in-chief. He was then raised to the House of Lords as Baron Raglan. In 1854 he was appointed to the command of the English troops sent to the Crimea. For the hardships and sufferings of the English soldiers in the terrible Crimean winter owing to a failure in the commissariat, both as regards food and clothing, Lord Raglan and his staff were at the time severely censured by the press and the government. The monotony of the siege was broken by the battles of Balaclava on October 26, and of Inkermann on November 5, in which the accurate and rapid decision of Lord Raglan changed impending disasters into brilliant victories. He died of dysentery on June 28, 1855.

RAGMAN ROLLS, the name given to the collection of instruments by which the nobility and gentry of Scotland were compelled to subscribe allegiance to Edward I. of England between the conference of Northampton in May, 1291, and the final award in favor of Baliol in November, 1292, and again in 1296. The derivation of the word "ragman" has never been satisfactorily explained, but has been sometimes confined to the record of 1296, of which an account is given in *Calendar of Documents relating to Scotland preserved in the Public Record Office, London* (1884).

RAGUSA (Slavonic *Dubrovnik*, Turkish *Paprovnik*), a city on the east coast of the Adriatic, for many centuries an independent republic, now at the head of a district in the province of Dalmatia in Austria-Hungary. It is built close to the sea at the foot of the bare limestone mass of Monte Sergio, on which stands an unfinished Fort Impérial erected by the French. In front lies the island of Lacroma, the traditional landing-place of Cœur-de-Lion. Ragusa can never have been a large city. In the sixteenth century it is said to have contained 30,000 or 40,000 inhabitants; in 1881 it had only 7,245, and its commune, with its fifteen additional villages, 10,936. The harbor, once one of the great ports of southern Europe, is altogether too small for modern requirements, in spite of the new breakwater constructed in 1873 to protect it from the southwest winds. The staple trade is that of oil, but the whole supply is sent to the Trieste market. Ragusan Malmsey, once famous, has disappeared before the vine disease since 1852.

RAGUSA, a city of Italy in the province of Syracuse (Sicily), sixteen miles east of Vittoria and ten north-northwest of Modica, lies on the right side of the valley of the Ragusa or Erminio (Herminius). It consists of an upper and lower town, with a total population in 1890 of about 35,000. Ragusa possesses a large cotton factory. Stone impregnated with petroleum is quarried in the Grotta Oleosa in the neighborhood, and after the oil is burned out becomes an article of export under the name of *pietra nera*. The city, which was destroyed by earthquake in 1693, is of considerable antiquity, as is proved by the numerous ancient tombs existing in the district.

RAHEL. See VARNHAGEN VON ENSE.

RAHWAY, a city of the United States in Union county, N. J., nineteen miles by rail southwest of New York, lies on Rahway river at the head of schooner navigation, about four miles above its mouth in Staten Island sound. It is best known for its carriage-factories, but has also a wool-mill, a printing-press manufactory, a printing-house, a shirt-factory, a hunting-goods factory, etc. The population was 6,258 in 1870, 6,455 in 1880, and 7,095 in 1890. First settled in 1720 and named after Rahwack, the Indian owner of the site, Rahway was incorporated as a city in 1858.

RAI BARELI or ROY BAREILLY, a district of

British India, in the Rai Bareli division of Oudh, under the jurisdiction of the lieutenant-governor of the Northwestern Provinces, has an area of 1,738 square miles, is bounded on the north by the districts of Lucknow and Bara Banki, on the east by Sultampur, on the south by Partabgarh and the Ganges, and on the west by Tuao. The general aspect of the district is slightly undulating and the country is beautifully wooded; in fact, the beauty of the country is not to be surpassed by any part of the real plain of Hindustan. The soil is remarkably fertile, and the cultivation of a high class. The principal rivers of the district are the Ganges and the Sai. Other rivers are the Basha, the Loni, and the Naiya. The indigenous products of Rai Bareli consist of several magnificent and useful timber trees, numerous kinds of grazing and thatching grasses, and a variety of rice known as "pasahi," which grows wild in many tanks and marshes; its jungle products are lac and silk cocoons. Herds of wild cattle are to be found in the south of the district, near the Sai river, and do much harm to the crops; nylghau are common near the Ganges, and wolves are occasionally met with in the jungles.

According to the census of 1881 Rai Bareli district contains a population of 951,905 (males 466,906, females 484,999). By religion 874,180 are Hindus, 77,424 Mohammedans, and 123 Christians. The most numerous castes are Ahirs (114,869), the Brahmans (113,212), and the Rajputs (70,757).

RAI BARELI or ROY BAREILLY, town and administrative headquarters of the above district, is situated on the banks of the Sai in 26° 14' N. latitude and 81° 17' E. longitude. It was founded by the Bhars, who called it Bharauli, but it was subsequently corrupted into Bareli. It possesses many architectural features, chief of which is a spacious and strong fort erected in 1403, and constructed of bricks two feet long by one foot thick and one and a half wide.

RAIKES, ROBERT, the founder of Sunday schools, was the son of Robert Raikes, a printer in Gloucester and proprietor of the *Gloucester Journal*, and was born on September 14, 1735. On the death of his father in 1757 he succeeded him in the business, which he continued to conduct till 1802. Along with some others he started a Sunday school at Gloucester in 1780. For nearly thirty years he continued actively engaged in the promotion of his undertaking, and he lived to witness its wide extension throughout England. He died on April 5, 1811.

RAIL (German *Ralle*, French *Râle*, Low Latin *Rallus*), originally the English name of two birds, distinguished from one another by a prefix, as land-rail and water-rail, but latterly applied in a much wider sense to all the species which are included in the family *Rallidæ* of Ornithology.

The land-rail, also very commonly known as the corn-crake, and sometimes as the daker-hen, is the *Rellus crex* of Linnæus and *Crex dratensis* of recent authors. It looks as big as a partridge, but on examination its appearance is found to be very deceptive, and it will hardly ever weigh more than half as much. The plumage above is of a tawny brown, the feathers being longitudinally streaked with blackish brown; beneath it is of a yellowish white; but the flanks are of a light chestnut. The species are very locally distributed and in a way for which there is at present no accounting. In some dry upland and corn-growing districts it is plentiful; in others, of apparently the same character, it but rarely occurs; and the same may be said in regard to low-lying marshy meadows, in most of which it is in season always to be heard, while in others having a close resemblance to them it is never met with. The nest is

on the ground, generally in long grass, and therein from nine to eleven eggs are commonly laid. These are of a cream-color, spotted and blotched with light red and gray. The young when hatched are thickly clothed with black down, as is the case in nearly all species of the family.

The water-rail, locally known as the skiddy or bill-cock, is the *Rallus aquaticus* of Ornithology. Having a general resemblance to the land-rail, it can be in a moment distinguished by its partly red and much longer bill, and the darker coloration of its plumage—the upper parts being of an olive brown with black streaks, the breast and belly of a sooty gray, and the flanks dull black barred with white. Its geographical distribution is very wide, extending from Iceland (where it is said to preserve its existence during winter by resorting to the hot springs) to China; and though it inhabits Northern India, Lower Egypt, and Barbary, it seems not to pass beyond the tropical line. It never affects upland districts as does the land-rail, but always haunts wet marshes or the close vicinity of water. The eggs resemble those of the preceding, but are more brightly and delicately tinted.

RAILWAYS had their origin in the fact that wheels carrying loads move more easily on hard continuous surfaces. "Railroad" is the term almost exclusively in use in the United States. In 1676 tramways consisted of rails of timber. By and by an additional or wearing rail, which could be easily renewed when worn, was placed above the supporting rail, and it became a common practice to nail down bars of wrought iron on the surfaces of the ascending inclines of the road. These bars or rails were about two inches wide and half an inch thick, and were fastened to the wood rails by countersunk spikes. Cast iron was first tried incidentally as a material for rails in 1767. The iron rails were cast in lengths of five feet, four inches wide, and one and one-fourth inches thick, formed with three holes, through which they were fastened to the oak rails. The tramway was developed into the railway by the employment of cast-iron flange rails to replace the wooden rails; the continuous flange or ledge on their inner edge kept the wheels on the track.

The benefits derived from the use of the tramway or railway for the transport of coal suggested to reflective persons the employment of it for the conveyance of general merchandise and of passengers. The first great movement in that direction was the passing of the act in 1821 for the construction of the Stockton and Darlington Railway, in England. This was to be worked with horses. By another act applied for at the request of George Stephenson, who became engineer to the line, the company was empowered to work the railway with locomotive engines. The line, with three branches, was over thirty-eight miles in length, and was at first laid as a single line, with passing places at intervals of a quarter of a mile, the way being constructed with wrought-iron fishbelly rails, weighing twenty-eight pounds per yard. It was opened in September, 1825, by a train of thirty-four vehicles, making a gross load of about ninety tons, drawn by one engine driven by Stephenson, *with a signalman on horseback in advance*. The train moved off at the rate of from ten to twelve miles an hour, and attained a speed of fifteen miles per hour on favorable parts of the line. A train weighing ninety-two tons could be drawn by one engine at the rate of five miles per hour. In October, 1825, the company began to run a daily coach, called the "Experiment," to carry six inside, and from fifteen to twenty outside, making the journey from Darlington to Stockton and

back in two hours. The Monklands Railway in Scotland, opened in 1826, was the first to follow the example of the Stockton and Darlington line, and several other small lines—including the Canterbury and Whitstable, worked partly by fixed engines and partly by locomotives—quickly adopted steam traction. But the inauguration of the Liverpool and Manchester Railway, opened in 1830, made the first great impression on the national mind that a revolution in the modes of traveling had really taken place. In 1838 a line was opened between London and Birmingham, and the first train accomplished the whole distance—one hundred and twelve and a quarter miles—at an average speed of over twenty miles per hour.

The earliest four-wheeled locomotive constructed by Robert Stephenson & Co., as an article of regular manufacture, weighed nine tons in working order. The six-wheeled engines which followed weighed eleven and a half tons. In the course of business locomotives of greater power and greater weight were constructed; and there are locomotives of the present time which weigh forty-seven and a half tons in working order, and with the tender full of water and coal about eighty tons gross. There are other engines of special design with twelve wheels which weigh in working order, with fuel and water, seventy-two tons.

Locomotives may broadly be reduced to two classes, according to the situation of the working cylinders. In the first class these are within the framing, under the boiler, with the main driving axle cranked at two points to receive the power from the two cylinders. This is almost exclusively the English form. The American locomotive engine has the cylinders outside the framing, and connected, not to the axle, which is straight, but to crank-pins fixed between the spokes of the wheels, in connection with the nave. In the latter the general contour of the cylinders is usually visible at the fore end of the machine. The tenders have eight wheels, four to a truck, and they are supplied with powerful brakes, included in the pneumatic system invented by Mr. Westinghouse, and in almost universal use for the past eighteen years. A water tank forms the upper part of the tender, namely, the two sides and the back, usually in the form of a horse-shoe, holding from 1,000 to 3,000 gallons; and in the hollow of the shoe the fuel is deposited, of which a full charge may weigh from 3,000 pounds to three and a half tons. The engine and the tender are sustained on springs placed over the axle bearings. Again, there is the general classification of locomotives into passenger engines and freight engines. As the power of the engine is brought into action through the grip of the driving wheels upon the rails, it is necessary, for the exertion of maximum power in freight engines, to make two or more pairs of the wheels of one size, and transmit the driving force from the central pair of wheels to the front and back pairs by means of coupling rods attached to crank pins at the naves of the wheels. An engine thus coupled can take the heaviest train on a good straight railway—that is, one free for the most part from curves; but shorter coupled engines work more economically on lines with frequent curves, and may be made so as to take, in average practice, as great a load as the others. Passenger locomotives have never been constructed in this country with a single pair of driving wheels; and express trains are worked with four-coupled engines. In recent years the fore part of engines has in all cases been placed on a four-wheeled truck connected by a central bolt or pivot to the frame of the engine, so that the fore wheels can swing to

the curves of the line. American practice, many years since, arrived at two leading types of locomotive for passenger and for freight traffic. The passenger locomotive has eight wheels, of which four in front are framed in a truck, and the four wheels behind are coupled drivers. This is the type to which English practice has been approximating. Freight locomotives are made with four, six or eight drivers; the leading pair of wheels, similar in pattern to those used under all cars, are universally known as “trucks,” or, in the case of locomotives, as “pilots,” and are connected with a swing bolster and radius bar, to conform laterally and radially with curves.

The common varieties of vehicle employed in railway traffic are as follows:—(1) Passenger train stock: first-class carriage, second-class carriage, and “smoking car.” To these may be added the U. S. Postal car, generally attached to all “through,” or express trains. (2) Freight stock, consisting of box cars, flat, or platform cars, stock cars. There are now in addition to these cars specially designed for carrying certain freight, as coal, oil, salt, ballast, heavy machinery, etc. Among these, and in extensive use, are what are known as refrigerator cars, of various design, by means of which the fruits of one region are placed fresh in the markets of another some thousands of miles away. There are also in extensive use stock cars of special pattern for the transportation of live stock without suffering and loss. The industry of making special cars for special purposes is constantly growing.

The early railroad passenger cars in England weighed three and a quarter tons, the bodies or upper parts being fifteen feet long, six and a half feet wide, and four feet nine inches high, divided into three compartments, to hold six passengers each, or eighteen in all. They now weigh from eight to thirteen tons each, and are from twenty to thirty feet in length and from eight to eight and a half feet wide. They were there until recent years placed almost all on four wheels; but six wheels on three axles are now generally in use. A modern first-class carriage, twenty-eight to thirty feet long with four compartments, gives seven to seven and a half feet of total length for each compartment, as against five feet in the early carriages. Second and third class carriages, in length from twenty-eight to thirty-one feet, are divided into five compartments, each from five feet seven inches to six feet two inches long. Saloon carriages are occasionally used, so called because two or more of the ordinary compartments are merged in one. Second-class carriages originally were destitute of cushioning, hard and square, on the nearly obsolete policy of making them uncomfortable in the hope of inducing passengers to travel first class. Third-class carriages have been improved, under the stimulating example of the Midland Railway Company, who abandoned their second-class carriages, and raised their third-class stock to an equality with the second-class vehicles of other lines.

The long double truck passenger car universally in use in the United States, originally introduced by Ross Winans on the Baltimore and Ohio Railroad, is distinguished essentially from the carriages on British railways by the longitudinal passage in the center of the body, reaching from end to end of the car, with seats at each side, and admitting of the free passage of the conductor throughout the train. The absence of doors at the sides permits of the enlargement of the body laterally. These cars are also distinguished by the use of two six-wheeled bogies or trucks on which the body is carried, and to which it is pivoted,

allowing the cars to pass with facility over quick curves. Ordinary passenger cars are nine and a half to ten feet wide and forty-four and a half in length of body, or forty-nine feet over the extreme platforms. They are about seven and a half feet high at the sides, inside the body, and nearly ten feet high at the center. The car is constructed with an open platform at each end, reached by steps at each side. The middle passage is about two feet wide. On each side there are fourteen to eighteen or twenty seats, placed transversely, each thirty-eight inches long and holding two persons. The backs of the seats, which do not rise more than thirty-four inches above the floor, are mounted on swivels, by which the seat is made reversible. A window is placed next each seat, having a movable glass and a venetian blind. The cars are heated by stoves or steam heaters, burning coal, and are lighted by oil lamps or candles, on some lines by compressed coal gas. Each car is provided with a water-closet, and a supply of iced water, and a vendor of books, papers, and cigars patrols the cars. There is a cord of communication with the engine driver, running invariably in loops through the length of the car above the aisle or passageway. The car complete weighs from seventeen to twenty tons, and sleeping cars about one-half more.

Mechanical means were first tried, in the systems of Fay and Newall, in England, in which the brakes are worked by a continuous rod passed under the vehicles. These systems were found to be available only on sections of not more than four or five vehicles. Subsequently many inventions were tried—brakes worked by fluid pressure, others worked by chains; but no practical solution of the automatic application of brakes under the control of the engine driver appears to have been arrived at until Mr. Westinghouse, of Pittsburgh, invented a really continuous brake worked by compressed air, which was quickly adopted in the United States, and was tried a few years later in England. This or a similar automatic brake worked by vacuum or pneumatic pressure, is in universal use in the United States.

The first American passenger coaches to be generally used presented the radical change upon English and continental construction noted above in respect to the doors at the ends, and the free aisle through the center of the car. In the compartment system there is merely a survival of the stagecoach and diligence idea, since the supposition of privacy cannot be maintained where the occupants are strangers to each other. Locked doors have also never been tolerated by the American public. The separate closets for women and men have existed also from the beginning, often supplemented by hand-basins, water, and a retiring-room furnished with a couch or sofa. Since the earliest days of railroads the people have habitually traveled, and have traversed long distances by rail, and all railroads, depending solely upon the public for support, have diligently catered to its comfort.

The result of this was the invention known as the sleeping car, for a long time, and chiefly yet, an American institution. The idea was carried to its present perfection and universal use by Mr. Pullman, of Chicago, supplemented in later years by other inventors and promoters. The Pullman car and its congeners have long since overcome all prejudice, and are well known by all travelers, native or foreign.

The second great stride toward perfection in American railroad travel was the dining car. This is a palatial restaurant on wheels, where all viands are cooked as well as eaten on board the car. The menu

is in no case limited to portable viands, is ordered by card, and is served with all accessories of a hotel of the first class. On some American lines the sleeping berth, with its luxurious seats and constant attendance by day, and the restaurant with its elaborate kitchen, service, wines, cigars and ices accompany the traveler across hundreds of miles of mountain and plain, and through regions a few years since uncivilized and inaccessible.

The link-and-pin coupling for passenger coaches in the United States was abandoned previous to 1870, and the Miller platform coupler and buffer substituted therefor, and the sudden and uncomfortable jerking and sudden starting has been unknown to the present generation. But the latest improvement in coupling, comparatively new, is the vestibuled train. By this the entire train is made practically continuous from end to end, and all platforms and passages are protected from dust, wind and storm. Dining car, parlor car, smoking car, and in a measure, the sleeping car, have all been made possible, and are finally practically continuous, through the distinctively American construction of passenger coaches with aisles and with doors only at the ends.

Railway development in the United States has had to adapt itself to the needs of a new and rapidly growing country, a large part of which was first made available for settlement by railways. Different authorities give somewhat differing statements as to the first line constructed in this country, the disposition being to make a distinction between steam roads and others upon which steam was not at first used. Without doubt the first built was intended to supply the Quincy granite for the erection of the Bunker Hill monument. It was four miles in length, and was projected and constructed in 1826 by the man who invented the American "truck,"—making it possible to give to a car eight, and afterwards twelve, wheels instead of four,—Mr. Gridley Bryant, who afterwards also invented the turntable and the switch. This road was so graded as to be partially worked by gravity. The next construction was nine miles in length, built as a coal road, at Mauch Chunk, Penn. This was so constructed that the coal was borne away by gravity, the cars being returned by horses. The first experiment with locomotive steam power on an American road was on what is now the Baltimore and Ohio, though that road continued for some time afterwards to use horses. The first railroad which was constructed for the use of steam power was probably a short line in South Carolina, in 1827-28. The first road to use T rails was built between New Orleans and Lake Ponchartrain, curiously enough by the first graduate of the U. S. Military Academy, Gen. Swift. But all the first roads were works of absolute necessity. The first actual connecting line, constructed with a view to commerce which should grow, was the Baltimore and Ohio—1828-1833. This was followed by the Camden and Amboy, the Baltimore and Susquehanna, the Boston and Providence, and others. Since those times most American roads have been built to supply a want which was *created by themselves*. Economically considered this is the striking feature of a vast and involved system which, more than any other agency, is the cause of a growth and prosperity heretofore unequalled in the annals of civilization.

Three locomotives were imported from England in 1829, and the first trial in America took place on August 8, 1829, at Honesdale, Penn. The mileage completed amounted to 40 miles at the end of 1830, to 3,361 miles in 1841, and to 5,206 miles in 1847, of which 1,350 miles had been opened within six years.

Then there was a sudden and great increase, the yearly additions for seven years being 1,056 miles in 1848, 1,048 in 1849, 1,261 in 1850, 1,274 in 1851, 2,288 in 1852, 2,170 in 1853, 3,442 miles in 1854. The civil war checked railway construction, only 3,257 miles being opened during the five years ending with 1865, when the aggregate amounted to 32,996 miles.

Between 1865 and 1873, the mileage increased more than 100 per cent., including one road in operation and a second line in progress of construction to the Pacific coast. The greatest increase of this period was in the western and southwestern States, in which fully 25,000 miles of trackage were made ready for traffic. At the close of 1873 the total capital invested in railroads of the United States aggregated \$3,784,543,034 of which \$1,836,904,450 represented the bonded indebtedness. The depression which followed the panic of that year continued until 1879. In the latter year the construction again increased 100 per cent., and between 1874 and 1888, there were built 85,814 miles of new railroad. Since the revival of railroad construction in 1879 there have been completed three additional through transcontinental roads, and at least three great western railroad systems are now stretching westward in the direction of the same terminus. The total number of miles of railroad in the United States at the opening of the year 1889 was, in round numbers, 160,000, and the total share capital and indebtedness of all kinds of all the roads equaled \$9,369,398,954. The roads cost nearly \$60,732 per mile and the gross earnings of all the lines amounted to \$960,256,270. During 1888, the roads transported 451,353,655 passengers, an increase of 5.4 per cent. over the number carried in 1887, and 589,398,317 tons of freight, the value of the latter being estimated at \$14,633,957,925.

In the early days of railroad development improvements were made under and by virtue of charters granted by the State legislatures, and all railroad corporations are organized under a charter granted by some State. Later, railroad commissioners appointed by the various States have been created, and later still laws were adopted having special reference to the organization of companies for the purpose of constructing, operating and maintaining a line or lines of railway.

The laws governing the formation of railway corporations and authorizing railway construction differ in different States, but in most it is open to any association of men with the necessary capital to form a company and construct a railway anywhere. Generally the laws relating to raising and extending capital and the disposition of income are very lax, and under them great abuses have occurred. All but a very small number of the railways have been projected and constructed by private enterprise; but many companies have received aid from towns, cities, counties, or States, and the Federal Government and the State of Texas (the only State owning the public land within its borders) have subsidized many railways, mostly west of the Mississippi, by immense grants of public lands, in the aggregate amounting to 200,000,000 acres. The Federal Government also lent its bonds to the amount of \$65,000,000 to aid in the construction of lines between the Missouri and the Pacific coast. Between 1830 and 1840 several States undertook to construct railways on their own account; but all of these attempts ended in disaster, and the railways were completed by companies, if completed at all. There remain, however, two State railways, one 138 miles long owned by Georgia, which it leases to

a corporation for working, and the other by Massachusetts, mostly in the long Hoosac tunnel.

Some years ago legislation was had in a number of States designed to regulate the traffic rates of roads operating within their jurisdiction. The laws passed, however, were in some instances declared to be unconstitutional, and the questions raised were finally carried to the Supreme Court of the United States, where the decisions above referred to were reversed, and what has since been known as the "Granger Law" sustained. Commissions in the States also held diverse opinions respecting certain enactments on subjects connected with the operation of railroads. Finally the Inter-State Commerce Commission was organized as the representative of the national government, and began a systematic regulation of the traffic of railroads and other transportation companies between the States. The object of the commission seems to be to obtain a fixed and uniform charge for services rendered by the roads, and the opinion is gradually obtaining that the workings of the law will prove advantageous to the railroads, the public and the State governments.

The "railway pool," as it formerly existed, was an agreement by which at stated periods, the common business of competing lines was aggregated and apportioned upon agreed percentages, the lines in excess paying over to the lines in deficit such sums of money as were required to produce the necessary equalization among the shares of traffic assigned to the several roads. This custom exists in England to-day. Our interstate commerce law has abolished it at short order. No railway pools exist now in the United States. Most railroads charged greater proportionate rates upon a shorter than upon a longer haul on the same line of transportation. This was abolished by the "short-haul" section of the law. It overturned customs, rate-sheets, and classifications of long standing in every part of the land, and involved a great loss of revenue to the roads. But it was generally submitted to by the companies, in spite of being felt as a grievous burden. Taking everything into consideration the interstate commerce law has had a beneficial effect and justifies this new line of Federal legislation fully.

In conclusion it might be said that in no country in the world are the equipments and appointments for railway travel equal to those available in the United States. To a substantial road bed, thoroughly ballasted and laid with steel rails, is added rolling stock unsurpassed in respect to its construction, elegance and appliances for the promotion of the comfort of travelers. Superb dining cars, luxurious sleepers and buffet cars are features of every railway system, whose tourists can secure meals and sleeping accommodations equal to any obtainable at a first-class hotel, and at but a moderate cost. These acquisitions which have come into universal use in the United States are gradually being adopted in England and other European nations, where their advantages are conceded and commended.

RAIMBACH, ABRAHAM, line-engraver, a Swiss by descent, was born in London in 1776. Educated at Archbishop Tenison's Library School, he was an apprentice to J. Hall the engraver from 1789 to 1796. *The Village Politicians*, and *Rent Day*, the *Cut Finger*, *Blind Man's Buff*, the *Errand Boy*, *Distraint for Rent*, the *Parish Beadle*, and the *Spanish Mother and Child* raised him in the estimation of connoisseurs, the French especially holding him in great honor. At his death in 1843, he held a gold medal awarded to him for his *Village Politicians* at the Paris

Exhibition of 1814. He was elected corresponding member of the Institute of France in 1835.

RAIMONDI, MARCANTONIO. See MARCANTONIO.

RAIN. See METEOROLOGY and GEOLOGY.

RAINBAND. Every transparent substance is perfectly opaque to some particular kinds of light. A certain shade of orange light is absorbed by the vapor of water, and, when sunlight which has traversed a stratum containing this vapor is decomposed in a spectroscopy, the blank caused by the missing rays appears as a black band or group of fine lines. This is called the *rainband*, because from its intensity the amount of moisture in the atmosphere may be guessed at, and the occurrence of rain predicted with considerable certainty.

RAINBOW. See LIGHT.

RAINGAUGE (PLUVIOMETER, HYETOMETER, UDOMETER). The value of the measurement of rainfall (see METEOROLOGY) has long been understood, although it is within the last 100 years that trustworthy results have been obtained. Marriotte is claimed as the originator of the raingauge in 1677. The simplest form is an open vessel of uniform diameter exposed to the rain, in which the depth of water collected during any interval of time may be measured. Raingauges on this plan cannot be very accurate; their one advantage is that the area of the collecting surface does not require to be known. Almost all raingauges now used have a circular funnel of known diameter, which conducts the rain-water to a receiver, from which it may be poured into a special narrow measuring-glass so graduated that what would cover a space of the area of the funnel to the depth of one inch fills a portion of the glass large enough to be easily graduated into 100 parts. The funnel may have any diameter from three to twenty-four inches without introducing a greater discrepancy than 1 or 2 per cent. of the amount of rain collected, but five and eight inches are the diameters usually employed, and the measuring-glasses are graduated accordingly.

RAIPUR, a district of India, in the Chhatisgarh division of the Central Provinces, lying between  $19^{\circ} 48'$  and  $21^{\circ} 45'$  N. latitude, and  $80^{\circ} 28'$  and  $82^{\circ} 38'$  E. longitude, with an area of 11,855 square miles. It is bounded on the north by Bilaspur, on the east by Sambalpur and Patna, on the west by Balaghat, Bhandara, and Chanda, and on the south by Bastar and Jeypur.

The population of Raipur in 1881 was 1,405,171 (males 696,242, females 708,929). By religion 856,492 were Hindus, 14,991 Mohammedans, and 821 Christians. The only town with a population exceeding 10,000 is RAIPUR (see below). Attached to the district are four feudatory states, viz., Chhuikhadan (with 32,879 inhabitants), Kanker (63,610), Khairagarh (166,138), and Nandgaon (164,339). Their combined area is 2,658 square miles.

RAIPUR, chief town of the above district and headquarters of the Chhatisgarh division of the Central Provinces, is situated in  $21^{\circ} 15'$  N. latitude and  $81^{\circ} 41'$  E. longitude, on a plateau 950 feet above the sea-level. In 1881 its population amounted to 24,948 (12,447 males and 12,501 females). The modern town dates from 1830, and carries on a flourishing trade in grain, lac, cotton, etc.

RAIS, RAIZ, or RETZ, GILLES DE, marshal of France, seigneur of Hautpart, and of many other lordships, who was hanged and burned at Nantes in 1440, has left a name connected directly with one of the most horrible stories in history, and indirectly with other curious matter. Not much is known of Rais before the trial which made his name infamous. The crimes with which he was charged extended over some fourteen years. During that period it was alleged that he

had, through different agents, especially a woman called La Meffraie, kidnaped or enticed to his various abodes large numbers (Monstrelet says 160, others 140) of children. These children, after being subjected to every outrage of lust and cruelty, were sacrificed to the devil, their blood used for magical ceremonies, their bodies burned, and their bones buried in the precincts of Rais' castles. The ultimate purpose of this devil-worship was asserted to be the acquisition by Rais (who was assisted by divers sorcerers, especially an Italian imported for the purpose) of power and honors in the State. The depositions were full, and still exist; and on them and his confession Rais was executed.

RAISINS are the dried fruits of certain varieties of the grape vine, *Vitis vinifera*, which grow principally in the warm climate of the Mediterranean coasts, and are comparatively rich in sugar. "Raisins of the sun" are obtained by letting the fruit continue on the vines after it has come to maturity, where there is sufficient sunshine and heat in the autumn, till the clusters dry on the stocks. Another plan is to partially sever the stalk before the grapes are quite ripe, thus stopping the flow of the sap, and in that condition to leave them on the vines till they are sufficiently dry. The more usual process, however, is to cut off the fully ripe clusters and expose them, spread out, for several days to the rays of the sun, taking care that they are not injured by rain. In unfavorable weather they may be dried in a heated chamber, but are then inferior in quality. Of late years the chief source of supply for American raisins has been California, the quality of whose productions will compare favorably with those of any other part of the world. The greater proportion of the common large raisins of English commerce come from the provinces of Malaga, Valencia, and Alicante, in Spain; these are known by the common name of Malaga raisins.

RAJÁ (English form RAJAH), Sanskrit nom. sing. of the stem *raján* (in modern Indian vernaculars *rájá*, *rājah*, *rāja*, *rājan*, *rāzu*, *irāsen*, also the forms *rái*, *ráo*, *ríná* are traceable to the same stem) = king, prince, chief, from the root *rāj*, to be resplendent. In the oldest times the headman of any petty tribe was called *rájá* from the fact of his being conspicuous for the number of golden ornaments with which he was decked out. Then *rájá* became the common designation for a king, whether of a small tribe or of a large state. The constitution of all states was monarchical, mostly hereditary, occasionally also electoral, but in no case absolute, for the people had a voice in the government.

RAJAMAHENDRI (Rajamahendravaram, Rajah-mundry), a town of India, in the Godavari district, Madras presidency, situated on high ground on the left bank of the Godavari river in  $17^{\circ}$  N. latitude and  $81^{\circ} 49'$  E. longitude, and 365 miles northeast of Madras. Its population in 1881 numbered 24,555 (males 12,290, females 12,265). Rajamahendri was formerly the headquarters of a separate district of the same name, but is now incorporated with Godavari.

RÁJPUTÁNA, an immense tract of country in India, consisting of twenty states, having each its own autonomy and separate chief, besides the small British division of Ajmere, which is situated almost in the center of the province. These territories lie between  $23^{\circ}$  and  $30^{\circ}$  N. latitude, and between  $69^{\circ} 30'$  and  $78^{\circ} 15'$  E. longitude, and their combined area is approximately estimated at 130,000 square miles.

The census of 1881, which was the first general enumeration of population in Rájputána since England's connection with India, gave a total number (including Ajmere division) of 10,729,114. The mass of the people are occupied in agriculture. In the large towns banking and commerce flourish to a degree beyond what



would be expected for so backward a country. In the north the staple products for export are salt, grain, wool, and cotton, in the south opium and cotton; while the imports consist of sugar, hardware, and piece goods. Rájputána is very poor in industrial production. The principal manufactures are salt, cotton, and woolen goods, carvings in ivory, and working in metals, etc., all of which handicrafts are chiefly carried on in the eastern states. The system of agriculture is very simple; in the country west of the Aravallis only one crop is raised in the year, while in other parts south and east of the Aravallis two crops are raised annually, and various kinds of cereals, pulses, and fibers are grown.

RÁJSHÁHÍ or RAJESHAYE, a district of India, in the lieutenant-governorship of Bengal, forming the southwestern corner of the Rájsháhí with Kuch Behar division. It lies between  $24^{\circ} 3'$  and  $24^{\circ} 59'$  N. latitude and between  $88^{\circ} 21'$  and  $89^{\circ} 24'$  E. longitude, and is bounded on the north by the districts of Dinájpur and Bogra, on the east by Bogra and Pabna, on the south by the Ganges and Nuddea district, and on the west by Maldah and Murshidábád.

*Population.*—The census of 1881 gave a population, almost entirely rural, of 1,338,638. The only town with over 10,000 inhabitants was Rampur Beaulah (19,228), which is the chief town and administrative headquarters of the district. This town is situated on the north bank of the Ganges in  $24^{\circ} 22'$  N. latitude and  $88^{\circ} 39'$  E. longitude; it is of modern growth and is built for the most part on river alluvia. It was formerly the seat of the Dutch and East India Company's factories, and is still a center of the silk and indigo trade.

Rice is the staple crop of the district; other cereal crops are wheat, barley, and Indian corn, which are grown to a small extent; among miscellaneous crops are indigo, sugar-cane, mulberry, and tobacco. Ganja is also grown in a small tract to the north of the district. Silk spinning and weaving and the preparation of indigo are the chief manufactures, but these are now both declining. The total revenue of Rájsháhí in 1883-84 amounted to \$600,000, toward which the land-tax contributed \$440,000.

RÁKÓCZY, the name of an old and wealthy family of upper Hungary. SIGISMUND was on February 11, 1607, elected prince of Transylvania, but in the following year abdicated in favor of Gabriel Báthori, to whom succeeded Bethlen Gábor. Bethlen died in 1629, and GEORGE I., son of Sigismund, born in 1591, was, after the demission of Gábor's widow, Catherine of Brandenburg, November 26, 1631, elected prince of Transylvania by the estates. He died on October 24, 1648. GEORGE II. (1615-1660), son of the preceding, was chosen by the estates to succeed him as prince of Transylvania. His procedure against Poland provoked the hostility of the Turks, with whom he was engaged in continual war until his death at Grosswardein on June 26, 1660, from wounds received at the battle of Klausenburg. FRANCIS I. (1642-1676), son of the preceding, did not succeed his father as prince of Transylvania. He edited a volume of prayers, which had an extensive circulation in Hungary. He died on July 8, 1676. FRANCIS LEOPOLD (1676-1735), son of the preceding, was at the age of twelve along with his mother made prisoner by the Austrians, and by them was educated in a Jesuit college in Bohemia. In 1707 Rákóczy was elected prince of Transylvania, and on May 31st of this year the independence of Hungary was proclaimed. From this time, however, the fortunes of the Hungarian cause began to decline, and Rákóczy finally in despair, having refused an amnesty and offers of pardon, retired to the frontiers of Poland, after

which, on May 1, 1711, peace was concluded at Szatmár. Rákóczy refused to accept it, and retired to France and subsequently to Turkey, where he died at Rodosto on April 8, 1735.

RALEIGH, a city of the United States, the capital of North Carolina and the seat of justice of Wake county, is situated in  $35^{\circ} 47'$  N. latitude and  $78^{\circ} 48'$  W. longitude, a little to the northeast of the geographical center of the State, and occupies a kind of high ground in the upper valley of the Neuse, a river flowing southeast toward Pamlico Sound. It is the meeting-place of three railways—the Raleigh and Gaston, the Raleigh and Augusta, and the Richmond and Danville lines—and its railway distance from Portsmouth is 177 miles and from Washington 230. Raleigh is laid out round a park of ten acres called Union Square and divided into four sections by four broad streets which strike out symmetrically from this center; the fine old trees which were spared by the original settlers give it the sobriquet of "City of Oaks." Besides the State-house or capitol (a substantial granite structure in Union Square), the public buildings comprise the county court-house, the governor's mansion, the United States court-house and post-office (1875), the State geological museum, a State insane asylum, institutions for the blind and the deaf and dumb, the penitentiary, and the Shaw institute for the higher education of colored pupils. There are a normal school and a graded school system for both white and colored pupils. Raleigh is a center of the cotton and tobacco trades, has railway machine and car shops, and manufactures steam-engines, shuttle blocks and bobbins, ice, cotton-seed oil, fertilizers, hosiery, clothing, agricultural implements, carriages, carpentry, cigars, marble wares, etc. The population was returned at 12,678 in 1890. Raleigh was selected as the seat of government in 1788, was laid out in 1792, and made a city in 1794.

RALEIGH, SIR WALTER, admiral and courtier, was born at Hayes, in Devonshire, in 1552. In one way or another Raleigh's conduct gained the favorable notice of Elizabeth. In 1585 he became lord warden of the Stannaries, soon afterward he was vice-admiral of Devon and Cornwall, and in 1587 was captain of the guard. But he was one of those who were dissatisfied unless they could pursue some public object in connection with their chase after a private fortune. In 1583 he risked \$10,000 in the expedition in which Sir Humphrey Gilbert perished. In 1584 he obtained a charter of colonization, and sent Amadas and Barlow to examine the country which he named Virginia. In 1585 he dispatched a fleet laden with colonists. They were, however, soon discouraged, and were brought back to England by Drake in the following year. Shortly afterward fifteen fresh colonists were landed, and another party in 1587. All these, however, perished, and, though Raleigh did all that was possible to succor them, the permanent colonizing of Virginia passed into other hands.

In 1584 Raleigh obtained a grant of an enormous tract of land in Munster, in one corner of which he introduced the cultivation of the potato. To people that land with English colonists was but the counterpart of the attempt to exterminate its original possessors. This view of the policy of England in Ireland was not confined to Raleigh, but it found in him its most eminent supporter. Wherever the strife was hottest Raleigh was sure to be found. If he could not succeed in Ireland he would fight it out with Spain. In 1588 he took an active part against the Armada, and is even supposed by some to have been the adviser of the successful tactics which avoided any attempt to board the Spanish galleons. In 1589 he shared in the unsuccess-

ful expedition commanded by Drake and Norris, and for some time vessels fitted out by him were actively employed in making reprisals upon Spain.

Raleigh was a courtier as well as a soldier and a mariner, and as early as 1589 he was brought into collision with the young earl of Essex, who challenged him, though the duel was prevented. In the end of 1591 or the beginning of 1592 Raleigh seduced and subsequently married Elizabeth Throckmorton, and was consequently thrown into the Tower by Elizabeth, who could not endure that the fantastic love-making to herself which she exacted from her courtiers should pass into real affection for a younger woman. Previously to his imprisonment Raleigh had been forbidden to sail in command of a fleet of which a great part had been fitted out at his own cost for service against Spain. The ships, however, sailed, and succeeded in capturing a prize of extraordinary value known at the time as the "Great Carrack." No one but Raleigh was capable of presiding over the work of securing the spoils. He was sent to Plymouth, still in the name of a prisoner, where his capacity for business and his power of winning the enthusiastic affection of his subordinates were alike put to the test. The queen at last consented to restore him to complete liberty, though she tried to cheat him of his fair share of the booty.

Raleigh resolved to use his regained liberty on an enterprise more romantic than the capture of a carrack. The fable of the existence of El Dorado was at that time fully believed in Spain, and in 1594 Raleigh sent out Captain Wheddon to acquire information about the lands near the Orinoco. In 1595 he sailed in person with five ships for Trinidad. On his arrival he found that the Spaniards, who had occupied a place called San Thomè at the junction of the Orinoco and the Caroni, had been obliged to abandon it. Raleigh ascended the river to the spot, heard more about El Dorado from the Indians, brought away some stones containing fragments of gold, and returned to England to prepare a more powerful expedition for the following year. When he came back he published an account of his voyage. In the next year, 1596, however, he was wanted near home, and was compelled to content himself with sending one of his followers, Captain Keymis, to extend his knowledge of Guiana. He was himself called on to take the command of a squadron in the expedition sent against Spain under Lord Howard of Effingham and the earl of Essex. It was Raleigh who, on the arrival of the fleet off Cadiz, persuaded Howard and Essex to begin by an attack on the Spanish fleet, and who himself led the van in sailing into the harbor. Before long the Spanish fleet was thoroughly beaten, and all of it, except two vessels which were captured, was destroyed by the Spaniards themselves. Raleigh was wounded in the action, and the subsequent capture of Cadiz was carried out by others.

After the death of Essex the question of the succession assumed a pressing importance with the imminence of the close of Elizabeth's reign. Cecil, allying himself with the intriguing Lord Henry Howard, assured himself of James' favor, and poisoned his ear against Raleigh and Cobham. Into Raleigh's feelings at this time it is impossible to penetrate with certainty, but it can hardly be doubted that, though he professed himself ready to support James' claim, he did not throw his whole heart into the cause of the Scottish king. When James came to the throne, therefore, he was certain to come into conflict with Raleigh, and not being able to see the advantage of keeping about him men of different tempers he dismissed him from the captaincy of the guard, compelled him to surrender the wardenship of the Stannaries, suspended his patent of wine licenses as a monopoly, and

took from him the governorship of Jersey, though for this he gave him a pension to compensate for his loss. That which followed it is impossible to fathom to the bottom. Raleigh must have been very angry, and it is quite possible that he may have used violent language, and have even spoken of a Spanish invasion as preferable to the rule of James, or have declared his preference of the title of Arabella Stuart to that of the existing sovereign. The main witness against him was Cobham, and Cobham made and retracted his charges with such levity that it is impossible to trust to his evidence. Raleigh, however, was imprisoned, and, after attempting to commit suicide, was brought to trial at Winchester in November, 1603, when he was condemned to death. The king, however, commuted his sentence upon the scaffold to one of imprisonment.

During his imprisonment in the Tower Raleigh devoted himself to chemical experiments and to literary work. It was here that he composed so much of the *History of the World* as was ever finished, and that he also issued pamphlets on questions of passing politics.

Raleigh's thoughts had often turned to Guiana. An offer made by him in 1612 to send Keymis to the gold mine which he believed to exist near the Orinoco was rejected, but in 1616 he was himself released at the intercession of Villiers, on the understanding that he was to go in person to Guiana, and was to visit the gold mine. The expedition turned out badly. His sailors would not ascend the Orinoco unless he remained at the mouth to keep off the Spaniards. Those who ascended found a Spanish village in the way, and after a sharp fight drove the Spaniards out and burned the place. The mine, if it really existed, they never reached, and Raleigh had to return to England with failure on his head. He was soon arrested and lodged in the Tower. He was brought before the commission of the privy council. At last the commission decided against him, and he was sent to execution formally on his old sentence at Winchester, in reality for having allowed his men to shed Spanish blood after engaging that he would not do so. He was executed on October 29, 1618.

RAMAH. See SAMUEL.

RAMÁYÁNA. See SANSKRIT LITERATURE.

RAMBAN. R. MOSHEH BEN NAHMAN, or NACHMANIDES, was born before 1200 at Gerona, where he was rabbi and physician, and died between 1268 and 1270 in Palestine, probably at Acre. Although a Sepharadi in the later and larger sense of the word, he was the disciple of the greatest Provençal rabbis, and became the most celebrated Talmudist and cabalist of his age in his own country.

RAMBOUILLET, chief town of an arrondissement in the department of Seine-et-Oise, France, thirty miles southwest of Paris on the line to Brest, is a small place of 5,186 inhabitants, and derives its whole interest from the associations connected with the ancient château, which stands surrounded by a beautiful park of 2,965 acres and a wide forest dating from the fourteenth century.

RAMBOUILLET, CATHERINE DE VIVONNE, MARQUISE DE, a lady famous in the literary history of France, was born in 1588 and died in 1665.

RAMEAU, JEAN PHILIPPE, musical theorist and composer, was born at Dijon, September 25, 1683. Rameau first set forth his new theory in his *Traité de l'Harmonie* (Paris, 1722), and followed it up in his *Nouveau Système* (1726), *Génération Harmonique* (1737), *Démonstration* (1750), and *Nouvelles Réflexions* (1752). King Louis XV. appointed him composer to the court in 1745, and in 1764 honored him with a patent of nobility and the order of Saint Michael. But

these last privileges were granted only on the eve of his death, which took place in Paris on September 12, 1764.

RAMESES (Gen. xlvii. 11; Exod. xii. 37; Num. xxxiii. 3), or, with a slight change in the vowel points, RAAMSES (Exod. i. 11), the name of a district and town in Lower Egypt, is notable as affording the mainstay of the current theory that King Rameses II. was the Pharaoh of the oppression and his successor Menptah the Pharaoh of the exodus.

RAMESWARAM, a small island situated between Ceylon and India, at the entrance of Palk Strait in the Gulf of Manaar, in  $9^{\circ} 18'$  N. latitude and  $79^{\circ} 22'$  E. longitude. It is about fourteen miles long by five wide, is low and sandy, and for the most part uncultivated. The estimated population of the island is about 14,000. It contains one of the most venerated Hindu shrines, which for centuries has been the resort of thousands of pilgrims from all parts of India.

RAMMOHUN ROY. See ROY.

RÁMPUR, a native state of India, in the Rohilkhand division of the Northwestern Provinces, lying between  $28^{\circ} 26'$  and  $29^{\circ} 10'$  N. latitude and between  $78^{\circ} 54'$  and  $79^{\circ} 33'$  E. longitude. It is bounded on the north and west by the British district of Murádábád, and on the northeast and southeast by the district of Bareilly. The total area of the state is 945 square miles, with a population (1881) of 541,914 (males 282,359, females 259,555), of whom 302,989 were Hindus and 238,925 Mohammedans.

RÁMPUR, capital of the above state, stands on the left bank of the Kosila in  $28^{\circ} 48'$  N. latitude and  $79^{\circ} 4'$  E. longitude. The population of the town in 1881 numbered 74,250 (males 36,355, females 37,895); it is famous for fine shawls and damask, which are exported to all parts of India.

RAMPUR BEULEAH. See RÁJSHÁHÍ *ante*.

RAMSAY, ALLAN, author of the *Gentle Shepherd*, a pastoral drama in the Lowland Scotch dialect, was born in Lanarkshire in 1686. The *Gentle Shepherd* is the only production of Ramsay's that has much claim to remembrance. His lyrics for the most part are poor artificial imitations, adorned here and there with pretty fancies, but devoid of sincerity of feeling. A collection of *Fables*, published complete in 1730, part original, part translated from La Motte and La Fontaine, was Ramsay's last literary work, but he lived to an advanced age, dying in 1758, the year before the birth of Burns.

RAMSAY, ALLAN, portrait-painter, the eldest son of the author of *The Gentle Shepherd*, was born at Edinburgh about 1713. He died at Dover on August 10, 1784.

RAMSAY, ANDREW MICHAEL, commonly called the "Chevalier Ramsay," who was born at Ayr, Scotland, on January 9, 1686, is noteworthy as having been among the few writers not of French birth who are admitted by French criticism to have written in French with purity and scholarship. He died at St. Germain-en-Laye (Seine-et-Oise) on May 6, 1743.

RAMSAY, DAVID, American physician and historian, was the son of an Irish emigrant, and was born in Lancaster county, Penn., on April 2, 1749. From 1782 to 1786 he was a member of Congress. His interest in the revolutionary struggle led him to devote his leisure to the preparation of several historical works on the subject, and in 1785 he published in two volumes *History of the Revolution in South Carolina*, in 1789 in two volumes *History of the American Revolution*, in 1801 a *Life of Washington*, and in 1809 in two volumes a *History of South Carolina*. He was also the author of several minor works. He died at Charleston, on May 8, 1815, from a wound inflicted by a lunatic.

RAMSDEN, JESSE, astronomical instrument maker, was born at Salterhebble near Halifax, Yorkshire, in 1735. He died on November 5, 1800.

RAMSGATE, a seaport and watering-place of England, in the Isle of Thanet, Kent, and a "vill" of the old Cinque Port of Sandwich, is finely situated between chalk cliffs at the northern extremity of Pegwell Bay, on the London, Chatham and Dover Railway, seventy-nine miles east-southeast of London. Ramsgate was incorporated as a borough in 1884. The population of the urban sanitary district (area 2,278 acres) in 1871 was 19,640, and in 1881 22,683, or, including 638 fisherman at sea, 23,321.

RAMUS, PETER, or PIERRE DE LA RAMÉE, logician, was born at the village of Cuth in Picardy in the year 1515. He perished by the hands of hired assassins in the massacre of St. Bartholomew (1572).

The logic of Ramus enjoyed a great celebrity for a time, and there existed a school of Ramists boasting numerous adherents in France, Germany, and Holland. As late as 1626 Burgersdyck divides the logicians of his day into the Aristotelians, the Ramists, and the Semi-Ramists, who endeavored, like Goclenius of Marburg, to mediate between the contending parties. Ramus' works appear among the logical text-books of the Scottish universities, and he was not without his followers in England in the seventeenth century.

RAMUSIO. The noble family of Ramusio was one of note for literary and official ability during at least four generations.

PAOLO THE ELDER, born about 1443, the first of those thus commemorated, migrated in 1458 from Rimini to Venice, where he obtained full citizenship, studied law, and became a member of the magistracy, filling the offices of *vicario*, of judicial assessor, and of criminal judge under various administrators of the Venetian provinces on the continent. He died in 1506.

GIROLAMO, younger brother of Paolo, born 1450, had a notable history. After he had studied medicine at Padua public suspicion was roused against him in connection with the death of a lady with whom he had had some love passages, and this ran so high that he was fain, by help of his brother Paolo, to whom he transferred his property, to make his escape (about 1481-83) to Syria and to take up his abode at Damascus. In 1486 he removed to Beyrout, and died the same year, killed, as the family chronicler relates, by a surfeit of "certain fruit that we call *armellini* and *albiccocche*, but which in that country are known as *mazzafranchi*," a title which English sailors in southern regions still give to apricots in the vernacular paraphrase of *killjohns*.

GIAN BATTISTA, the eldest son of Paolo Ramusio and Tomyris Maccachio, was born at Treviso in 1485 (June 20th). Having been educated at Venice and at Padua, at an early age he entered the public service (1505), becoming in 1515 secretary of the senate and in 1533 secretary of the Council of Ten. He also served the republic in various missions to foreign states. A few days before his death Ramusio removed to Padua, and there died, July 10, 1557, at the age of seventy-two.

PAOLO (GIROLAMO GASPARE), was the only child of Gian Battista, and was born on July 4, 1532. Like his father he maintained a large correspondence with many persons of learning and note. He died in 1600.

GIROLAMO GIUSEPPE, the son of Paolo, was born at Venice in 1555. He entered the public service in 1577, and was employed in connection with various foreign missions. He died at Padua in 1611, and his posterity did nothing to continue the reputation of the family, official or literary.

RANCE, ARMAND JEAN LE BOUTHILLIER DE. See TRAPPISTS.

RANDERS, a town of Denmark, at the head of an amt in the province of North Jutland (Nørrejyland), on the Gudena, about eight miles above its junction with Randers Fjord, an inlet of the Cattegat. The population was 11,354 in 1870 and 13,457 in 1880.

Randers is best known in history as the scene of the assassination of Count Geerts by Niels Ebbesön in 1340. In the Middle Ages it had six churches and four monastic establishments—the oldest a Benedictine nunnery (1170). The Grey Friars' building was turned into a castle (Dronningborg) after the Reformation; its church was burned down in 1698.

RANDOLPH, JOHN, of Roanoke, American statesman, was descended from an influential and wealthy Virginian family, and was the third and youngest son of John Randolph of Cawsons, Chesterfield county, where he was born on June 2, 1773. His father having died in his infancy, his early years were passed under the care of his stepfather. He attended schools at Williamsburg and Princeton and for a short time studied at Columbia College, New York, but, although well read in modern works bearing on politics and philosophy, his own statement, "I am an ignorant man, sir," was in other respects not inaccurate. Both his religious and his political views were radical and extreme. At an early period he imbibed deistical opinions, which he promulgated with extreme eagerness. He was also so strongly opposed to the new constitution of the United States that he could not bear to hear Washington take the oath to support it. In order to assist in asserting the right of resistance to national laws, and to withstand the "encroachments of the administration upon the indisputable rights" of Virginia, he was in 1799 elected as a Democrat to Congress, where he sat, with the exception of two terms, till 1825. After the election of Jefferson as president in 1801 Randolph was elected chairman of the committee of ways and means. He took an active part in agitating for the reform of the judiciary, and in 1804 moved the impeachment of Judge Chase. The part he took in this matter tended to widen his breach with Jefferson, from whom he finally separated in 1806. Possessing considerable wit, great readiness, and a showy eloquence, he would undoubtedly have risen to high influence but for his strong vein of eccentricity and his bitter and ungovernable temper. The championship of State rights was carried by him to an extreme utterly quixotic, inasmuch as he not only asserted the constitutional right of Virginia to interpose her protest against the usurpation of power at Washington, but claimed that the protest should be supported by force. On account of his opposition to the war with England in 1812 he was not returned to Congress in 1813, but he was reelected in 1815. In 1825 he was elected to the United States Senate, where he continued to sit till 1827. In 1830 he was for a short time minister to Russia. He was elected to Congress in 1832, but died of consumption at Philadelphia before he took his seat, May 24, 1833.

RANDOLPH, THOMAS, an English poet, was born in Northamptonshire in 1605. He died under thirty in 1634, before his powers had reached their maturity. His principal works are—*The Muses' Looking-Glass, a Comedy; Amyntas, or the Impossible Dowry*, a pastoral acted before the king and queen; *Aristippus, or the Jovial Philosopher; The Conceited Pedlar; The Jealous Lovers, a Comedy; Hey for Honesty, down with Knavery, a Comedy*; and several other poems. His works have recently been edited by W. Carew Hazlitt.

RANGOON TOWN, a district in the Pegu division

of the province of British Burmah, situated in  $16^{\circ} 47'$  N. latitude and  $96^{\circ} 13'$  E. longitude, on the left bank of the Hlaing or Rangoon river at its junction with the Pegu and Pu-zwon-doung streams, twenty-one miles from the sea. In 1880 the town was detached from the surrounding area of the old district of Rangoon and constituted a separate district, the remainder of the country being formed into a distinct jurisdiction under the title of Hanthawady. Rangoon comprises an area of twenty-two square miles, with a population in 1881 of 134,176 (males 91,504, females 42,672); Hindus numbered 35,871, Mohammedans 21,169, Christians 9,741, and Buddhists 67,131.

RANGPUR, a district of British India, in the lieutenant-governorship of Bengal, lying between  $25^{\circ} 3'$  and  $26^{\circ} 19'$  N. latitude, and  $88^{\circ} 47'$  and  $89^{\circ} 56'$  E. longitude, is bounded on the north by Jalpaiguri district and Kuch Behar state, on the east by the Brahmaputra, separating it from Goalpara and Maimansinh, on the south by Bogra, and on the west by Dinajpur and Jalpaiguri. In 1881 the population was 2,097,964.

The district contains an area of 3,486 square miles, about three-fourths being under continuous cultivation. The staple crops are rice, wheat, and other grains, oil-seeds, and jute; among the miscellaneous crops are indigo, sugar-cane, betel-leaf, betel-nut, and mulberry for silkworms. Spare land capable of cultivation can hardly be said to exist—even the patches of waste land yield a valuable tribute of reeds and cane. Of industries the chief is the manufacture of paper from jute fiber; other products are striped cotton carpets, silk cloth woven from the cocoon of a worm fed on the castor-oil plant, baskets and mats, brass-ware, and ornaments carved in ivory and buffalo horn.

RANGPUR, principal town and administrative headquarters of the above district, is situated on the north bank of the Ghaghat river in  $25^{\circ} 44'$  N. latitude and  $89^{\circ} 17'$  E. longitude, and contains a population (1881) of 13,320.

RANJÍT SINGH (RUNJEET SINGH). See PUNJAB, INDIA.

RANKINE, WILLIAM JOHN MACQUORN, a descendant of old Scottish families, the Rankines of Carrick and the Cochranes of Dundonald by the father's side, and the Grahames of Dougalston by the mother's, was born at Edinburgh in 1820, and completed his education in its university. He was trained as an engineer under Sir J. Macneill, working chiefly on surveys, harbors, and railroads, and was appointed in 1855 to the chair of civil engineering in Glasgow, vacant by the resignation of Lewis Gordon, whose work he had undertaken during the previous session. He was a voluminous writer on subjects directly connected with his chair, besides contributing almost weekly to the technical journals. Rankine died in 1872.

RANPUR, a native state of India, in the province of Orissa in the lieutenant-governorship of Bengal, situated on the western boundary of the British district of Puri, in about  $20^{\circ}$  N. latitude and  $85^{\circ} 20'$  E. longitude. Its population in 1881 was 36,539 (18,382 males, 18,157 females). The only town is the rájá's place of residence, which consists of one long and wide street.

RANUNCULUS. Familiarly known as "buttercups," the species of this genus form the type of the order *Ranunculaceæ*. The genus is large as to number of species, which occur in most temperate countries in the northern and southern hemispheres, and, while they extend into arctic and antarctic regions, they show little or no tendency to inhabit tropical countries except on the higher mountains.

RAOUL ROCHETTE, DÉSIÉR, French archæologist, was born in 1783 at St. Amand in the depart-

ment of Cher. At his death in 1854 Raoul Rochette was perpetual secretary of the Academy of Fine Arts and a corresponding member of most of the learned societies in Europe.

RAOUX, JEAN, French painter, was born at Montpellier in 1677, and died at Paris in 1734. The list of his works is a long series of sets of the *Seasons*, of the *Hours*, of the *Elements*, or of those scenes of amusement and gallantry in the representation of which he was immeasurably surpassed by his younger rival Watteau.

RAPANUI, or EASTER ISLAND (*Paascheylandt*, *Osterinsel*, *Ile de Pâques*, etc.), the WAIHU or TEAPI of Cook, an island in the eastern part of the South Pacific, lying in 27° 8' S. latitude and 109° 25' W. longitude, 1,000 miles east of Pitcairn. It is rudely triangular in shape, with its hypotenuse twelve miles long running northeast and southwest, and its three angles marked by three volcanic peaks. The coasts have no natural harbors of any importance, and landing is difficult. There is no lack of fertile soil, and the climate is moist enough to make up for the absence of running water. At one time the island would appear to have been wooded, but it now presents only a few bushes (*Edwardsia*, *Broussonetia*, etc.), ferns, grasses, sedges, etc. The natives keep a few goats and a large stock of domestic fowls, and the French house which now owns a large part of the island feeds about 10,000 sheep.

RAPE OIL. This important fatty oil, known also as "sweet oil," is obtained from seeds of various cultivated varieties of the cruciferous genus *Brassica*, the parent form of the whole apparently being the wild navev, *B. campestris* (Lin.), the *B. præcox* of De Candolle.

The oil yielded by these seeds is, in physical and chemical properties, practically the same, the range of fluctuations not being greater than would be found in the oil of any specific seed under similar varying conditions of production. Newly pressed rape oil has a dark sherry color with, at first, scarcely any perceptible smell; but after resting a short time the oil deposits an abundant mucilaginous slime, and by taking up oxygen it acquires a peculiar disagreeable odor and an acrid taste. Refined by the ordinary process the oil assumes a clear golden yellow color.

The principal uses of rape oil are for lubrication and lighting; but since the introduction of mineral oils for both these purposes the importance of rape has considerably decreased.

RAPHAEL (רפאל, "God heals") first appears in literature in the book of Tobit, where in human disguise and under the name of Azarias ("God helps") he accompanies Tobias in his adventurous journey and conquers the demon Asmodæus. He is said to be "one of the seven angels [archangels] who present the prayers of the saints and enter into the presence of the glory of the Holy One." In the book of Enoch Raphael is the angel of the spirits of man, and it is his business to gather the souls of the dead in the place where they are reserved till the day of judgment—a conception which seems to imply a derivation from רפאים, "ghosts." In later Midrash Raphael appears as the angel commissioned to put down the evil spirits that vexed the sons of Noah with plagues and sicknesses after the flood, and he it was who taught men the use of simples and furnished materials for the "Book of Noah," the earliest treatise on materia medica, (Rönsch, *Buch der Jubiläen*, p. 385 seq.)

RAPHAEL, RAPHAEL SANZIO, born in 1483, was the son of Giovanni Santi, a painter of some repute in the ducal city of Urbino, situated among the Apennines on the borders of Tuscany and Umbria. On the death of his father in 1494 young Raphael (then aged eleven) was left in the care of his stepmother (his own mother, Magia Ciarla, having died in 1491) and of his uncle, a priest called Bartolomeo. In what year Raphael was apprenticed to Perugino and how the interval before that was spent are matters of doubt.

Before long Raphael appears to have been admitted to take a share in the execution of paintings by his master; and his touch can with more or less certainty be traced in some of Perugino's panels which were executed about 1502.

About 1502 Raphael began to execute independent works; four pictures for churches at Città di Castello were probably the earliest of these, and appear to have been painted in the years 1502-4.

From 1504 to 1508 Raphael's life was very stirring and active. In the first of 1504 he visited Urbino, where he painted two small panels for Duke Guidobaldo, the *St. George* and the *St. Michael* of the Louvre. His first and for him momentous visit to Florence was made toward the end of 1504, when he presented himself with a warm letter of recommendation from his patroness Joanna della Rovere to the gonfaloniere Pier Soderini. In Florence Raphael was kindly received, and, in spite of his youth (being barely of age), was welcomed as an equal by the majority of those great artists who at that time had raised Florence to a pitch of artistic celebrity far above all other cities of the world.

The transition in Raphael's style from his first or Perugian to his second or Florentine manner is well shown in the large picture of the *Coronation of the Virgin* painted for Maddalena degli Oddi, now in the Vatican, one of the most beautiful that he ever produced, and especially remarkable for its strong religious sentiment.

His first visit to Florence lasted only a few months; in 1505 he was again in Perugia painting his first fresco, the *Trinity and Saints* for the Camaldoli monks of San Severo, now a mere wreck from injury and restorations.

In 1506 Raphael was again in Urbino, where he painted for the duke another picture of *St. George* which was sent to England as a present to Henry VII.

Toward the end of 1506 Raphael returned to Florence, and there (before 1508) produced a large number of his finest works, carefully finished, and for the most part wholly the work of his own hand.

In 1508 Raphael was painting several important pictures in Florence; in September of that year we find him settled in Rome.

A series of rooms in the Vatican, over the Appartamenti Borgia, were already decorated with frescoes by Bonfigli, Perugino, Piero della Francesca, Andrea del Castagno, Signorelli, and Sodoma; but so rapidly had the taste of the time changed that Julius II. decided to sweep them all away, and re-cover the walls with paintings in the more developed but less truly decorative style of Raphael.

It was not without regret that Raphael saw the destruction of this noble series of frescoes. One vault, that of the *Stanza dell' Incendio*, painted by his master Perugino, he saved from obliteration; it still exists, well preserved, a most skillful piece of decorative work; and he also set his pupils to copy a number of portrait-heads in the frescoes of Piero della Francesca before they were destroyed.

The paintings in the stanze were only a small part of Raphael's work between 1509 and 1513. To this period belong the *Madonna of Foligno* (Vatican), painted in 1511 for Sigismondo Conti; it is one of his most beautiful compositions, full of the utmost grace and sweetness of expression, and appears to be wholly the work of his hand. It has suffered much from repainting. Of

about the same date are the gem-like *Garvagh Madonna* (National Gallery, bought for \$45,000 once in the possession of the Aldobrandini family), the *Diademed Virgin of the Louvre*, and the *Madonna del Pesce* at Madrid. The last is a very noble picture, but the design is more pleasing than the color, which, like other paintings of Raphael's at Madrid, suggests the inferior touch of a pupil; it was executed in 1513 for S. Domenico in Naples. In addition to other easel pictures a number of his finest portraits belong to this period—that of Julius II. (Uffizi), of which a good replica or contemporary copy exists in the National Gallery, the so-called *Fornarina* in the Palazzo Barberini, the *Baldassare Castiglione* of the Louvre, and the unfinished portrait of Federigo Gonzaga of Mantua.

Among the latest works of Raphael are the large *St. Michael and the Devil*, in the Louvre, signed "Raphael Urbinas pingebat, MDXVIII.," and the very beautiful portrait of the violin-player, in the Sciarra-Colonna Palace in Rome, also dated 1518; this last bears much resemblance to the painter himself. The British Museum possesses one of Raphael's finest portraits, though only a chalk drawing, that of his friend the painter Timoteo della Vite, a masterpiece of expression and vigor; it is executed in black and red, and is but little inferior in chromatic effect to an oil-painting; it is life-size, and is executed with wonderful skill and evident keen interest in the subject.

In 1519 Cardinal Giuliano de' Medici (afterward Clement VII.,) as bishop of Narbonne, ordered two altar-pieces for his cathedral—the one by Raphael, the other by Raphael's Venetian rival Sebastiano del Piombo. That by the latter painter is the noble *Resurrection of Lazarus*, now in the National Gallery, in the drawing of which the Venetian received important aid from Michelangelo. Several studies for Raphael's picture exist, showing that he at first intended to paint a Resurrection of Christ as a pendant to Sebastiano's subject, but soon altered his scheme into the Transfiguration. The eight or nine existing studies are scattered through the Oxford, Lille, Windsor, and some private collections. A great part of the lower group was unfinished at the time of the painter's sudden death in 1520, and a good deal of the heavy coloring of Giulio Romano is visible in it. On the death of Raphael the picture became too precious to send out of Rome, and Cardinal de' Medici contented himself with sending the *Resurrection of Lazarus* to Narbonne. *The Transfiguration* was bequeathed by him to the monks of S. Pietro in Montorio, in whose church it remained till it was stolen by Napoleon I. It now hangs in the Vatican Gallery.

A sober criticism of Raphael's architectural works must force one to refuse him a high position in this branch of art. In the church of S. Eligio and the Chigi chapel he is merely a copyist of Bramante, and his more original works show but little power of invention or even mastery of the first principles of architectural design. His details are, however, often delicate and refined (especially in the Palazzo Pandolfini), and he was supremely successful in the decorative treatment of richly ornamented interiors when he did not, as in some of the Vatican stanze, sacrifice the room to the frescoes on its walls.

Like other great artists, Raphael did not disdain to practice the lesser branches of art: a design for a silver perfume-burner with female caryatids is preserved in an engraving by Marco da Ravenna; and he also designed two handsome repoussé salvers for Agostino Chigi, drawings for which are now at Dresden. In designs for tarsia-work and wood-carving he was especially skillful; witness the magnificent doors and shutters of the stanze

executed by his pupil Giovanni Barile of Siena. The majolica designs attributed to him were by a namesake and relation called Raffaello di Ciarla; and though many fine dishes and ewers of Urbina and other majolica are decorated with Raphael's designs, they are all taken from pictures or engravings, not specially done by him for ceramic purposes. With the frivolty of his age Leo X. occasionally wasted Raphael's skill on unworthy objects, such as the scenery of a temporary theater; and in 1516 the pope set him to paint in fresco the portrait life-size of a large elephant, the gift of the king of Portugal, after the animal was dead. This elephant is also introduced among the stucco reliefs of the Vatican loggie, with the poetaster Barrabal sitting in mock triumph on its back.

Though Raphael himself does not appear to have practiced the art of engraving, yet this formed one of the many branches of art which were carried on under his supervision. A large number of his designs were engraved by his pupils Marcantonio Raimondi and Agostino Veneziano. These valuable engravings are from Raphael's sketches, not from his finished pictures, and in some cases they show important alterations made in the execution of the picture. Raimondi's engraving of the S. Cecilia of Bologna in design is very inferior to that of the actual painting. Several of Raphael's most important compositions are known to us only by these early engravings, e.g., the *Massacre of the Innocents* (engraved by Raimondi), which is one of his finest works, both for skillful composition and for masterly drawing of the nude. Another magnificent design is the *Judgment of Paris*, containing a large number of figures; the nude figure of Minerva is a work of especial force and beauty. A standing figure of Lucretia about to stab herself is also one of his most lovely figures. Many of Raphael's studies for Marcantonio's engravings still exist.

As an antiquary Raphael deserves to take the highest rank. His report to Leo X. in 1518 is an eloquent plea for the preservation of ancient buildings. In 1515 he had been appointed by Leo X. inspector of all excavations in Rome and within ten miles round. His careful study of the antique, both statues and modes of decoration, is clearly shown in many of his frescoes, and especially in the graceful stucco reliefs and painted grotteschi, of which he and his pupils made such skillful use in the decorations of the Vatican loggie, the Villa Madama, and elsewhere.

When we consider the immense field over which his labors were spread and the strong personal individuality which appears in all these varied branches of art, together with the almost incredible number of paintings that issued from his studio, it will be seen that he must have labored with an amount of unflagging industry which has perhaps never been surpassed, and that too in a time and in a city of which the social habits and luxurious splendor certainly threw every possible temptation in the way of steady application and regular work.

Among all the painters of the world none has been so universally popular as Raphael, or has so steadily maintained his preëminent reputation throughout the many changes in taste which have taken place in the last three and a half centuries. He died in 1520.

RAPIN, PAUL DE, sieur of Thoyras, French historian, was the son of Jacques de Rapin, avocat at Castres (Tarn), where he was born March 25, 1661. He died in 1725. Rapin was the author of a *Dissertation sur les Whigs et les Torys*, 1717. *L'Histoire d'Angleterre*, embracing the period from the invasion of the Romans to the death of Charles I., was printed at The Hague in 1724 in 8 vols.

RASGRAD or RESARGRAD, a town of Bulgaria, with

a station about two miles distant, on the Varna and Rustchuk Railway, is situated on the Byaly Lom, 970 feet above the sea-level. It has increased in population during the last fifty years from 3,000 to 10,000 inhabitants. In 1810 it was the scene of the defeat of the Turks by the Russians.

RASHBA (רשב"א) stands for three rabbins of various ages and various countries.

1. R. SHIME'ON BEN EL'AZAR was a Mishnic teacher of the second century.

2. RABBENU SHIMSHON BEN ABRAHAM of Sens wrote commentaries on various Mishnic treatises (see MISHNAH).

3. R. SHELOMOH BEN ABRAHAM (or Ben [Ibn] Addereth) was a disciple of Nachmanides, upon whom his master's mantle had fallen (see RAMBAN). He became chief rabbi of Barcelona. Here so many disciples from the neighboring provinces flocked to him as to excite emulation among the Jews in the capital of Castile, who thereupon appointed the German Rabbi Asher b. Yehiel (Rosh). At the same time religious questions poured in upon him from all Israel, so that it is a marvel how he could go through his mere clerical work.

RASHBAM. RABBENU SHEMUEL BEN MEIR, commonly called, from his title and the initials of his own and his father's names, Rashbam, was born at Rameru (Ramerupt near Troyes, in France) about 1080. He was almost the greatest Talmudist of his time, the only two excelling him till 1105 being Rashi and later on his own younger brother, Rabbenu Ya'akov, better known as Rabbenu Tham. He died about 1160.

RASHI (רש"י), that is, RABBENU SHELOMOH JARCHI (Solomon, son of Isaac), whence by Christian writers he is also called Isacides, born in 1040, was the greatest rabbi of the Middle Ages. He is equally important for Biblical and Talmudic study, and in the former connection as interesting to Christians as to Jews from the influence of his exegesis on Luther's Bible and on the English version of the Old Testament (mainly through Ibn 'Ezra, and still more through Kimhi). Rashi is the most eminent of the "sages" or "great men of Lothaire" (לוֹתֵיר, *i.e.*, Lorraine) in whom culminated that movement of Jewish scholarship to which Charlemagne had given the first impulse. He died in 1105.

RASHT (also Räscht, Rescht, Rashd, and Resht), a town in northern Persia, situated in 37° 18' N. latitude and 49° 37' E. longitude, capital of the richly wooded maritime province of Gilan, contains from 15,000 to 20,000 inhabitants.

RASK, RASMUS CHRISTIAN, an eminent scholar and philologist, was born at Brändekilde in the Island of Fünen or Fyen in Denmark in 1787. He died at Copenhagen on November 14, 1832.

RASKOLNIKS. See RUSSIA.

RASPBERRY. See HORTICULTURE.

RASTATT, or RASTADT, a small town in Baden, is situated on the Murg, four miles above its junction with the Rhine and twelve miles southwest of Carlsruhe. The industry of Rastatt is almost confined to local needs, and the town may be said to live on the garrison, which forms nearly half of its population (1885) of 11,743. Two-thirds of the inhabitants are Roman Catholics.

RASTELL, the name of two early English printers.

I. JOHN RASTELL or RASTALL, printer and author, was born at London toward the end of the fifteenth century. He died at London, leaving two sons—William, printer and judge (see below), and John, a justice of the peace.

II. WILLIAM RASTELL, printer and judge, son of the above, was born in London about 1508. He died at Louvain on August 27, 1565.

RASTRICK, an urban sanitary district in the West Riding of Yorkshire, is situated on an acclivity near the Calder, and on the Lancashire and Yorkshire Railway five miles southeast of Halifax and three and one-half north of Huddersfield. It possesses woolen and silk manufactures, and there are stone quarries in the neighborhood. The population of the urban sanitary district (area, 1,371 acres) in 1871 was 5,896, and in 1881 it was 8,039.

RAT. Under the article MOUSE an account has been already given of the relationships and chief allies of the animals known as rats, and the present article is confined to the two species to which the name rat is most strictly applicable. These are the so-called old English black rat, *Mus rattus*, and the common brown or Norway rat, *M. decumanus*. The first of these is a comparatively small and lightly built animal, seldom exceeding about seven inches in length, with a slender head, large ears, and a long thin scaly tail about eight or nine inches in length. Its color is, at least in all temperate climates, a peculiar shining bluish black, rather lighter on the belly, the ears, feet, and tail being also black; but in tropical regions it is represented by a gray or rufous-backed and white-bellied race to which the name of Alexandrian rat (*M. alexandrinus*) has been applied, owing to its having been first discovered at Alexandria, but which cannot be considered to be really specifically distinct from the true black rat. Its disposition is milder and more tamable than that of *M. decumanus*, and it is therefore the species to which the tame white and pied rats kept as pets commonly belong. It is said that in some parts of Germany *M. rattus* has been lately reasserting itself and increasing at the expense of *M. decumanus*, but this seems very unlikely from the previous history of the two animals.

The brown or Norway rat, *M. decumanus*, is a heavily built animal, growing to eight or nine inches in length, with a bluff rounded head, small ears, and a comparatively short tail—always shorter than the head and body combined, and generally not longer than the body alone. Its color is a uniform grayish brown above, and white below, the ears, feet, and tail being flesh-colored; melanistic varieties are by no means rare, and these are often mistaken for true black rats, but the differences in size and proportions form a ready means of distinguishing the two. The brown rat is believed to be a native of western China, where a wild race has been recently discovered so like it as to be practically indistinguishable. The two species agree fully in their predaceous habits, omnivorous diet, and great fecundity. They bear four or five times in the year from four to ten blind and naked young, which are in their turn able to breed at an age of about six months. The time of gestation is about twenty days.

RATAFIA is a term applied to a flavoring essence, the basis of which is the essential oil of bitter almonds. Peach kernels are properly the source of ratafia, but any of the other substances yielding bitter almond oil is used. The name "ratafia" is also applied in France to a variety of liquors, and from Dantzic a special liqueur is sent out under the name of "ratafia."

RATEL. The animals known as Ratels or Honey-badgers are small clumsy-looking creatures of about the size and appearance of the true badgers, and belong to the same natural group of the *Carnivora*, namely, the subfamily *Melinæ* of the large family *Mustelidæ*, which contains the otters, badgers, stoats, weasels, etc. Of the ratels two species are generally recognized, viz., the Indian Ratel (*Mellivora indica*), a native of all the peninsula of India, and the African (*M. ratel*), which ranges over the whole of the African continent. All the ratels are of much the same color, namely, iron-gray

on the upper parts of the head, body, and tail, and black below, a style of coloration rather rare among mammals, as the upper side of the body is in the great majority darker than the lower.

RATHENOW, a small town of Prussia in the province of Brandenburg, lies on the right bank of the Havel, forty-four miles to the west of Berlin. It is known for its "Rathenow stones," *i.e.*, bricks made of the clay of the Havel, and for its spectacles and optical instruments, which are exported to various parts of the world. It contains no buildings of note. The population in 1889 was 11,394, including 174 Roman Catholics and 68 Jews.

RATIBOR (Polish, *Raciborz*), a town of Prussian Silesia in the department of Oppeln, is pleasantly situated on the left bank of the Oder at the point where the river becomes navigable, about twelve miles from the Austrian frontier. The population in 1889 was 18,373, or, including the immediately adjacent villages, 27,100, five-sixths of whom are Roman Catholics.

RATIONALISM. In modern usage the term "rationalism" is employed almost exclusively to denote a theological tendency, method, or system, and is then applied in a narrower and a wider sense. In its wider sense, which is most common in English theological literature, it is the name of that mode of thought generally which finds the final test of religious truth in the human understanding, conscience, or reason, and particularly in the understanding. In its narrower sense, which is almost the only sense it bears in Germany, it denotes a definite school, or rather phase of theological thought, and a phase of thought which has now been outlived.

German rationalism was a specific theological form of the general intellectual movement of the last century known as "illuminism" or *Aufklärung*; but while the illuminati generally ended in rejecting Christianity, the rationalist retained and defended it in a form approved by the logical understanding or the moral sense. While rationalism, as a child of the general intellectual movement of the age in which it appeared, owed much to the philosophy, science, and humanism of the intellectual life of Europe, as a specially theological tendency it was powerfully influenced by English deistical writings. Thus both orthodoxy and pietism were agents in calling forth rationalism, which was to prove the most dangerous opponent to both. More than one of the foremost rationalists had passed through the school of pietism.

Regarding rationalism as the opponent of supernaturalism and naturalism, and as an opponent which appealed in the conflict almost exclusively to either the logical understanding or the moral sense as the criterion of religious truth, it may be said to have existed in Germany for nearly a century (*c.* 1740-1836), and to have flourished about half that length of time (*c.* 1760-1810)—that is, it took its rise simultaneously with the publication of Wolff's writings (1736-50) and the translation into German of the works of the English deists (Tindal's *Christianity as Old as the Creation* was translated in 1741), displayed its greatest strength in Semler's critical works (1760-73) and in Kant's philosophy (1781-93), began then to decline gradually under the influence of the works of Herder, Jacobi, Fichte (in his later period), and Hegel, and at last died out when Schleiermacher especially, in the department of theology proper, and Baur and Strauss, among others, in the department of Biblical criticism, had given currency to ideas and issues which rendered its main contentions objectless and its criteria of religious truth invalid.

It was in the application of its principles and method to Biblical studies that rationalism won its greatest triumphs, and really accomplished its greatest measure of

good work. Johann Salomo Semler (1725-1791), the father of modern Biblical criticism, as the Germans call him, was the greatest representative of the school in this department. A pietist by education, with something of Gottfried Arnold's liking for heretics and all his dislike of ecclesiasticism, but with none of Arnold's mysticism, a man of immense learning, without any clear and systematic management of it, he was the first German to apply the strict principles of historical criticism, in conjunction with the rationalistic truths and errors of his day, to the study of the Scriptures and ecclesiastical history, particularly the history of doctrines. He assailed with all the wealth of his learning the traditional view of the limits and authority of the Biblical canon especially, and having, as he held, demonstrated its human origin and fallibility, he proceeded to deal freely with the books composing it, as sharing the failings common to everything human. He found the Scriptures pervaded with "local ideas," and his Christianity was really limited to the "natural religion" of the deists and the moral truths taught by Christ. As a man who had been under a pietistic training, he was, it is true, unwilling to refer to the understanding alone for evidence of the truths of Christianity, but his enlargement of the test is confined to the admission of an appeal to the measure of virtue and happiness produced. By this extended test he tries the matter of the Scriptures, assigning to his category of local ideas "whatever is not adapted to make men wise unto their true advantage." The supernatural origin of the Scriptures as writings and most of the miracles recorded in them he rejected; but, on the other hand, he was a vigorous opponent of the adversaries of Christianity and of the naturalists who denied revelation altogether—Reimarus, for instance, the author of the *Wolfenbüttel Fragmente*. Other decided rationalists contemporaneous with Semler were Teller (1734-1804), Eberhard (1739-1809), and Steinbart (1738-1809), who all agreed in confounding religion with morality, and in reducing Christianity to a popularization of utilitarian morals.

RATISBON (German, *Regensburg*), an ancient city of Bavaria, the seat of a bishop, and the capital of the Upper Palatinate, is pleasantly situated on the right bank of the Danube, opposite the influx of the Regen, from which it derives its German name. It lies almost exactly in the center of the kingdom, about sixty-five miles to the northeast of Munich and fifty-three miles to the southeast of Nuremberg.

The town-house, a somewhat gloomy pile, dating in part from the fourteenth century, contains the rooms occupied by the imperial diet of Germany from 1663 to 1806. An historical interest also attaches to the Golden Cross Inn, where Charles V. made the acquaintance of the fair Barbara Blumberger, the mother of Don John of Austria. Among the chief manufactures of Ratisbon are iron and steel wares, pottery, parquet flooring, and lead pencils. Boat-building is also prosecuted, and a brisk transit trade is carried on in salt, grain, and timber. In 1880 the town contained 34,516 inhabitants.

RATLAM or RUTLAM, a native state of India, in the Western Malwa Agency (Central India Agency), lying between 23° 2' and 23° 36' N. latitude and 74° 42' and 75° 17' E. longitude, with an area of 729 square miles, and a population (1881) of 87,314 (males 45,779, females 41,535), Hindus numbering 54,034, Mohammedans 9,913, Jains 6,038, Christians 19, and aboriginals 17,297.

RATNARIGI or RUTNAGHERRY, a British district of India, in the Konkan division of the Bombay presidency, with an area of 3,922 square miles. It lies



between  $15^{\circ} 40'$  and  $18^{\circ} 5'$  N. latitude and  $73^{\circ} 5'$  and  $73^{\circ} 55'$  E. longitude, and is bounded on the north by the Savitri river, separating it from the Janjira Agency, and by Kolaba district; on the east by the Western Ghats, dividing it from the districts of Satara and Belgaum and the native state of Kolhapur; on the south, where it is reduced to a strip of sea-coast not more than four miles wide, by the Portuguese possessions of Goa; and on the west by the Arabian Sea. In 1889 the population of Ratnagiri district was 997,090.

Ratnagiri formed part of the dominions of the peshwa, and was annexed by the British Government in 1880 on the overthrow of Baji Rao.

RATNAGIRI or RUTNAGHERRY, chief town of the above district, is situated on the Konkan coast in  $16^{\circ} 59'$  N. latitude and  $73^{\circ} 19'$  E. longitude, 136 miles south-by-east of Bombay. A leading industry connected with the town is the sardine fishery, which usually takes place in January and February, and engages fleets of canoes. A single net-caster will fill his canoe in the course of a morning. The lighthouse was erected in 1867; its light, visible eighteen miles distant, is 250 feet above high water. The population of the town in 1881 numbered 12,616 (males 6,418, females 6,198).

RATRAMNUS, a theological controversialist of some mark, who flourished in the ninth century, was a monk of the Benedictine abbey of Corbie near Amiens, but beyond this fact almost nothing of his personal history has been preserved. He is now best known by his treatise on the Eucharist (*De Corpore et sanguine Domini liber*), in which he controverted the doctrine of transubstantiation as taught in a similar work by his contemporary Radbertus Paschasius.

RATTAN. See CANE and PALM.

RATTAZZI, URBANO, Italian statesman, was born on June 29, 1808, at Alessandria, and from 1838 practiced with great success at the bar. In 1848 he was sent to the chamber of deputies in Turin as representative of his native town. The defeat at Novara compelled the resignation of Rattazzi in March, 1849. His election as president of the chamber in 1852 was one of the earliest results of the so-called "connubio" with Cavour, and having become minister of justice in 1853 he in that and the next following years was able to carry a number of measures of reform of considerable importance. He was intrusted with the formation of a new ministry in March, 1862. He was again prime minister in 1867, from April to October. His death took place at Frosinone on June 5, 1873.

RATTLESNAKE. Rattlesnakes are a small group of the family of Pit-vipers (*Crotalidæ*), characterized by a tail which terminates in a chain of horny, loosely connected rings, the so-called "rattle." The "pit" by which the family is distinguished from the ordinary vipers is a deep depression in the integument of the sides of the snout, between the nostrils and the eye; its physiological function is unknown. The rattle is a complicated and highly specialized organ, developed from the simple conical scale or epidermal spine, which in the majority of snakes forms the termination of the general integument of the tail. The bone by which the root of the rattle is supported consists of the last caudal vertebræ, from three to eight in number, which are enlarged, dilated, compressed, and coalesced. This bone is covered with thick and vascular cutis, transversely divided by two constrictions into three portions, of which the proximal is larger than the median, and the median much larger than the distal. This cuticular portion constitutes the matrix of a horny epidermoid covering which closely fits the shape of the

underlying soft part and which is the first commencement of the rattle, as it appears in very young rattlesnakes before they have shed their skin for the first time. When the period of a renewal of the skin approaches a new covering of the extremity of the tail is formed below the old one, but the latter, instead of being cast off with the remainder of the epidermis, is retained by the posterior swelling of the end of the tail, forming now the first loose joint of the rattle. This process is repeated on succeeding exuviations—the new joints being always larger than the old ones as long as the snake grows. Perfect rattles therefore taper toward the point, but generally the oldest (terminal) joints wear away in time and are lost. As rattlesnakes shed their skins more than once every year, the number of joints of the rattle does not indicate the age of the animal but the number of exuviations which it has undergone. The largest rattle in the British Museum has twenty-one joints. The rattle consists thus of a variable number of dry, hard, horny cup-shaped joints, each of which loosely grasps a portion of the preceding, and all of which are capable of being shaken against each other. If the interspaces between the joints are filled with water, as often happens in wet weather, no noise can be produced. The motor power lies in the lateral muscles of the tail, by which a vibratory motion is communicated to the rattle, the noise produced being similar to that of a weak child's rattle and perceptible at a distance of from ten to twenty yards.

The habit of violently and rapidly agitating the tail is by no means peculiar to the rattlesnake, but has been observed in other venomous as well as innocuous snakes with the ordinary termination of the tail, when under the influence of fear or anger. The special object for which the rattle has been developed in these snakes is unknown.

Rattlesnakes are entirely confined to the New World. North-American authors distinguish now a great number of different kinds, the most recent, Garman (*Reptiles and Batrachians of North America*, 1883, 4to), enumerating twelve distinct species and thirteen additional varieties; but all these species or varieties fall into two groups, viz., one which has the upper side of the head covered with the ordinary nine dermal shields, and the other in which the shields between and behind the eyes are broken up or replaced by small scales. The former group consists of two species only, of comparatively small size, both North American, *Crotalus miliarius* being the more generally known. The second group comprises the more formidable kinds of South as well as North America, which are generally described under the names of *C. horridus* and *C. durissus*.

RAU, KARL HEINRICH, German political economist, was born at Erlangen on November 23, 1792. He was elected a corresponding member of the French Institute in 1856. After a useful and honorable career he died at Heidelberg on March 18, 1870.

His principal work is the *Lehrbuch der politischen Oekonomie* (1826-37), an encyclopædia of the economic knowledge of his time, written with a special view to the guidance of practical men. The doctrines are, in the main, those of Smith and Say; but they are treated in an independent manner, and the conclusions of his predecessors are modified, especially by giving larger scope to the action of the state.

RAUCH, CHRISTIAN DANIEL, one of the most celebrated sculptors of modern times, was born at Arolsen, in the principality of Waldeck, on January 2, 1777. He died December 3, 1857.

RAUMER, FRIEDRICH LUDWIG GEORG VON, German historian, was born at Wörlitz in Anhalt, on May

14, 1781. He died at Berlin on June 14, 1873. Raumer made many contributions to history, in all of which he embodied the results of independent research and gave evidence of a sound and penetrating judgment. His style is direct, lucid, and vigorous, and his best books have been as warmly appreciated by ordinary readers as by scholars.

1 RAUPACH, ERNST BENJAMIN SALOMO, German dramatic writer, was born on April 21, 1784, at Staupitz, a village near Liegnitz in Silesia. He died at Berlin on March 18, 1852.

RAVAILLAC, FRANÇOIS, the assassin of Henry IV. of France, was born near Angoulême in 1578. Various disappointments tended to foster a violently fanatical temperament, and widely-spread rumors that the king was intending to make war upon the pope suggested to him the idea of assassination, which he deliberately and successfully carried out on May 14, 1610. He was put to death by torture on May 27th.

RAVEN, the largest of the birds of the order *Passeres*, and probably the most highly developed of all birds. The raven breeds very early in the year, in England resorting to its nest, which is usually an ancient if not an ancestral structure, about the middle or toward the end of January. Therein are laid from five to seven eggs of the common Corvine coloration, and the young are hatched before the end of February. In more northern countries the breeding-season is naturally delayed, but everywhere this species is almost if not quite the earliest of birds to enter upon the business of perpetuating its kind. The raven measures about twenty-six inches in length, and has an expanse of wing considerably exceeding a yard. Its bill and feet are black and the same may be said of its whole plumage, but the feathers of the upper parts, as well as of the breast are very glossy, reflecting a bright purple or steel-blue. The species inhabits the whole of Europe, and the northern if not the central parts of Asia; but in the latter continent its southern range is not well determined. In America it is, or used to be, found from the shores of the Polar Sea to Guatemala if not to Honduras, but is said hardly to be found of late years in the eastern part of the United States. In Africa its place is taken by three allied but well-differentiated species.

RAVENNA, chief city of an Italian province of the same name, contained 18,571 inhabitants according to the census of 1881. It is situated in the northeast of Italy, in 44° 25' N. latitude and 12° 12' E. longitude, about four miles from the Adriatic, with which it is now connected by the Corsini Canal, the two small rivers Ronco and Montone no longer serving as means of communication between the city and the sea. A railway, twenty-six miles long, unites Ravenna with Castel Bolognese on the line from Bologna to Rimini.

RAVENSBURG, an industrial town of Würtemberg, is pleasantly situated amid vine-clad hills on the small river Schussen, twelve miles to the north of Friedrichshafen on the Lake of Constance. The industrial products of Ravensburg are varied, including linen, cotton, embroidered muslins, pottery, glass, and playing cards. The fruit market is of considerable importance, and trade is also carried on in cattle, grain, and wood. The population in 1880 was 10,550, of whom 2,620 were Protestants.

RÁWAL PINDÍ or RAWUL PINDEE, a district of British India, in the division of the same name, under the jurisdiction of the lieutenant-governor of the Punjab, lying between 33° and 34° N. latitude and 71° 46' and 73° 41' E. longitude. It is situated on the southern slopes of the northwestern extremities of the Himálayas, and contains large mountain tracts, with

rich valleys traversed by many mountain torrents. Its area is 4,861 square miles.

The population in 1881 was 820,512 (males 449,287 females 371,225), Hindus numbering 86,162, Moham medans 711,546, Sikhs 17,780, Christians 3,822, and "others" 202. The only town with a population exceeding 10,000 is the capital. The inhabitants are mostly scattered in small hamlets over the surface of the country. The staple product is wheat in the spring and bajra in the autumn. Inferior grains are giving place to more valuable cereals, and to cotton and potatoes.

RÁWAL PINDÍ or RAWUL PINDEE, principal town and administrative headquarters of the above district, lies in 33° 37' N. latitude and 73° 6' E. longitude. The population of the town in 1881 was 52,975 (35,985 males and 16,990 females).

RÁWANDÍS. See MOHAMMEDANISM.

RAWITSCH (Polish *Ravicz*), a small manufacturing town of Prussia in the province of Posen, lies near the Silesian frontier, thirty-seven miles to the north of Breslau. The population in 1880 was 12,260, made up of 7,587 Protestants, 3,539 Roman Catholics, and 1,123 Jews. Rawitsch is of comparatively modern origin, having been founded by Protestant refugees from Silesia during the Thirty Years' War.

RAWMARSH, a large village and urban sanitary district in the West Riding of Yorkshire, is situated on the ridge of a hill above the valley of the Don and on the Midland Railway, two miles north of Rotherham and twelve southwest of Doncaster. It possesses extensive iron-works and steel rolling-mills, and there are collieries in the neighborhood. The population of the urban sanitary district (area, 2,578 acres) in 1871 was 6,869, and in 1891 it was 11,983.

RAWTENSTALL, a town of east Lancashire, is situated on the Lancashire and Yorkshire railway, eight miles north of Bury and twelve southeast of Blackburn. The cotton and woolen mills are very extensive, and in the neighborhood there are stone quarries. The population of the urban sanitary district (area, 1,667 acres) in 1871 was estimated at 11,307, and in 1881 it was 12,571.

RAY. The rays (*Batoidei*) together with the sharks (*Selachoidei*) form the suborder *Plagiostomata* of cartilaginous fishes, and are divided into six families.

The first family contains only the Saw-fishes (*Pristis*), of which five species are known, from tropical and subtropical seas. Although saw-fishes possess all the essential characteristics of the rays proper, they retain the elongate form of the body of sharks, the tail being excessively muscular and the sole organ of locomotion. The "saw" is a flat and enormously developed prolongation of the snout, with an endoskeleton which consists of from three to five cartilaginous tubes; these are, in fact, merely the rostral processes of the cranial cartilage and are found in all rays, though they are commonly much shorter. The integument of the saw is hard, covered with shagreen; and a series of strong teeth, sharp in front, and flat behind, are embedded in it, in alveolar sockets, on each side. The saw is a most formidable weapon of offense, by means of which the fish tears pieces of flesh off the body of its victim, or rips open its abdomen to feed on the protruding intestines.

The third family, *Torpedinidæ*, includes the electric rays. The peculiar organ by which the electricity is produced the fish uses voluntarily either to defend itself or to stun or kill the smaller animals on which it feeds. To receive the shock the object must complete the galvanic circuit by communicating with the fish at two distinct points, either directly or through the medium of some conducting body. The electric currents created

in these fishes exercise all the other known powers of electricity. All the rays of this family have, like electric fishes generally, a smooth and naked body.

The fourth family, *Raiidae*, comprises the skates and rays proper, or *Raia*. More than thirty species are known, chiefly from the temperate seas of both hemispheres, but much more numerous from the northern than the southern. A few species descend to a depth of nearly 600 fathoms, without, however, essentially differing from their surface congeners. Rays, as is sufficiently indicated by the shape of their body, are bottom-fishes, living on flat sandy ground, generally at no great distance from the coast or the surface.

The members of the fifth family, *Trygonidae* or Sting-rays, are distinguished from the rays proper by having the vertical fins replaced by a strong spine attached to the upper side of the tail. Some forty species are known, which inhabit tropical more than temperate seas. The spine is barbed on the sides, and is a most effective weapon of defense; by lashing the tail in every direction the sting-rays can inflict dangerous or at least extremely painful wounds.

The rays of the sixth and last family, *Myliobatidae*, are popularly known under various names, such as "devil-fishes," "sea-devils," and "eagle-rays." In them the dilatation of the body, or rather the development of the pectoral fins, is carried to an extreme, while the tail is very thin and sometimes long like a whipcord. Caudal spines are generally present and similar to those of the sting-rays; but in the pectoral fin a portion is detached and forms a "cephalic" lobe or pair of lobes in front of the snout. The dentition consists of perfectly flat molars, adapted for crushing hard substances. In some of the eagle-rays the molars are large and tessellated, in others extremely small. Of the twenty species which are known, from tropical and temperate seas, the majority attain to a very large and some to an enormous size; one mentioned by Risso, which was taken at Messina, weighed 1,250 pounds.

RAY or WRAY (as he wrote his name till 1670) JOHN, sometimes called the father of English natural history, was the son of the blacksmith of Black Notley near Braintree in Essex. There he was born, November 29, 1628, or, according to other authorities, some months earlier.

In 1667 Ray was elected a fellow of the Royal Society, and in 1669 he published in conjunction with Willughby his first paper in the *Philosophical Transactions* on "Experiments concerning the Motion of Sap in Trees." He lived to the age of seventy-six, dying January 17, 1705.

RAYMOND LULLY. See LULLY.

RAYMOND, OF SABUNDE (Sebonde, Sebeyde, etc.) appears to have been born at Barcelona toward the end of the fourteenth century. He combined the training of a physician and a theologian, and was professor of theology at Toulouse, seemingly from the year 1430 onward. He published there in 1436 his chief work, *Theologia Naturalis, sive liber creaturarum*.

RAYNAL, GUILLAUME THOMAS FRANÇOIS, French author, was born on April 12, 1713, in the province of Rouergue. He did not a little journalism and book-making of divers kinds; but his name would be entirely forgotten were it not for the *Histoire philosophique et politique des Établissements et du Commerce des Européens dans les Deux Indes*. He died on March 6, 1796.

RAZORBILL or RAZOR-BILLED AUK, known also on many parts of the British coasts as the marrot, murre, scout, tinker, or willock—names which it, however, shares with the guillemot, and to some extent with the puffin—a common sea-bird of the North-

ern Atlantic, resorting in vast numbers to certain stations on rocky cliffs for the purpose of breeding, and, its object being accomplished, returning to deeper waters for the rest of the year. It is the *Alca Torda* of Linnæus. In habits the razorbill closely agrees with the true guillemot, laying its single egg (which is not, however, subject to the same amazing variety of coloration that is preëminently the Guillemot's own) on the ledges of the cliffs to which it repairs in the breeding season, but it is said then as a rule to occupy higher elevations, and when not breeding to keep further out to sea. On the east side of the Atlantic the razorbill has its stations on convenient parts of the coast from the North Cape to Brittany, besides several in the Baltic, while in winter it passes much further to the southward, and is sometimes numerous in the Bay of Gibraltar, occasionally entering the Mediterranean, but apparently never extending to the eastward of Sicily or Malta. On the west side of the Atlantic it breeds from 70° N. latitude on the eastern shore of Baffin's Bay to Cape Farewell, and again on the coast of America from Labrador and Newfoundland to the Bay of Fundy, while in winter it reaches Long Island.

RAZZI, GIANANTONIO. See SODDOMA.

RÉ, ISLE OF, a long, low island three miles off the coast of the French department of Charente Inférieure, runs southeast and northwest with a breadth of about three miles and a length of eighteen and one-half miles. The northwest point (Pointe des Baleines) has a lighthouse of the first class. The Pertuis Breton separates the island from the coast of La Vendée to the north, and the Pertuis d'Antioche from the Isle of Oléron to the south. With a surface of 18,259 acres, the Isle of Ré has 15,370 inhabitants, whose chief source of income is the salt marshes, producing annually 31,500 tons of salt. Tradition says that the city of Antioche on the west coast was destroyed by the Atlantic storms, which still constantly threaten to cut the island in two at the isthmus (only 230 feet wide) formed by the gulf called Fier d'Ars. There are two cantons—St. Martin and Ars-en-Ré—in the arrondissement of La Rochelle. St. Martin, with a secure harbor, was fortified by Vauban, and is the depot for convicts on their way to New Caledonia.

READE, CHARLES, holds a high and distinctive place among the English novelists of the third quarter of the nineteenth century. The son of an Oxfordshire squire, he was born at Ipsden in 1814, and was educated for the bar. He entered Magdalen College, Oxford, proceeded B.A. in 1835, with a third class in classics, was elected Vinerian Reader in 1842, and was called to the bar (Lincoln's Inn) in 1843. It was comparatively late in his life that he made his first appearance as an author. He was dramatist first and novelist afterward, not merely chronologically but in his aims as an author, always having an eye to stage-effect in scene and situation as well as in dialogue. *Gold*, his first play (1850), was but a moderate success. He did not achieve popularity till 1856, when he produced *It's Never Too Late to Mend*, a novel written with the purpose of reforming abuses in prison discipline and the treatment of criminals. *It's Never Too Late to Mend* was his first great success, but before this he had gained the respect of critics with two shorter novels, *Peg Woffington* (1852), a close study of life and character behind the scenes, and *Christie Johnstone* (1853), an equally close study of Scotch fisher folk.

He had also established his position as a dramatist by writing (in combination with Mr. Tom Taylor) a stage version of *Peg Woffington* under the title of *Masks and Faces* (1854), the most successful and most frequently reproduced of his plays, besides three that were less

successful, *The Courier of Lyons* (a powerful melodrama), *Two Loves and a Life*, and *The King's Rivals* (1854). From 1856 onward he kept his position in the foremost rank of contemporary novelists. Five minor novels followed in quick succession—*The Course of True Love never did Run Smooth* (1857), *Jack of all Trades* (1858), *The Autobiography of a Thief* (1858), *Love Me Little, Love Me Long* (1859), *The Double Marriage, or White Lies* (1860). Then appeared, in 1861, what most critics regard as his masterpiece, *The Cloister and the Hearth*. Returning from the fifteenth century to modern English life, he next produced another startling novel with a purpose, *Hard Cash* (1863), in which he strove to direct attention to the abuses of private lunatic asylums. Three others followed—*Foul Play* (1869), in which he exposed the iniquities of ship-knackers, and paved the way for the labors of Mr. Plimsoll; *Put Yourself in his Place* (1870), in which he grappled with the tyrannous outrages of trades-unions; and *A Woman-Hater* (1877), in which he gave a helping hand to the advocates of woman's rights. The *Wandering Heir* (1875), of which he also wrote a version for the stage, was suggested by the Tichborne trial. Outside the line of these moral and occasional works Reade produced three that might be classed as psychological, inasmuch as they were elaborate studies of character—*Griffith Gaunt* (1866), *A Terrible Temptation* (1871), *A Simpleton* (1873). His greatest success as a dramatist attended his last attempt—*Drink*—an adaptation of Zola's *L'Assommoir*, produced in 1879. At his death in 1884 (April 11th), Reade left behind him a completed novel, *A Perilous Secret*, which showed no falling off in the art of weaving a complicated plot and devising thrilling situations.

READING, a market town and ancient borough of Berkshire, is pleasantly situated on slightly elevated ground on the banks of the Kennet, a short distance above its junction with the Thames, and on branches of the Great Western, South-Eastern, and South-Western Railways, twenty-eight miles south-southeast of Oxford and thirty-five and a half west of London by rail. The population of the borough (area, 2,186 acres) in 1871 was 32,324, and in 1891 it was 55,752.

READING, a city of the United States, capital of Berks county, Penn., on the east bank of the Schuylkill river, and on the Schuylkill and Union Canals, fifty-eight miles northwest of Philadelphia at the intersection of some sixteen railway lines, representing eight different companies. It occupies an elevated and healthy position on a plain that gradually rises toward an amphitheater of hills, including Penn's Mount on the east and Neversink Mountain on the south. The plain is extremely regular and the principal streets cross at Penn Square, the business center of the city. An abundant supply of excellent water helps to keep the whole place sweet and clean. Conspicuous buildings are—the courthouse, the city hall, Trinity Church (Lutheran), Christ Church (Episcopal), the opera house, Mishler's academy of music, and the railway station. Besides a very extensive and varied manufacture of iron and iron wares from steam-boilers down to nails, Reading carries on distilling, tanning, cotton-weaving, cigar-rolling, paper-making, and many other industries, and is the seat of extensive machine-shops of the Philadelphia and Reading Railroad. The population—2,385 in 1800, 15,743 in 1850, 33,930 in 1870, 43,278 in 1880, and 58,661 in 1890—is largely of German origin.

Laid out in 1748 by Thomas and Richard Penn, Reading received incorporation as a borough in 1783, and was made a city in 1847.

REALEJO, a town and harbor on the Pacific coast of Nicaragua, situated in the neighborhood of 12° 28'

N. latitude. The harbor is spacious and well sheltered, and altogether the best which Nicaragua possesses on that coast; it is protected by a peninsula and two considerable islands, Cardon and Asserradores or Corinto. The town lies nine miles inland, and as a port is now superseded by the new town of Corinto, founded about 1849, and since 1881 connected with Leon and the interior by a railway. Realejo was the terminus adopted by Bedford Pim for his scheme of an interoceanic canal; but the route actually sanctioned reaches the coast of the Pacific at Brito, some distance to the south.

REAL ESTATE. The land law of England, and of countries whose law is based upon that of England, stands in a peculiar position, which can be understood only by an outline of its history.

*History.*—Such terms as "fee" or "homage" carry us far back into feudal times. Rights of common and distress are based upon still older institutions, forming the very basis of primitive law. The conception of tenure is the most fundamental ground of distinction between real and personal estate, the former only being strictly entitled to the name of estate (see ESTATE). The division into real and personal is coincident to a great extent with that into immovable and movable, generally used by systems of law founded on the Roman (see PERSONAL ESTATE). That it is not entirely coincident is due to the influence of the Roman law itself. The Greeks and Romans of the republic were essentially nations of citizens; the Teutons were essentially a nation of land folk; the Roman empire bridged the gulf between the two. It is probable that the English land law was produced by the action of the policy adopted in the lower empire, finally developed into feudalism, upon the previously existing course of Teutonic custom (see FEUDALISM). It is sufficient to say here that the distinguishing features of the Teutonic system were the enjoyment in common and the absence of private ownership, except to a limited extent. The history of the development of the old English land law before the Conquest will be found under ENGLAND and LAND. Its principal features, stated as shortly as possible, were (1) liberty of alienation, either by will or *inter vivos*, of such land as could be alienated, chiefly, if not entirely, bockland, subject always to the limits fixed by the *boc*; (2) publicity of transfer by enrollment in the shire-book or church-book; (3) equal partition of the estate of a deceased among the sons, and, failing sons, among the daughters; (4) cultivation to a great extent by persons in various degrees of serfdom, owing money or labor rents; (5) variety of custom, tending to become uniform, through the application of the same principles in the local courts; (6) subjection of land to the *trinoda necessitas*, a burden imposed for the purpose of defence of the realm.

The elements of feudalism so far existed in England under the Anglo-Saxon and Danish kings as to make it easy to introduce it in full at the Norman Conquest. The land forfeited to the Conqueror was regranted by him to be held by military service due to the king, not to the mesne lord as in Continental feudalism. In 1086 at the council of Salisbury all the landholders swore fealty to the crown. In the full vigor of feudalism the inhabitants were either free or not free. The free inhabitants held their lands either by free tenure (*liberum tenementum*, franktenement) or by a tenure which was originally that of a non-free inhabitant, but attached to land in the possession of a free man. Franktenement was either military tenure, called also tenure in knight service or chivalry (including barony, the highest tenure known to the law, grand serjeanty and the special forms of escuage, castle-guard, cornage, and others), or socage (including burgage and petit serjeanty), or frankalmoign

(*libera elemosina*) or in *vine* service, by which ecclesiastical corporations generally held their land. The non-free inhabitants were in Domesday Book *servi*, *cotarii*, or *bordarii*, later *nativi* or *villani*, the last name being applied to both free men and serfs. All these were in a more or less dependent condition. The most important difference between the military and socage tenures was the mode of descent. Whether or not a feudal benefice was originally hereditary, it had certainly become so at the time of the Conquest, and it descended to the eldest son.

The common law as far as it dealt with real estate had in the main assumed its present aspect by the reign of Henry III. The changes which have been made since that date have been chiefly due to the action of equity and legislation, the latter sometimes interpreted by the courts in a manner very different from the intention of parliament. The most important influence of equity has been exercised in MORTGAGE (*q. v.*) and trusts (see TRUST), in the doctrine of specific performance of contracts concerning real estate, and in relief from forfeiture for breach of covenant.

Corporeal hereditaments are all necessarily freehold; an interest in land less than freehold, such as a term of years, is personalty only. There was no room for such an interest in the feudal gradation of tenure; it was regarded as a mere personal contract, and was incapable of the incidents of tenure. By the Conveyancing Act, 1881, the residue of a long term of years may in certain cases be enlarged into the fee-simple. A copyhold is in strict law only a tenancy at the will of the lord (see COPYHOLD). Estates of freehold are either estates for life or in fee (called also estates of inheritance), the latter being in fee-tail or in fee-simple. An estate for life may be either for the life of the tenant or for the life of another person, the latter called an estate *pur autre vie*. The former kind of estate includes estates of dower and curtesy (see HUSBAND AND WIFE). An estate in fee is called a fee simply, an obvious sign of its feudal origin. Estates tail are either general or special, the latter being in tail male or (rarely) in tail female. There may also be a quasi-entail of an estate *pur autre vie* (see ENTAIL). An estate in fee-simple is the largest estate known to English law. Its ordinary incidents are an oath of fealty (never exacted), ESCHEAT (*q. v.*), and (in a manor) suit of the court baron, and occasionally a small quit-rent and relief. All these are obviously relics of the once important feudal incidents. Incorporeal hereditaments consist chiefly, if not wholly, of rights *in alieno solo*. They are divided by Mr. Joshua Williams (*Real Property*, pt. ii.) into (1) reversions, remainders, and executory interests, (2) hereditaments purely incorporeal, the last being either appendant, appurtenant, or in gross. Examples are profits *a prendre* (such as rights of common), easements (such as rights of way), seignories, advowsons, rents, tithes, titles of honor, offices, franchises. Before 1845 corporeal hereditaments were said to lie in livery, incorporeal in grant. But by 8 and 9 Vict. c. 106, s. 2, all corporeal hereditaments are, as regards the conveyance of the immediate freehold thereof, to be deemed to lie in grant as well as in livery. With regard to the *time* of enjoyment, estates are either in possession or in expectancy—that is, in reversion or remainder or executory interests (see REMAINDER). With regard to the *mode* of enjoyment, estates are either joint, in common, in coparcenary, or in severalty.

*Exceptional Tenures.*—It has been already stated that there are still to be found survivals of the old pre-Conquest customary law. They are found both in the tenure and in the conveyance of land. The only customs of which judicial notice is taken are GAVELKIND

(*q. v.*) and BOROUGH-ENGLISH (*q. v.*). Any other local customs, as in manors, must be proved by evidence. The tenures of frankalmoign and grand serjeanty were specially preserved by 12 Car. II. c. 24. Tenure in frankalmoign is the nearest approach in English law to absolute ownership. An estate in frankalmoign has no incidents, as it is held simply by divine service and is not subject to escheat. All tenures in frankalmoign must (except where created by the crown) be older than *Quia Emptores*. The tenure of grand serjeanty is the holding of lands by doing a personal service to the king, as carrying his banner or sword. Petit serjeanty consists in the payment to the king yearly of a bow, sword, dagger, or such other small things belonging to war (Littleton, § 159). It is in effect socage.

*Restraints on Alienation.*—The alienation of real estate may be subject to almost any conditions, provided that such conditions do not contravene the law. As a general rule there can be no restrictions upon the alienation of an estate in fee-simple; the two ideas are incompatible.

*United States.*—The law of real estate in the United States is the law of England modified to suit a different state of circumstances. The main point of difference is that in the United States the occupiers of land are generally wholly or in part owners, not tenants, as in England. This is to a great extent the effect of the homestead laws (see HOMESTEAD). The traces of the feudal origin of the law are, as might be expected, considerably less prominent than in England. Thus estates tail are practically obsolete; in some States they are specially forbidden by the State constitutions. The law of descent is the same in real and personal estate (see INHERITANCE). Manors do not exist, except in the State of New York, where they were created by the crown in colonial days (Bouvier, *Law Dict.*, "Manor"). Registration of deeds is general (see REGISTRATION). In some States forms of deed are prescribed by statute. Conveyancing is for the most part simpler than in England. The holding of real estate by religious or charitable corporations is generally restricted by the act creating them rather than by anything like the English law of mortmain. In Pennsylvania such a corporation cannot hold land without an act of the legislature, and in Territories of the United States it cannot hold real estate of a greater value than \$50,000. Perpetuities are forbidden in most States. The right of eminent domain is at once acknowledged and limited by the constitution of the United States. By art. 5 of the amendments private property is not to be taken for public use without just compensation. A similar provision is found in many of the State constitutions. By an act of Congress of April 9, 1866, c. 31, all citizens of the United States have the same right in every State and Territory as is enjoyed by white citizens thereof to inherit, purchase, lease, sell, hold, and convey real and personal property. In most States aliens may hold land; but in some States they cannot do so without becoming naturalized or at least filing in the specified manner a declaration of intention to become naturalized. For the State laws affecting the capacity of aliens to hold land, see Washburn, *Real Property*, vol. i. p. 64.

*International Law.*—The law of the place where real estate is situated (*lex loci rei sitæ*) governs its tenure and transfer. The laws of England and of the United States are more strict on this point than the laws of most other countries. They require that the formalities of the *locus rei sitæ* must be observed, even if not necessary to be observed in the place where the contract was made. The *lex loci rei sitæ* determines what is to be considered real estate. A foreign court cannot, as a

general rule, pass title to land situated in another country. The English and United States courts of equity have to a certain extent avoided the inconvenience which this inability to deal with land out of the jurisdiction sometimes causes by the use of the theory that equity acts upon the conscience of the party, and not upon the title to the foreign land. Thus, in the leading case of *Penn. v. Baltimore*, in 1750, the Court of Chancery on this ground decreed specific performance of articles for settling the boundaries of the provinces of Pennsylvania and Maryland. The difficulty always arises that, although the court professes to act upon the conscience, it must indirectly act upon the property, and that it can not carry its decision into execution without the aid of the local tribunals.

REALISM. See SCHOLASTICISM.

RÉAUMUR, RENÉ ANTOINE FERCHAULT DE, the eldest son of a French nobleman, was born on February 28, 1683, at La Rochelle, and received his early education there. In 1731 he invented the thermometer which bears his name. He loved retirement, and lived much at his country residences, at one of which, La Dermondière (Maine), he met with an accident, a fall from horseback, the effects of which proved fatal on October 17, 1757.

Réaumur was a man of wide attainments, and great industry. His writings, sometimes on trivial topics, were frequently diffuse, yet always interesting.

Réaumur's scientific papers are too numerous to be recapitulated; they deal with nearly all branches of science. His first paper, in 1708, was on a general problem in geometry, his last, in 1756, on the forms of birds' nests.

REBUS, an enigmatical representation of some name or thing, by using figures or pictures instead of words or parts of words. Camden mentions an instance of this kind of wit in a gallant who expressed his love to a woman named Rose Hill by painting in the border of his gown a rose, a hill, an eye, a loaf, and a well; this in the style of the rebus, reads "Rose Hill I love well." This kind of wit was long practiced by the great, who took the pains to find devices for their names. It was, however, happily ridiculed by Ben Jonson in the humorous description of Abel Drugger's device in the *Alchemist* and by the *Spectator* in the device of Jack of Newberry. The name is also applied to arrangements of words in which the position of the several vocables is to be taken into account in divining the meaning. Thus "I understand you undertake to overthrow my undertaking" makes the rebus

stand	take	to	taking
I	you	throw	my;

or in French

pir	vent	venir
un	vient	d'un

may be read "un soupir vient souvent d'un souvenir." The original use of the word, which comes to us from France, was, however, wider: any equivoque or satirical pleasantry might be so named, and the origin of the term is ascribed by Ménage to the clerks of Picardy, who at carnival time used to put out satirical squibs called "De rebus quæ geruntur." "Rebus," in heraldry, is a coat of arms which bears an allusion to the name of the person—as three castles for Castleton, three cups for Butler, three conies for Coningsby.

RÉCAMIER, MADAME (whose maiden name was JEANNE FRANÇOISE JULIE ADELAIDE BERNARD), was born on December 4, 1777, at Lyons, and died at Paris on May 11, 1849. She was married at fifteen to the banker Récamier, who was more than old enough to be her father. Beautiful, accomplished, with a real love for literature, she possessed at the same time a tempera-

ment which protected her from scandal, and from the early days of the consulate to almost the end of the July monarchy her salon was one of the chief resorts of literary and political society that pretended to fashion. Madame Récamier never even in old age, ill-health, and reduced circumstances lost her attraction. After her death *Souvenirs et Correspondances tirés des Papiers de Madame Récamier* were published.

RECANTI, a city of Italy, in the province of Macerata, seventeen and one-half miles from Loreto, on the highway between Ancona and Rome, is built on a hill 910 feet above the sea, and still retains portions of its fifteenth century walls and gateways. It is now perhaps best known as the birthplace of the poet Leopardi. The population in 1881 was 8,864 in the town and port (3,040) and 19,524 in the commune.

RECHABITES, or SONS OF RECHAB, in ancient Israel formed a sort of religious order in some respects analogous to the Nazarites, with whom they shared the rule of abstinence from wine. They went farther than the latter, however, in eschewing the luxuries and pursuits of settled life, living in tents and refusing to sow grain as well as to plant vineyards. Their origin must have been in northern Israel, for their "father" or founder, to whom they referred their rule of life, was that Jehonadab or Jonadab, son of Rechab, who lent his countenance to Jehu in the abolition of Tyrian Baal-worship.

RECIFÈ. See PERNAMBUCO.

RECOGNIZANCE, in law, is, in the words of Blackstone, "an obligation of record, entered into before some court or magistrate duly authorized, whereby the party bound acknowledges that he owes to the king or a private plaintiff (as the case may be) a certain sum of money, with condition to be void if he shall do some particular act—as if he shall appear at the assizes, keep the peace, pay a certain debt, or the like." The term itself means that the person bound *recognizes* the existence of a debt. Recognizance was at one time used as a security for money lent, something in the nature of a mortgage. In this sense it is practically obsolete. The principal use of recognizance at the present day is in chancery and criminal procedure. In chancery recognizances are entered into as a form of security by certain persons appointed to positions of trust, such as guardians or receivers. In criminal practice they affect either suspected or accused persons, or witnesses. As early as 1360 the Act of 34 Edw. III., c. 1, empowered justices to take of all them that were not of good fame sufficient surety and mainprize of their good behavior. The wide terms of this provision are not acted upon at the present day. The only recognizances of this kind practically enforced are those entered into as security for keeping the peace. Such recognizances are forfeited by any act tending to a breach of the peace.

In the United States recognizances are used for much the same purpose as in England.

RECORDE, ROBERT, a physician and eminent mathematician, was descended from a respectable family at Tenby in Wales, and was born about 1500. He died in the King's Bench prison, Southwark, where he was confined for debt, in 1558.

RECORDER. See COURT and QUARTER SESSIONS.

RECORDS, PUBLIC. According to the definition of the Record Commissioners appointed at the commencement of this century to report upon the nature of the archives, the national muniments of England constitute four great classes. The first class consists of independent documents relating to various subjects, persons, and places, but making altogether one whole, such as, for instance, *Domesday Book*, or the *Valor*

*Ecclesiasticus* of Henry VIII. The second class consists of the series of enrollments, including within one roll great varieties of distinct and separate entries classed according to their formal character, as, for instance, the close rolls and patent rolls, or classed according to their subject-matter, as are the Liberate and the Norman rolls. The third class embraces those records which contain entries of judicial proceedings and those where each subject has a distinct roll; while the last class comprises all separate documents, such as letters, inquisitions, privy seals, commissions, and other various descriptions of formal instruments.

In consequence of the neglect and indifference from which the national archives suffered before being housed in their present quarters, it is as much a matter for wonder as for congratulation that any of them are still in existence. In the earlier periods the records of the courts were preserved in the palace of the king; but, when the law courts became stationary and were held within the precincts of the royal palace, instead of following the sovereign from place to place, all legal documents remained in the custody of their respective courts. On the business of the country increasing, the records began to assume such vast proportions that further accommodation had to be obtained. Gradually three warehouses for the custody of public documents came into existence. The records of the King's Bench and Common Pleas were removed to the palace at Westminster, to the old chapter-house, and to the cloister of the abbey of Westminster, and thus laid the foundation of the well-known "chapter-house repository." Toward the end of the reign of Richard I., the Court of Chancery became separated from that of the Exchequer, the wardrobe in the Tower of London was used as the chief place of deposit for all Chancery documents, and thus the Record Office in the Tower sprang up. On the accession of Charles II., William Prynne, then keeper of the records in the Tower, implored the king "to preserve these ancient records not only from fire and sword, but water, moths, canker, dust, cobwebs, for your own and your kingdom's honor and service, they being such sacred reliques, such peerless jewels that your noble ancestors have estimated no places so fit to preserve them in as consecrated chapels or royal treasuries and wardrobes where they lay up their sacred crowns, jewels, robes; and that upon very good grounds, they being the principal evidences by which they held, supported, defended their crowns, kingdoms, revenues, prerogatives, and their subjects their respective lands, lives, liberties, properties, franchises, rights, laws." This earnest appeal was not urged before it was required. On his appointment to office Prynne made an inspection of the records under his custody. He found them "buried together in one confused chaos, dust, and filth in the dark corners of Cæsar's chapel in the White Tower." He employed soldiers and women to remove and cleanse them, "who soon growing weary of this noisome work left them as foul, dusty, and nasty as they found them." He then begged the aid of the clerks of his department, but these officials "being unwilling to touch the records for fear of fouling their fingers, spoiling their clothes, endangering their eyesight and healths by their cankerous dust and evil scent," declined the task. To the energetic Prynne the labor of methodizing the papers in his charge seemed hopeless; he saw them in confused heaps here and scattered there and destitute of anything approaching to an index. He lamented that it would require "Briareus his hundred hands, Argus his hundred eyes, and Nestor's centuries of years to marshal them into distinct files and make exact alpha-

betical tables of the several things, names, places, comprised in them." Still nothing was done to remedy the evils complained of. Addresses were presented to parliament upon the subject; reports were drawn up and committees frequently sat; but it was not until the beginning of this century that a complete and satisfactory investigation of the public records was entered into. In the summer of 1800 a very able report upon the state of the archives was drawn up; and a commission was appointed "to methodize, regulate, and digest the records." But the commission directed its attention exclusively to the printing of antiquarian matter, and nothing was attempted for the better preservation of the archives. Dissatisfaction arose, and a select committee of the House of Commons was appointed to inquire into the working of the Record Commission. The result of its sittings was the passing of a special act of Parliament, which placed the public records in the custody and under the superintendence of the master of the rolls for the time being, and directed the treasury forthwith to provide a suitable building. In 1851 the foundations of the present Record Repository were laid, and seven years afterward the public records were removed from their different places of deposit and housed in their new quarters, where they are now most carefully preserved.

In the United States there is no central depository of public records, each municipality, county and state preserving in its own appointed places of safe-keeping the various public documents which may accumulate in connection with the administration of its own particular branch of the government. The documents of national character are placed on file with the heads of each department concerned (in Washington city), or in the Congressional library. In the nature of our government there can be nothing analogous to the English public records offices. The records themselves are chiefly papers relating to legislative action, records of court transactions, and conveyances of property.

REDBREAST, the name of a bird which from its manners, no less familiar than engaging, has for a long while been a great favorite among all classes.

From its abundance, or from innumerable figures, the redbreast is too well known to need description, yet there are very few representations of it which give a notion of its characteristic appearance or gestures—all so suggestive of intelligence. Its olive-brown back and reddish-orange breast, or their equivalents in black and white, may be easily imitated by the draughtsman; but the faculty of tracing a truthful outline or fixing the peculiar expression of this favorite bird has proved to be beyond the skill of almost every artist who has attempted its portraiture. The redbreast exhibits a curious uncertainty of temperament in regard to its nesting habits. At times it will place the utmost confidence in man, and again at times show the greatest jealousy. The nest, though generally pretty, can seldom be called a work of art, and is usually built of moss and dead leaves, with a moderate lining of hair. In this are laid from five to seven white eggs, sprinkled or blotched with light red.

REDDITCH, a town of Worcestershire, England, is on an eminence near the Warwickshire border, sixteen miles southwest of Birmingham by the Midland Railway. The urban sanitary district (area about 926 acres) had a population of about 7,871 in 1871, and of 11,295 in 1891.

REDEMPTORISTS. See LIGUORI.

RED RIVER. Three at least of the many Red Rivers of the world deserve to be mentioned,—(1) the Red River or Fleuve Rouge, the Songcoi or Thao of the Anamese, the Hoang-Kiang of the Chinese, which

flows through the heart of TONG-KING (*q.v.*); (2) the Red River which rises in the Staked Plain in Texas, passes through a magnificent cañon 100 miles long, and from 200 to 1,000 feet deep, and furnishes a navigable channel of 1,200 miles before it reaches the MISSISSIPPI (*q.v.*); (3) the Red River of the North, a somewhat smaller stream, which, rising in Elbow Lake (so called from its shape) in Minnesota, not far from the sources of the Mississippi, crosses into Canada at Pembina, and falls into Lake Winnipeg, after a course of 565 miles (110 in Canada).

**RED RIVER SETTLEMENT.**—In 1811 the fifth earl of Selkirk (1771–1820), who had devoted special attention to emigration as a means of providing for the surplus population of the Scottish Highlands, obtained from the Hudson's Bay Company a grant of land in what was then called the district of Ossiniboia (Assiniboia). In 1813 a settlement was founded by his agent, Mr. Miles Macdonell, on the banks of the Red River, the first fort (Fort Daer) being at Pembina. By 1814 the settlers numbered 200. The North-West Fur-Traders of Manchester (a company which was the bitterest rival of the Hudson's Bay Company till the two amalgamated in 1821) did all they could by force and fraud to break up the colony, which, by 1816, had taken up its headquarters at Fort Douglas, on the site of the present town of Winnipeg. The French-Indian half-breeds (Bois-Brûlés) were incited against it, and its mills and houses were burned. The earl of Selkirk, arriving on the scene, succeeded in reorganizing the community, to which the name of Kildonan was now given, after Kildonan in Helmsdale, Sutherlandshire. He found himself personally involved in a very network of hostile intrigue; but the colony was saved, and after his premature death it continued to be more or less supported by his heirs till 1824. In 1835 Lord Selkirk's territorial claims were transferred to the Hudson's Bay Company, who undertook to pay the expenses incurred by the family. At that date the population of the settlement consisted of about 5,000 Highlanders, Bois-Brûlés, English half-breeds, and retired company officials. At the transfer of territorial jurisdiction to the Canadian Government in 1869 the Bois-Brûlés, under a certain Louis RIEL (*q.v.*) (son of a Frenchman who had built the first mill on the Red river), revolted and declared an independent republic. Colonel (now Lord) Wolseley was dispatched with a force of 1,400 men, and without bloodshed took possession of Fort Garry on August 24, 1870. The only striking feature of the expedition was the remarkable energy with which the difficulties of transport were overcome. Riel in 1885 became the leader of another unsuccessful insurrection of half-breeds in the same region, was captured, tried, and hanged.

**REDRUTH**, a market town of Cornwall, England, is pleasantly situated on the West Cornwall Railway, about nine miles west of Truro. The population of the urban sanitary district (area 4,006 acres) in 1871 was 10,685, and in 1891 was 10,324.

**RED SEA.** The Red Sea runs north-northwest from the Gulf of Aden in the Indian Ocean for about 1,200 miles, extending from 12° 40' to 30° N. latitude. The Strait of Bab-el-Mandeb at the entrance to the Gulf of Aden is thirteen and a half miles across, and is divided by Perim Island into two channels, the northeastern narrow and shallow, the southwestern ten miles wide, and deep. The sea widens rapidly to 230 miles in 16° N. latitude, and more gradually to 250 miles off Kunfuda in 19° N. latitude; from this point it narrows to 130 miles in 24° N. latitude, a breadth which is maintained up to 27° 45' N. latitude, where the sea divides into two gulfs, those of Suez and

'Akaba. The Gulf of Suez continues in the north-northwest direction for 170 miles, with an average width of 30 miles; that of 'Akaba is narrower, and runs north-northeast for 97 miles. The Sinaitic peninsula between the two gulfs bounds the Red Sea to the north; on the east the Arabian coast and on the west the coasts of Egypt, Nubia, and Abyssinia form the boundaries.

The Red Sea area is in a state of gradual upheaval, the former seaport of Adulis on Annesley Bay is now four miles from the shore, and at Suez the former limits of the sea can be traced for several miles northward; whereas the north coast of Egypt is undergoing gradual subsidence.

The tides are imperceptible at many places on the Red Sea, and where observable they are extremely uncertain, varying both as to time and to amount of rise with the direction and force of the wind. At Suez, where they are most regular, the rise varies from seven feet at spring to four feet at neap tides. The surface-currents of the sea are also variable and perplexing; they are chiefly produced by the wind, and change in velocity and direction accordingly.

**Traffic.**—From the decline of the old Indian trade with Egypt till the formation of the Peninsular and Oriental Steam Navigation Company and the overland route to India in 1840, traffic in the Red Sea was almost entirely confined to small native vessels trading with grain and fruit between Egypt and Arabia, and carrying pilgrims to Jiddah, the port of Mecca. Since 1840 passenger traffic, and since the opening of the Suez Canal in 1869 trade of all kinds in European vessels, have greatly increased. A telegraphic cable was laid from Bombay to Suez in 1859.

**Meteorology.**—The climate of the Red Sea region is one of the hottest in the world. The altitude of the sun, the almost continually cloudless skies, the arid rainless character of the shores, and the complete absence of rivers combine to make the mean temperature high. That of the air usually ranges from 70° to 94° Fahr., though it has been frequently observed as high as 105° in the shade on board ship, and in the northern part of the sea the clearness of the nights promotes radiation, so that by morning the thermometer may fall to the freezing-point on shore.

The temperature of the water at the south end of the sea is usually in excess of that of the air, and it is on record that on four consecutive days the temperature of the surface-water was 100°, 106°, 100°, and 96°, while at the same time that of the air was 80°, 82°, 83°, and 82°. The surface-temperature varies from 70° to 90°, according to the position and the season.

**REDSHANK**, the usual name of a bird—the *Scolopax calidris* of Linnæus and *Totanus calidris* of modern authors—so called in English from the color of the bare part of its legs, which, being also long, are conspicuous as it flies over its marshy haunts or runs nimbly beside the waters it affects. The body of the redshank is almost as big as a snipe's, but its long neck, wings, and legs make it appear a much larger bird. Above, the general color is grayish drab, freckled with black, except the lower part of the back and a conspicuous band on each wing, which are white, while the flight-quills are black, thus producing a very harmonious effect. In the breeding season the back and breast are mottled with dark brown, but in winter the latter is white. The nest is generally concealed in a tuft of rushes or grass, a little removed from the wettest parts of the swamp whence the bird gets its sustenance, and contains four eggs, usually of a rather warmly tinted brown with blackish spots or blotches; but no brief description can be given that would point out their



differences from the eggs of other birds, more or less akin, among which, those of the LAPWING especially, they are taken and find a ready sale.

REDSTART, a bird well known in Great Britain, in many parts of which it is called Firetail—a name of almost the same meaning, since “start” is from the Anglo-Saxon *steort*, a tail. This beautiful bird, the *Ruticilla phœnicurus* of most ornithologists, returns to England about the middle or toward the end of April, and at once takes up its abode in gardens, orchards, and about old buildings, when its curious habit of flirting at nearly every change of position its brightly-colored tail, together with the pure white forehead, the black throat, and bright bay breast of the cock, renders him conspicuous, even if attention be not drawn by his lively and pleasing though short and intermittent song. The hen is much more plainly attired; but the characteristic coloring and action of the tail pertain to her equally as to her mate. The nest is almost always placed in a hole, whether of a tree or of a more or less ruined building, and contains from five to seven eggs of a delicate greenish-blue, occasionally sprinkled with faint red spots. The young on assuming their feathers present a great resemblance to those of the redbreast at the same age; but the red tail, though of duller hue than in the adult, forms even at this early age an easy means of distinguishing them.

In America the name redstart has been not unfittingly bestowed upon a bird which has some curious outward resemblance, in both looks and manners, to that of the old country, though the two are in the opinion of some systematists nearly as widely separated from each other as truly passerine birds well can be. The American redstart is the *Setophaga ruticilla* of authors, belonging to the purely New-World family *Mniotiltidæ*, and to a genus which contains about a dozen species, ranging from Canada (in summer) to Bolivia. The wonderful likeness, coupled of course with many sharp distinctions, upon which it would be here impossible to dwell, between the birds of these two genera of perfectly distinct origin, is a matter that must compel every evolutionist to admit that we are as yet very far from penetrating the action of creative power, and that especially we are wholly ignorant of the causes which in some instances produce analogy.

REDWING, the *Turdus iliacus* of authors, which is an abundant winter visitor to the British Islands, arriving in autumn generally about the same time as the fieldfare does. This bird has its common English name from the sides of its body, its inner wing-coverts, and axillaries being of a bright reddish-orange, of which color, however, there is no appearance on the wing itself while the bird is at rest, and not much is ordinarily seen while it is in flight. In other respects it is very like a song-thrush, and indeed in France and some other countries it bears the name mauvis or mavis, often given to that species in some parts of Britain; but its coloration is much more vividly contrasted, and a conspicuous white, instead of a light brown, streak over the eye at once affords a ready diagnosis. The redwing breeds in Iceland, in the subalpine and arctic districts of Norway, Sweden, and Finland, and thence across Northern Russia and Siberia, becoming scarce to the eastward of the Yenissei, and not extending beyond Lake Baikal. In winter it visits the whole of Europe and North Africa, occasionally reaching Madeira, while to the eastward it is found at that season in the northwestern Himalayas and Kohat.

RED WING, a city of the United States, capital of Goodhue County, Minn., occupies a commanding site on a plateau encircled by high bluffs (nearly 300 feet high), on the west bank of the Mississippi, forty-one

miles south of St. Paul on the La Crosse division of the Chicago and St. Paul railroad; it is also the eastern terminus of the Cannon Valley branch of the same railway. Red Wing has an opera house and a music hall; it trades in lumber, manufactures earthenware, wagons and carriages, furniture, flour, leather, and boots and shoes, and exports large quantities of wheat. The population was 4,260 in 1870, and 5,876 in 1880; in 1890 it was 6,277.

REDWOOD. See SEQUOIA.

REED, a term applied to several distinct species of large, water-loving grasses. The common or water reed, *Phragmites communis*, Trin. (*Arundo phragmites*, L.), occurs along the margins of lakes, fens, marshes, and placid streams, not only throughout Britain, but over the Palæarctic and Nearctic regions, and even in South Australia. Another very important species is *Psamma arenaria* R., and S. (*Ammophila* or *Arundo arundinacea*, Host.), the sea-reed or marram grass, a native of the sandy shores of Europe and North Africa. Other reeds are *Calamagrostis* (various species), *Gynurium argenteum* (pampas grass), *Deyeuxia*, etc.; also, *Arundo Donax*, the largest European grass (six to twelve feet high), which is abundant in southern Europe. Reeds have been extensively used from the earliest times in thatching and other branches of construction, and also for arrows, the pipes of musical instruments, etc. Reed pens are still used in the East (see PEN).

REED, in music. See OBOE, HARMONIUM and ORGAN.

REEVE, CLARA, one of the imitators of Horace Walpole in Gothic romance, was born at Ipswich in 1725. She was the daughter of a Suffolk clergyman, and died at Ipswich in 1803.

REFEREE, in law, is a person to whom a matter is delegated by a superior for report or decision. Inquiry and report may be directed in any case—trial only by consent of the parties, or in any matter requiring any prolonged examination of documents or accounts, or any scientific or local investigation which cannot be tried in the ordinary way.

REFLECTION. See LIGHT.

REFORMATION. The period occupied by the great movement known as the Protestant Reformation stands identified, for the most part, with the period which marks the transition from the mediæval to the modern era in European history. Taken within its narrowest limits, it may be looked upon as commencing with the year 1517 and as finding a certain consummation with the year 1545. In the former year Luther's theses, published at Wittenberg, represent the commencement of that direct and open renunciation of mediæval doctrine which he initiated; in the latter year the assembling of the council of Trent marks the renewed sanction and promulgation of that doctrine whereby an insuperable barrier was erected between the communion of Rome and the churches of Protestantism. From that time each communion possessed its distinctive organization and formulary of faith, and the struggles which subsequently took place between Romanism and Protestantism represent, not attempts to bring about or to resist reform (whether of discipline or of doctrine), but endeavors on the part of both communions to bring about, if possible, the extinction of the opposed form of faith.

But, although the contest which Luther initiated had, long before his death, resulted in complete and irreparable rupture between the contending parties, it is certain that in order to understand the true nature and origin of that contest we must go back to events long anterior to 1517; while in order fully to estimate its effects we

must follow the history of events long after 1545. In Germany, for example, the Reformation can hardly be regarded as finding even a formal consummation before the peace of Augsburg (1555); in Switzerland the movement went on with important modifications down to the death of Calvin in 1564; in France the onward progress was not materially checked before the massacre on the eve of St. Bartholomew (1572); in Bohemia its independent and peculiar fortunes found a final solution only with the battle of the White Hill in 1620; while in England and in Scotland, in the Netherlands, in Scandinavia, in Italy and in Spain, the movement assumed so much variety of character, and was decided by circumstances of time and place of so different a kind, that its essential features often become merged and almost lost in their combination with other and altogether extraneous elements.

Not a few, and some very memorable, efforts had been made before the sixteenth century to bring about a reformation of doctrine, but these had almost invariably been promptly visited with the censure of the church. Long after the "heresies" of the fourth century had died away and after the controversies of the turbulent ninth century—such as those on the eucharist between Paschasius Radbertus and Ratramnus, and on predestination between John Scotus Erigena and Gottschalk—had been silenced by the decisions of the pontiffs, we find movements arising, which, however much they differ in other characteristics, all attest the existence of a widespread desire among large sections of the community to revert to a simpler form of religious belief and practice. The Paulicians (or Manichæans of the East), the Albigenses or (Manichæans of the West), the Waldenses, the Cathari, and the Leonists (or Poor Men of Lyons)—sects which made their appearance mainly in the twelfth and thirteenth centuries, and for the most part in Switzerland, Languedoc, and northern France—the Lollards in England and the Hussites in Bohemia, may be looked upon as the ancestors in faith of the Huguenots and the Puritans of after-times, and were all more or less characterized by an aversion to the Roman ritual, to splendid churches, to crosses and crucifixes, combined with a more definite denial of such doctrines as that of baptismal regeneration, of transubstantiation, of masses for the dead, and of the obligation to observe Lent. The ultimate fate of these different sects was singularly similar.

In the whole history of the Reformation, and of the period by which it was immediately preceded, the political relations of the popedom to the other European powers and more especially to Germany, constitute, in fact, elements of primary importance. In the latter part of the fifteenth century those relations were still further embittered by the personal character and aims of the reigning pontiffs. At the very time when the existence of the popedom as a temporal power was menaced by the rising spirit of innovation, the reverence and sympathy of Europe were still further alienated by the spectacle of the career of Alexander VI. and of his end—the result, it was commonly reported, of the poison which he had designed for the destruction of another. The character of his successor, Julius II. (1503–1513), might well seem virtuous by comparison; but at no period in the history of the pontificate does its religious character seem more completely lost sight of in purely secular interests. It had long before (see *POPEDOM*) been the aim of each more ambitious pope to become a great territorial prince and thus to lay the foundation of the private fortunes of his house. But Julius aimed at something more than this—at the assertion of political supremacy throughout Italy and of the right to rank with the great powers of Europe as

wielding at once material resources but little inferior to theirs, and as commanding a widespread organization to the like of which not one of them could aspire. Such were the objects to which his untiring energies were systematically directed. Within four years of his accession he had added Perugia and Bologna to the possession of the church, and from Piacenza to Terracina his sway extended over all the great strongholds and the most fertile territory; even the great powers of France and Spain, notwithstanding their newly consolidated strength, could not but regard with jealousy and apprehension his genius and his policy.

While the popular feeling in Germany was being effectually alienated from the papal see, the learning of Germany was also pursuing that ominous track, first delineated by Gregory of Heimburg, which marks its complete divergence from the Italian humanism. The names of Johann von Goch (d. 1475), Johann Wessel (d. 1489), Johann Reuchlin (d. 1522), and Erasmus stand associated, although in different ways, with a great movement which, by attacking at once the doctrine and the discipline of the church, opened up the way for Luther.

Four years after Erasmus came an Augustinian monk from Erfurt, full of reverence for the traditions, the grandeur and the sanctity of Rome. Martin Luther appears to have been less struck than was Erasmus by the unpriestly character of Julius II., who, as he admits, maintained order and watched over the sanitary condition of the Sacred City. But he was shocked beyond measure by the corruption, the profanity and the immoral lives of the Roman clergy. The fond illusion of his monastic life was at an end; and he returned to Germany not only prepared to counsel resistance to papal extortion but shaken in his whole allegiance to the holy see. A few months after Luther came Ulrich von Hutten. It would be difficult to select a better representative of the temper and feeling of the higher classes in Germany at that time. To pride of birth and devotion to the new learning he united a love of adventure which no physical suffering or misfortune seemed able to subdue, and a chivalrous spirit which could but impatiently brook the assertion of even legitimate authority. Already burning with resentment at the systematic extortion to which his countrymen were subjected, his feelings were still further intensified as he listened to the contemptuous language and observed the supercilious demeanor which marked the Roman estimate of those who bore the German name.

It must be admitted that the character of the German episcopate at this time was such that it scarcely appeared to advantage even when compared with the ecclesiastics of the Roman Curia. Its members were generally scions of princely houses, caring little for the spiritual interests of their dioceses, but delighting in field sports and martial exercises, given to building palaces for their own residence rather than to the erection of churches, and often without the slightest tincture of learning. Their primate at this time was Albert, brother of the elector of Brandenburg, archbishop of Mainz and Magdeburg, a young and ambitious voluptuary, caring for little but pleasure and display. On the great prelates the extortion of Rome sometimes fell not less heavily than on the laity; and the archbishop, before he could receive his pallium, was called upon to pay the sum of 30,000 gulden into the papal exchequer. Leo X. was at that time intent on carrying out the great design of his predecessor, the rebuilding of St. Peter's. It has been observed by Pallavicino that the millions devoted to the erection of the material church were acquired at the cost of many more millions to the spiritual church. Leo proclaimed a fresh issue

of indulgences, and the archbishop Albert was appointed his commissioner to carry out the sale in a large portion of Germany. He seized the occasion to prevail upon the pope to allow him to appropriate one-half of the money collected for the indulgences in order to pay for his pallium. As his chief agent in the sale he imprudently selected one Tetzel, a Dominican friar, whose unscrupulousness in such work was so notorious that the papal collector at Mainz refused to employ him. In the course of his progress Tetzel came to Jüterbogk, near Wittenberg, and his superstitious traffic and the impudent devices which he employed to cajole the people were thus brought directly under the notice of Luther. The young professor seized the opportunity of directing the attention of the university, where he was already highly popular, to the abuses associated with the sale of indulgences. He did not as yet impugn the doctrine of indulgences itself, and he expressed his conviction that their good father the pope must be altogether unaware of the extent to which such abuses were allowed to prevail. His celebrated theses were forwarded by himself to the archbishop, as well as to the elector of Saxony, his patron, and also the munificent founder of the university. The elector, who had seen with no small dissatisfaction the manner in which his provinces were being plundered in order to pay for the extravagance of a neighboring prelate, extended his protection to the courageous polemic, and Luther thus gained the all-precious interval of freedom from molestation, which enabled him to compose the memorable treatises whereby he produced such an immense effect on the minds and consciences of his countrymen. To Leo, however, the vague reports that reached Rome conveyed only the impression of a dispute between the two monastic orders of which Luther and Tetzel were respectively the representatives. He declared that Luther was a man of genius, and refused to interfere. Even Ulrich von Hutten, at that time residing not far from Wittenberg, seems to have shared in this misapprehension, and writing to his patron, he expresses the hope that the two contending parties may eventually tear each other to pieces.

But in the course of a few months the importance of the struggle began to be more clearly apprehended. John Eck of Ingoldstadt drew attention to the resemblance between the doctrines put forth in the theses and those of the Hussites, and at the mention of that undoubted heresy not a few of Luther's supporters recoiled. The danger that menaced the Roman see could now no longer be disguised; and in June, 1520, Leo fulminated his bull of excommunication against Luther. On the eighth of the following July he addressed a letter to Frederick of Saxony in which he deplores that he can no longer speak of Luther as a son. He feels certain that the elector will prove loyal to the church, although he does not disguise the fact that he has heard of his friendship for the heretical leader and that the latter relies on his support. He has ordered the bull to be circulated among the nobility of Saxony, and he feels equally assured that he may reckon on their assistance in extinguishing this "incendiary conflagration." As for Luther himself, he denounces him as one who is seeking to revive the heresies of the Waldenses, the Hussites, and the Bohemians, and who, by the manner in which he has condemned the burning of heretics, has clearly shown that he sympathizes with the Turks and aims at the destruction of the true church.

The bull of excommunication, along with numerous volumes of the decretals, was burned by Luther himself at Wittenberg in the following December, a proceeding by which he formally intimated his repudiation of the decrees and canons of the church.

The Reformation in England had already commenced, and its origin must be looked upon as in a great measure independent of the Lutheran movement; as in Germany, it had been preceded by a kindred movement, and endeavor to bring about a reform of discipline. The nation was not compelled, as in Italy, to witness the corruptions of the papal court, nor were the laity equally opposed with the people of Germany by imposts and exactions of every kind. But the unsparing extortion practised by Wolsey's agents after his appointment as *legatus a latere* was severely resented, and appeared all the more grievous when contrasted with that immunity from arbitrary taxation which it was the Englishman's special boast to inherit as his birthright; and the arbitrary procedure of the ecclesiastical courts and the licentious lives of the clergy were the subjects of loud and continual complaint. In the year 1514 the notable case of Richard Hunne roused popular indignation to the highest pitch. He had been so bold as to resist what he regarded as an unjust exaction of mortuary fees, by pleading in the ecclesiastical court that the action brought against him was unlawful by the Statute of Præmunire—a plea which virtually raised the whole question of benefit of clergy. Hunne was committed to the Lollards' Tower and was shortly after found dead—murdered, as it was popularly believed, by the contrivance of the chancellor of the bishop of London. The case gave rise to a fierce legal controversy, in which the authority of an act of Parliament was opposed by the precedents established by a decretal of the church. It was followed by the memorable trial of Doctor Standish (1515), by which the question of the royal supremacy was distinctly raised, and Henry himself not improbably led to conceive that theory of his legitimate authority in matters ecclesiastical which was afterward attended with such important results. The state of discipline among the clergy at large was but little, if any, better than in Germany, and their addiction to secular pursuits and pleasures, their covetousness, ambition, and licentiousness are attested not only by satirists like Roy and Skelton, but by grave and temperate censors such as Dean Colet, Archbishop Warham, Bishop Fisher, and Sir Thomas More, and form the subject of their earnest remonstrance and appeals for reform.

The effects of the concurrent action of religious and national sentiment thus brought about were soon to receive a memorable illustration in Italy. The soldiers who made their way under the leadership of Frondsberg, Ferdinand's lieutenant, across the Alps, in the snows of November, 1526, into the plains of Lombardy, and afterward mingled with the Spanish forces which Bourbon led on to the assault on Rome, were almost entirely avowed supporters of Luther's cause and full of fierce hatred of popery. Frondsberg himself loudly declared that as soon as he had taken Rome he would hang the pope. The Spaniards, notwithstanding their unshaken devotion to Catholicism, entered the city burning with the spirit of national antipathy, and eager to revenge the long series of wrongs and exactions which their countrymen had suffered at the hands of Italian ecclesiastics. Among the horrors which followed upon the capture of the capital (May, 1527) nothing more completely shocked the sense of Latin Christendom than the savage contempt manifested by the German soldiery for everything that symbolized the Roman faith, their wanton destruction of relics and images, mock religious services, and especial brutality in the treatment of priests. Even their Spanish confederates, though equally merciless in their excesses, looked on with indignation as they saw them disguising themselves as cardinals and holding a mock consistory under the

windows of St. Angelo for the purpose of electing Luther as pope. But even the impressions thus produced were evanescent when compared with the constantly renewed and unavailing regret which filled the breast of the scholar and the churchman in after years, as he realized the irreparable losses inflicted upon art and learning, the destruction of unique manuscripts and ancient records. Nor can it be a matter of surprise that a sentiment of deep revenge should have arisen in Rome against the Lutheran destroyer, and that even the Swabian and the Spanish invader alike should have afterward been solicitous in a manner to disguise their own responsibility, by professing to look upon the blow thus struck at the sanctity and inviolability of the sacred city as a direct judgment of God. For a time, though only for a few months, it was believed, even by politicians so shrewd and well informed as Wolsey, that the emperor himself was designing to aid the Reformation. The approach of the Turks, who had overrun Hungary, and the hostility of France demonstrated the urgent necessity of maintaining concord among his subjects in the empire; and it is possible that he may really have contemplated placing himself at the head of the Lutheran movement and keeping Clement VII. permanently a prisoner at Gaeta. But his Spanish blood, his education under Adrian of Utrecht, and the traditions of the imperial dignity proved too powerful a counterpoise, and Charles eventually not only deigned to lay before the courts of Europe a partial explanation and apology for the tragedy at Rome, but in a treaty (November 26, 1527) with the pontiff he entered upon an agreement for the adoption of a distinct anti-Reformation policy. It has been asserted that Clement also undertook on this occasion not to declare the marriage of Henry VIII. and Catherine illegal, but no such stipulation appears in the existing treaty.

In pursuance of his anti-imperial policy Wolsey did not fail to seek to turn to the best account the sensation caused by the triumph of the imperial arms. He enjoined the observance of a three days' fast and the offering up of prayers in every church in England for the captive pontiff's deliverance. He could not, however, but be conscious that his policy was regarded with but little favor by the nation at large. The young emperor was highly popular among the citizens of London, and the ancient amicable relations with the house of Burgundy and the actual important commercial relations with Flanders combined to render Spain in the eyes of Englishmen their natural ally, while France they still regarded as their hereditary foe. An expedient to which he had recourse about this time only served still further to fan this feeling. He had sought to render France, instead of the Low Countries, the main channel of the commerce between England and the Continent by making Calais the chief port for merchandise. The merchants of the Hanse towns took alarm; and, as it was in their vessels that Luther's writings, which were now eagerly purchased in England, even at exorbitant prices, chiefly found their way across the Channel, the preachers of the Reformation found no difficulty in representing to their countrymen that an Anglo-French alliance could not fail to prove inimical to the gospel. On the other hand, the Catholic party both in England and in Germany, as soon as the project of the divorce became noised abroad, could not but recognize in Catherine the representative of the interests of the true church, while they looked upon the emperor as her champion, and upon Wolsey as a traitor to the cause of truth and justice. During the last five years the cardinal's efforts to reform the clergy and repress the Reformation in England had been strenuous and constant. In the year 1521 he had enjoined all the bishops

"to take order that any books, written or printed, of Martin Luther's heresies and errors should be brought in to the bishop of each diocese." The movement at Cambridge continued, however, to progress, and in 1523 some of the bishops suggested the appointment of a visitation to the university "for trying who were the fautors of heresy there." This proposition was not acted upon by Wolsey, who probably in his heart sympathized with the genuine spirit of learning developing in the university, and the matter was subsequently made the ground of an accusation against him by his enemies. We find, accordingly, George Stafford, a member of Pembroke Hall, venturing in the following year to adopt the example set by Luther, of taking the Scriptures themselves, instead of the *Sentences* of Peter Lombard (the theological text-book of the universities), as the basis of a course of divinity lectures. In the following year William Tyndal published at Antwerp the first edition of his translation of the New Testament, and in 1526 we hear of its introduction into Oxford by Thomas Garret, and of the volume being burnt at Paul's Cross. On November 27, 1527, Bilney and Arthur were examined at the Chapter House at Westminster before Wolsey and other ecclesiastics, as to whether they had preached or taught to the people the opinions of Luther or any others condemned by the church. Owing to the proximity of Cambridge to the seaports and commercial towns of the eastern counties, such as Yarmouth, Harwich, and Norwich, the university would appear to have become familiarized with the Lutheran doctrines much sooner than Oxford. From July 3 to September 20, 1527, Wolsey was in France, intent on bringing about the marriage of Princess Mary with the duke of Orleans, and on gaining the support of Francis in the matter of the royal divorce.

Henry himself had at this time fully resolved to carry the latter project into effect, and the doubts raised with respect to the validity of his marriage and the legitimacy of Mary cannot be regarded as anything more than official formalities, designed to give a veil of decency to his real purpose. While in France Wolsey learned from Flanders that the emperor had become apprised of Henry's real intentions, and he himself now proceeded (to quote his own words) to employ "all possible ways and practices for the obtaining of the pope's consent." Unfortunately for the success of his efforts, Henry at this juncture conceived the design of sending another agent to Rome, to act altogether independently of Wolsey, and charged to procure, not only the appointment of a commission empowered to dissolve the marriage with Catherine; but also a dispensation removing all obstacles to the king's second marriage with Anne Boleyn. Clement was still a prisoner in the castle of St. Angelo, but on the evening of December 9, 1527, disguised in a blouse and carrying a basket and an empty sack on his back, he effected his escape, and with the assistance of a guide arrived the next morning at Orvieto. From that day his resolve was probably definitely taken, and, notwithstanding his previous promises and his subsequent apparent concessions, he would seem to have been firmly resolved not to grant his consent to a measure deeply humiliating to himself and certain to expose him to the full brunt of the emperor's resentment. But at Orvieto Henry's delegate, Knight, although untrained and ill qualified for the task of a diplomatist, obtained both a commission and a dispensation, which, however, on his reaching England, were both found to be worthless, owing to a designed non-observance of the necessary technicalities. In the following year Foxe and Gardiner were dispatched on a like errand. The latter was far better suited for the work than Knight; and he did not scruple to threaten

the trembling pontiff with the complete withdrawal of Henry's support, and to predict as the inevitable consequence the collapse of the already tottering apostolic see—a result which, he declared, "would be attended by the applause and satisfaction of the whole world." By such menaces Clement was eventually induced again to grant a commission and a dispensation. A decretal bull, formally annulling Henry's first marriage, was handed to Campeggio, which he was instructed to show to the king and then to destroy. But in the meantime the celebrated brief executed by Julius II., in which the dispensation for Henry's first marriage was reenacted in more precise and unqualified terms, was discovered in the Spanish archives. It was sought to show that the brief was a forgery, but to this view of the matter Clement altogether refused to assent. At length, however, in May, 1529, the legate proceeded to open his court at Westminster. The courageous conduct of Catherine put honorable men to shame; and no slight impression was produced by Bishop Fisher's heroic declaration of his willingness to stake his life that her marriage with the king was perfectly valid. Campeggio, under various pretexts, still hesitated and delayed. In July the news of the peace of Cambray arrived, and it was known that the influence of the emperor would henceforth be paramount in Italy, while it was believed that the projected marriage between the French monarch and the sister of the emperor augured a durable peace between the empire and France. Then the legate adjourned the court and the pontiff revoked the cause to Rome. All around Wolsey saw the plans which he had laid with so much toil and skill breaking up, and on him the royal displeasure vented itself. He died November 30, 1530, a victim to the wanton caprice of one whom he had served only too faithfully, and with him the ablest supporter of papal influence and the most formidable opponent of Reformation principles in England disappeared.

Henry would not condescend to appear before a Roman court, and as a last expedient it was proposed that the question of the legality of his first marriage should be submitted to the learned bodies, the universities and eminent canonists of Europe. This scheme had already been recommended by the episcopal bench, but to Cranmer's ingenuity is attributed the further suggestion that the opinion thus obtained should be carried into effect by a court convened in England. Commissioners, among whom Richard Croke appears as the most conspicuous and indefatigable, were accordingly dispatched on the proposed errand. The means to which they had recourse in order to obtain opinions such as their royal employer desired are plainly described by a contemporary writer, who says that "there was inestimable sums of money given to the famous clerks to choke them, and in especial to such as had the governance and custody of their universities' seals." The evidence more recently brought to light enables us to accept this statement as substantially correct. The unpopularity of the divorce among the nation at large was especially shown at the two universities, where the junior members made demonstrations of the greatest dissatisfaction, while their seniors were mostly bribed or intimidated into acquiescence by the royal agents; nor could the authorities at either Oxford or Cambridge disguise the fact that they found themselves at variance with the feeling of the country at large.

It is at this juncture that Cranmer assumes a foremost place as a leader of the English Reformation. He had written in defense of the divorce, and had taken a part in embassies sent by Henry to treat on the question with the emperor and the pope; and Clement had shown his sense of the value of his influence by appoint-

ing him to the lucrative post of grand penitentiary for England, in the hope of winning him over to the papal interests. Cranmer's whole policy, however, had been directly opposed to that of Wolsey. He had used his best efforts to confirm the commercial relations with the Netherlands, and had superintended the negotiation of a commercial treaty between that country and England. He had resided for some months in Germany, and while there had married Margaret, the daughter of Andrew Osiander, a distinguished preacher and leader of the Lutheran party at Nuremberg. From Germany he was now summoned back to England to become the successor of Warham, the primate, who had died in August, 1532. As there had as yet been no formal rupture with the see of Rome, it became necessary for him to apply to Clement for the customary bull of consecration, and also for his pallium as metropolitan, and on receiving these it was also requisite that he should take the oaths of canonical obedience and subjection to the Roman pontiff. His conduct in this dilemma has been generally regarded as indefensible. In order to show that he disclaimed the right of the pontiff to nominate to ecclesiastical offices in England, he surrendered the several bulls, eleven in number, into Henry's hands; and, having done this, he took the usual oath of obedience to the see of Rome. Before doing so, however, he made a protestation to the effect that he did not intend thereby to bind himself to do anything contrary to the laws of God, the king's prerogative, or the commonwealth and statutes of the kingdom. On May 23, 1533, he proceeded, as archbishop and legate of the apostolic see, to pronounce the king's marriage with Catherine of Aragon null and void *ab initio*, as contrary to the divine law; and five days later he gave judicial confirmation to the royal marriage with Anne Boleyn. In the following year (March 23, 1534,) Clement rejoined by a manifesto declaring the validity of the first marriage, and calling upon Henry to take back his first wife and to observe "a perpetual silence" in relation to the question for the future. This decisive step was mainly the result of the parliamentary action that had in the meantime been going on. The parliament of 1529 had in various ways limited the privileges of the clergy, and by the Act 21 Hen. VIII. c. 13 had deprived them of the power of holding pluralities by virtue of licenses obtained from Rome for money. Fisher, from his place in the House of Lords, vainly sought to combat these reforms by declaring that Lutheranism was spreading in the nation and by reminding his audience of Germany and Bohemia and the miseries that had already befallen those countries. The allusion to the Lutheran movement appears to have been, indeed, singularly injudicious, and there can be no doubt that at this period it was the aim not only of the king but of the bishops to dissociate the Reformation movement in England from the movement that was in progress in Germany. As yet the repudiation of the papal supremacy and a reform in matters of discipline were all that was contemplated by either the crown or the parliament. In 1531 appeared a proclamation making it penal to introduce bulls from Rome, and this was shortly followed by an act visiting with severe penalties all who should be found going about the country for the purpose of carrying on the sale of indulgences; while under the famous Statute of Præmunire the whole body of the clergy were convicted of having recognized the validity of Wolsey's acts as papal legate, and thereby placed both their liberties and possessions at the mercy of the king. In April, 1533, there followed an act providing that all causes should henceforth be tried in the courts of the kingdom, and forbidding appeals to Rome under any circumstances whatever—the body "now

being usually called the English Church," being held "sufficient and meet of itself to declare and determine all such doubts and duties as to their rooms [*i.e.*, offices] spiritual doth appertain." These successive enactments had already paved the way for Henry's final rejoinder to Clement's demands, the Act of Supremacy (November, 1534), whereby the king was not only declared to be supreme head of the Church of England, but was at the same time invested with full power "to repress and amend all such errors and heresies as, by any manner of spiritual jurisdiction, might and ought to be lawfully reformed."

While such was the progress of events in England and in Germany there had been going on in Switzerland a corresponding movement, second only in importance to that initiated by Luther.

In no country was the Reformation so closely associated with political feeling as in Switzerland; and its upholders, amid surrounding despotism, were advocates of republican institutions. Zwingli and his followers looked on with shame and sorrow as they saw their countrymen hastening to cross the Alps to become the mercenaries of the pope. With no less sense of humiliation did they regard the venal spirit of their public officials stooping to become the pensioners of the French court. The progress of these new opinions was, as is usually the case, much more rapid in the large towns than in the more rural and mountainous regions.

In the year 1531 the feud between the Catholic and Protestant cantons had reached a climax; in the former the more bigoted section, aided by Ferdinand of Austria, had commenced an active persecution, and some of the Protestant preachers had been put to death. In order to repel these aggressions a league was formed between Zurich, Strasburg, and the landgrave of Hesse, and Zwingli strongly advised that a combined attack should forthwith be made on their opponents in Lucerne and Schwyz, and freedom of conscience obtained by an armed demonstration. Divided counsels, however, prevailed; and eventually Zurich was left to bear the brunt of the contest almost entirely alone. At the battle of Chappel (October 11, 1531) Zwingli fell, and his followers sustained a defeat which, although they carried on a war of fierce retaliation, they were unable to retrieve, and a decided reaction in favor of Catholicism now set in.

In Germany, on the other hand, the Reformation continued to progress. In 1533 Philip of Hesse, who was subsidized by France, inflicted a severe defeat on Ferdinand, and was able shortly after to reinstate Ulrich, duke of Würtemberg, in his dominions. The emperor at the peace of Kadan (June 29, 1534) undertook to abstain from further interference in the ecclesiastical affairs of the duchy, and the understanding arrived at on that occasion is regarded by Ranke as marking the second important stage in the history of the Reformation in Germany. The Reformed faith was forthwith established throughout Würtemberg, and soon after was introduced into Holstein, Pomerania, the Mark of Brandenburg, Upper Saxony, Brunswick, and the Palatinate.

As elsewhere, the history of the Reformation in France is that of a twofold struggle—an endeavor to bring about a reform of discipline, and a contest which pointed in the direction of doctrinal change. The abuses that prevailed in the Gallican Church at this period were scarcely less glaring than those in Germany. The appointments to the higher benefices were dictated solely by the most sordid motives—political ambition, court favoritism, and family interest. Pluralism largely prevailed; and both bishoprics and abbeys were granted *in commendam* to such an existence that

residence was almost unknown. Preferments were often bestowed upon laymen, and even upon females and children. But in no country was the movement, that aimed at the correction of abuses such as these, more completely dissociated from the religious revolution contemplated by the Protestant leaders.

At the period at which we have now arrived the main influences which guided the later history of the Reformation may be discerned in full activity. Largely political almost from the commencement of the movement, they continued more and more to partake of that character or became mingled with elements not less secular. Foremost among these latter must be placed the appeal made to baser motives both in Germany and in England, by the manner in which the nobility of both countries were bribed to acquiesce in the suppression of the religious orders, by being allowed to become large sharers in the property and revenues of the monastic and conventual foundations. Among the lower classes, on the other hand, who were often painfully reminded of the loss they had sustained in the withdrawal of that charity which, amid all the degeneracy of the monasteries, had still been one of their recognized functions, a certain genuine sympathy with Catholicism and traditional regard for its institutions long continued to survive. But even among these classes men could not but be conscious that a higher standard of belief and practice had been introduced by the Reformation, while the superior ability shown by those who preached its doctrines, in adapting their discourse to the comprehension and spiritual needs of the poor, invested them with a highly effective influence.

In Germany the policy of the emperor, nearly always ambiguous, became complicated with new difficulties. Charles himself, from political motives, appears at this time to have been really desirous of bringing about a termination of the prevailing religious controversies, but his vice-chancellor, Held, on whom it devolved to carry out his intentions, pursued a singularly infelicitous line of action, which ultimately led to the formation of the League of Nuremberg. In the meantime Protestantism continued to advance; Hermann von Wied, elector of Cologne, became a supporter of its doctrines; and Pomerania, Anhalt, Mecklenburg, and the imperial cities were added to the territories in which it became the dominant faith. It was at this juncture, when the Reformation in Germany may be considered to have advanced to its highest point, that Paul III. brought forward a proposal for assembling a general council—a proposition to which it was decided by the Protestant party at the diet of Worms (March, 1545) not to accede, inasmuch as it would be a council convened by the pope. In the following December, however, the council (see TRENT, COUNCIL OF) assembled.

Two months after the first assembling of the council of Trent Luther died. His latter days had been embittered by the defection (as he regarded it) of Melancthon to a hostile camp, in the espousal of the latter of the tenets maintained by Ecolampadius and Bucer.

In the Scandinavian kingdoms the Reformation was materially assisted by political motives; the introduction of Lutheranism into Denmark by King Christian II. in 1520 was to a great extent the result of his desire to raise the lower classes with a view to the corresponding depression of the nobility and the more powerful ecclesiastics of the realm. He sanctioned the marriage of the clergy and caused the New Testament to be translated into Danish.

In Bohemia the Hussite movement (see HUSS and HUSSITES) must be held to have become almost absorbed in the broader current of Lutheranism, al-

though the Calixtines (or moderate Utraquists) and the Taborites (or extreme party) long continued to differ on questions of discipline. In the earlier part of the seventeenth century, however, the trained activity and energy of the Jesuits led to the almost entire expulsion of both parties, and Protestantism as a professed creed nearly ceased to survive.

In Poland Protestantism prevailed before the first quarter of the sixteenth century closed. In Dantzic, Elbing, and Thorn it was established by overwhelming majorities. But here again the influence of the Jesuits ultimately proved victorious. The nobles were gained over by their arts, and Catholicism reasserted itself.

In the Netherlands, where the free spirit of the great mercantile communities was in singular harmony with the movement, the progress was still more rapid. The church organization was modeled on the political organization of the provinces, each province being subdivided into classes, while the mode of government was nearly identical with that known as Presbyterian.

In England the reformation of doctrine made but little progress during the reign of Henry VIII., for although by the Ten Articles (1536) the royal assent was given to the adoption of the doctrine of justification by faith and to the recognition of the Bible and the three ancient creeds as the standard of belief, a marked reaction in favor of Catholic doctrine took place in the enactment of the Six Articles in 1539. For a brief period heresy became a statutable offense and death was inflicted under the new provisions. The anomalous position of the English Church became a scandal to Europe; for a while some men were burnt for denying the doctrine of transubstantiation or for refusing to admit the royal supremacy, others, as Barnes and Gerard, suffered at the stake for their profession of Lutheran opinions, and even Cromwell must be regarded as in some measure a victim of his attachment to German Protestantism. During the reign of Edward VI. Somerset, in conjunction with Cranmer, pressed on the work of the Reformation apace. Chantry and hospitals were everywhere suppressed and their endowments confiscated. The bishops were compelled to acknowledge their direct subordination to the crown by being required to take out licenses for the exercise of their jurisdiction. In 1549 the first Book of Common Prayer was published, and the Act of Uniformity prescribed its use, while that of all other forms of devotion was forbidden under heavy penalties. The canon law was revised by a body of commissioners especially appointed for the purpose, and the new code was completed for future use, although it never received the young king's signature. By these and other similar reforms, carried out in a great measure under Cranmer's direction, it was sought to make the Reformation in England a complete rejoinder to the proceedings of the council assembled at Trent.

In Scotland the Reformation assumed a different character from that of the movement in England. It was inspired directly and solely by Germany, and may be regarded as commencing from the martyrdom of Patrick Hamilton, in the year 1528, there being no evidence of any prior spontaneous efforts in the direction of doctrinal reform on the part of the people.

In Ireland the circumstances which favored the introduction of Protestantism in England were altogether wanting. The Roman ritual was in harmony with the genius of the people, whereas the aversion naturally inspired by a creed imposed at the dictation of the conqueror was in itself a formidable obstacle. Protestantism became odious in the eyes of the Irish people; and, when, after long years of oppression and neglect, it was sought to inaugurate a juster policy and to render the

established church in some degree really national, the obstacles thus created could not be overcome.

**REFORMATORY AND INDUSTRIAL SCHOOLS.** There exist two classes of schools for the reformation and industrial training of children in the United States both to a certain extent under state control when duly certified. Reformatory schools are for the better training of juvenile convicted offenders; industrial schools, in which industrial training is provided, are chiefly for vagrant and neglected children and children not convicted of theft. These schools are of modern but gradual growth, the result in part of humane endeavors to rescue children from evil courses already embarked on or likely to be their lot, in part of the conviction that, as a matter of social economy, the expenditure incurred in early restraint is less costly than the punishment of matured crime. Nearly every State in the Union and many of the large cities have established reformatory and industrial schools—New York being the pioneer in this direction. In addition to the reform schools directly under State control there are some denominational schools to which juvenile offenders can be committed by law and there kept until released by their parents or until they arrive at their majority. Examples of this kind of schools may be seen in the House of the Good Shepherd, the Magdalene Home, etc., in different cities.

**REFORMED CHURCHES,** the designation of those Protestant bodies who adopted the tenets of Zwingli (and later of Calvin), as distinguished from those of the Lutheran or Evangelical divines. Compare **PRESBYTERIANISM, REFORMATION, and GERMANY.**

**REFORMED CHURCH IN AMERICA (DUTCH),** formerly the Reformed Protestant Dutch Church, a religious denomination which arose in Holland in the sixteenth century. (See **PRESBYTERIANISM.**)

**REFRACTION.** See **LIGHT and OPTICS.**

**REFRIGERATION.** See **ICE and PRESERVED FOOD.**

**REGALIA,** insignia of royalty used at the coronation of the sovereign and other great state ceremonials. The regalia of England were in very early times deposited for security in some religious house dependent on the crown, most generally in the treasury of the Temple. The first mention of their being deposited in the Tower of London is in the reign of Henry III., who on his return from France in 1230 commanded the bishop of Carlisle to replace the jewels in the Tower as they had been before. From this time down to the present the regalia (with the exception of the ancient crown of Edward the Confessor, long retained in Westminster Abbey) have been generally in the Tower under the care of a keeper, but both Henry III. and several of his successors, when in money difficulties, had recourse to the expedient of pawning the crown jewels to raise a loan.

**REGENSBURG.** See **RATISBON.**

**REGENT.** The position of a regent as an administrator of the realm during the minority or incapacity of the king is one unknown to the common law. For reasons of necessity a regency, however anomalous it may be in strict law, has frequently been constituted in various countries. There are fifteen instances in English history, the earliest of which is the appointment of the earl of Pembroke with the assent of the loyal barons on the accession of Henry III.

**REGGIO DI CALABRIA,** a city of Italy, in the province of its own name, formerly Calabria Ulteriore Prima, is admirably situated on the Strait of Messina some miles farther south than the city of Messina on the other side. The population of Reggio was, in 1881, 23,853 in the city, or including the various suburban

villages—Sbarre (3,622), Santa Catarina (1,147), etc.—35,437, and in the commune 39,296.

REGGIO NELL' EMILIA, a city and episcopal see of Italy, in the province of Reggio nell' Emilia (up till 1859 part of the duchy of Modena), is situated on the line of the old Via Æmilia, seventeen miles by rail southeast of Parma. It is a large, well-built and flourishing place with a population in 1881 of 18,634 (commune 56,031) within the circuit of its walls.

REGIOMONTANUS. The real name of this astronomer was JOHANN MÜLLER, but from his birth-place, Königsberg, a small town in Franconia, he called himself JOH. DE MONTEREGIO. The name Regiomontanus occurs for the first time on the title page of his *Scripta*, published in 1544, but he has since become best known by it. He was born in June, 1436. He died very shortly after his arrival in Rome, July 6, 1476.

REGISTRATION. In all systems of law the registration of certain legal facts has been regarded as necessary, chiefly for the purpose of insuring publicity and simplifying evidence. Registers, when made in performance of a public duty, are as a general rule admissible in evidence merely on the production from the proper custody of the registers themselves or (in most cases) of examined or certified copies. The extent to which registration is carried varies very much in different countries. For obvious reasons judicial decisions are registered in all countries alike. In other matters no general rule can be laid down, except perhaps that on the whole registration is not as fully enforced in the United Kingdom and the United States as in Continental states. The most important uses of registration occur in the case of judicial proceedings, land, ships, bills of sale, births, marriages, and deaths, companies, friendly and other societies, newspapers, copyrights, patents, designs, trade marks, and professions and occupations. The registration of qualified voters in elections in the United States is treated in a separate section below.

In every State of the Union, the voter as a prerequisite to suffrage, must appear by name on a list of electors for the State. The law governing such registration varies slightly in every State. We append a copy of the law of Illinois, which with a few modifications will furnish the substance of all other legislation on the same subject:

Article III. *General Registration*.—1. The judges of election shall constitute the board of registry in the precinct for which they shall be appointed.

2. Every person having resided in the State one year, in the county ninety days, and in the election precinct thirty days next preceding any election therein, who was an elector in this State on the first day of April, in the year A. D. 1848, or obtained a certificate of naturalization before any court of record in this State prior to the first day of January, 1870, or who shall be a male citizen of the United States above the age of twenty-one years, shall be entitled to vote at such election.

3. Such board of registry and the election clerks shall meet in the precinct on Tuesday, four weeks preceding the first general city, village or town election, or the first general State or county election which may occur after the first appointment of such board of election commissioners, at the place designated by such board of commissioners, and they shall then proceed to make a general registration of all the voters in such precinct. A new general registration shall be made by the board of registry prior to and for each presidential election, in the same way as required hereby for the first registration hereunder. Three registry books shall be furnished to such board by the board of election commissioners for the purpose of such registration.

The following is an extract from the Illinois laws as to the registration of deeds, etc., and may be taken as a sample of legislation in other States:

28. Deeds, etc., to be recorded. Deeds, mortgages, powers of attorney, and other instruments relating to or affecting the title of real estate in this State, shall be recorded in the county in which such real estate is situated; but if such county is not organized, then in the county to which such unorganized county is attached for judicial purposes. (As amended by act approved April 3, 1873. In force July 1, 1874. R. S. 1845, p. 108, 22).

30. Effect of recording as to creditors, etc. All deeds, mortgages, and other instruments of writing which are authorized to be recorded, shall take effect and be in force from and after the time of filing the same for record, and not before, as to all creditors and subsequent purchasers, without notice; and all such deeds and title papers shall be adjudged void as to all such creditors and subsequent purchasers, without notice, until the same shall be filed for record. (R. S. 1845, p. 108, 23, *Buchanan v. International bank*, 78 Ill., 500).

REGNARD, JEAN FRANÇOIS, who in general estimation ranks next to Molière among French comic dramatists, was born at Paris in 1656, and died on September 4, 1709.

REGNAULT, HENRI, French painter, born at Paris on October 31, 1843, was the son of Henri Victor Regnault (noticed below). The war between France and Germany arose, and found Regnault foremost in the devoted ranks of Buzenval, where he fell on January 19, 1871.

REGNAULT, HENRI VICTOR, French chemist, was born on July 21, 1811, at Aix-la-Chapelle.

Regnault is perhaps best known by his careful re-determination of the specific heats of all the elements obtainable, and of many compounds—solids, liquids, and gases—by which he was enabled to correct the values obtained by Dulong and Petit, and to reduce the number of exceptions to their law that *the specific heat of an element varies inversely as its atomic weight, and of a compound as its molecular weight*. He also paid attention to hygrometry and devised a hygrometer in which a cooled metal surface is used for the deposition of moisture.

In 1854 he was appointed to succeed Ebelman as director of the celebrated porcelain manufactory at Sèvres. He carried on the great research on the expansion of gases in the laboratory at Sèvres, but all the results of his latest work were destroyed during the Franco-German War, in which also his son Henri (noticed above) was killed. Regnault lived until January 19, 1878.

REGNAULT, JEAN BAPTISTE, French painter, was born at Paris on October 9, 1754, and died in the same city on November 12, 1829.

REGNIER, MATHURIN, the greatest satirist of France, was born at Chartres on December 21, 1573. He died in 1613.

REGULUS, MARCUS ATILIUS, was consul for the second time in the ninth year of the First Punic War (256 B.C.) and so was one of the commanders in the great naval expedition which shattered the Carthaginian fleet and successfully landed an army on Carthaginian territory at Clupea. At first the invaders had such success that half the army and the other consul Manlius could be recalled to Rome, and yet leave good hope that Regulus with the insurgent Numidian subjects of the Phœnicians would finish the war in the second campaign. But Carthage, which had found an able general in the Spartan Xanthippus, used the winter



to such good account that in the spring of 255 Regulus was decidedly inferior in strength, and, hazarding a pitched battle on ground favorable to the enemy, had his army cut to pieces and was himself taken captive. Regulus perished in captivity, and was supposed at Rome to have been done to death: according to the common story he was sent to Rome on parole to negotiate a peace or exchange of prisoners, but on his arrival strongly urged the senate to refuse both proposals, and returning to Carthage was slain with horrid tortures.

REICHA, ANTON JOSEPH, musical theorist and teacher of composition, was born at Prague, February 27, 1780. He died at Paris, May 28, 1836.

REICHENAU, a picturesque island in the Untersee or western arm of the lake of Constance, is three miles in length by one in breadth, and is connected with the east bank by a causeway three quarters of a mile long. It belongs to the duchy of Baden, and comprises the three parishes of Oberzell, Mittelzell, and Unterzell, with a joint population of 1,463 in 1880.

REICHENBACH, a manufacturing town of Saxony, in the province of Zwickau, lies in the hilly district known as the Voigtland, fifty miles to the south of Leipsic. Its importance is of recent origin, and the population, amounting to 18,330 in 1885, has trebled itself within the last fifty years.

REICHENBACH, a cotton-manufacturing town of Prussian Silesia, with 7,368 inhabitants (1891) and an old castle, lies thirty miles to the south-southwest of Breslau, and demands mention chiefly from its connection with several important historical events.

REICHENBACH, GEORG VON, astronomical instrument maker, was born at Durlach in Baden on August 24, 1772. He died at Munich on May 21, 1826.

REICHENBERG (Bohem. *Liberec*), a town of Bohemia, with an independent jurisdiction, lies on the Neisse, about fifty miles to the northeast of Prague and not far from the Saxon and Prussian frontiers. The population in 1880 was 28,090.

REICHENHALL, a small town and watering-place of Upper Bavaria, is finely situated in an amphitheater of lofty mountains, on the river Saale or Saalach, 1,570 feet above the level of the sea and nine miles to the southwest of Salzburg. The resident population in 1890 was 3,436, almost all Roman Catholics. The saline springs are used both for drinking and bathing, and are said to be efficacious in scrofula and incipient tuberculosis. In addition to numerous large hotels, the most prominent edifices are the Romanesque church, recently restored, and the handsome and extensive building of the salt-works.

REICHSTADT, DUKE OF. See NAPOLEON II. The title is derived from the little town of Reichstadt in northern Bohemia.

REID, MAYNE, captain in the United States army, was in his generation one of the most popular of writers of stories of adventure. His own early life was as adventurous as any boy reader of his novels could desire. He was a native of Ulster, born in 1818, and was educated for the church, but, disliking the prospect of a regular profession, went to America at the age of twenty in search of excitement and fortune. Among other experiences he made trading excursions on the Red River, and studied the ways of the retiring red man and the white pioneer on the spot. He made acquaintance with the Missouri in the same practical manner, and roved about through all the States of the Union. When the war with Mexico broke out in 1845 he obtained a commission, was present at the siege and capture of Vera Cruz, and led a forlorn hope at Chapultepec. Thereafter he settled in England, and

began his career of a novelist in 1849 with the *Rifle Rangers*. This was followed next year by the *Scalp Hunters*. He never surpassed his first productions, except perhaps in *The White Chief* (1855) and *The Quadroon* (1856). He died in London, October 22, 1883.

REID, THOMAS, the chief founder of what is generally designated the Scottish school of philosophy, was born at Strachan in Kincardineshire, about twenty miles from Aberdeen, on April 26, 1710. He died in 1796.

The key to Reid's whole philosophy is to be found in his revulsion from the skeptical conclusions of Hume. In several passages of his writings he expressly dates his philosophical awakening from the appearance of the *Treatise of Human Nature*.

The principles which Reid insists upon as everywhere present in experience evidently correspond pretty closely to the Kantian categories and the unity of apperception. Similarly, Reid's assertion of the essential distinction between space or extension and feeling or any succession of feelings may be compared with Kant's doctrine in the *Æsthetic*.

REID, SIR WILLIAM, administrator and man of science, was born in 1797 at the manse of Kinglassie, Fifeshire, Scotland. He died in October, 1858, shortly after his return to England.

REIGATE, a market town and municipal borough of Surrey, England, is at the head of the long valley of Holmsdale Hollow, on three railway lines, twenty-three miles south of London. The area of the municipal borough is 6,015 acres, with a population in 1871 of 15,916, and in 1891 of 22,646.

REIMARUS, HERMANN SAMUEL, known to history chiefly as the author of the *Wolfenbüttel Fragments*, was born at Hamburg, December 22, 1694. He died in 1768.

REIMS. See RHEIMS.

REINAUD, JOSEPH TOUSSAINT, a distinguished French Orientalist, was born in 1795 at Lambesc, Bouches du Rhône. He died in 1867.

REINDEER. See DEER.

REINEKE VOS. See GERMAN LITERATURE and ROMANCE.

REINHOLD, KARL LEONHARD, who played a considerable part in the early spread and development of the Kantian philosophy, was born at Vienna in 1758. He taught at Kiel (having previously occupied a chair at Jena) till his death in 1823.

REISKE, JOHANN JACOB, scholar and physician, was born December 25, 1716, in the little town of Zörbig, in Electoral Saxony. Reiske died August 14, 1774, and his MS. remains passed, through Lessing's mediation, to the Danish minister Suhm, and are now in the Copenhagen library. Reiske certainly surpassed all his predecessors in the range and quality of his knowledge of Arabic literature.

RELAND, ADRIAN, a meritorious Dutch Orientalist, was born at Ryp, July 17, 1676, studied at Utrecht and Leyden and successively professed Oriental languages with great success at Harderwijk (1699) and Utrecht (1701). In the latter chair, from which he also lectured on sacred antiquities, he remained till he died of smallpox February 5, 1718.

RELICS. Relics, in what may be called their merely human and historic aspect, appeal to many of the most obvious and most deeply seated principles of human nature—to that power of connection with the past which has been justly called one of the divinest elements of our being, to the law of association, and to that love of something like ocular testimony which so notoriously affects the mind more forcibly than "the hearing of the ear."

It would be strange indeed if religion (which alike in its good features and in its abuses, penetrates more deeply than anything else into the human heart) were found to be dissociated from relics. Probably all the more widely spread creeds claim some such material links with the past. Let it suffice to mention here the Ka'ba at Mecca, and the tooth of Buddha exhibited in Ceylon.

We turn to the pre-Christian and Christian dispensations. The Old Testament contains allusions to relics too numerous to mention.

Certainly, however, in one respect, perhaps in two (though of seemingly opposite tendencies), Judaism stands in this matter distinguished from contemporary religions. Nowhere else should we read of a valued and most interesting relic being destroyed by a devout ruler because it was found to have been abused and to have led to idolatry, as was done to the brazen serpent by Hezekiah (2 Kings xviii. 4). But it may also be questioned whether the records of any other people contain an account of a miracle wrought by the relics of a deceased prophet. But the second book of Kings relates the revival of a dead man by the bones of Elisha—a narrative rendered the more remarkable by the fact that, as a rule, the contact with a corpse, a bone, or a grave made a man unclean for seven days (Num. xix. 11-22).

The New Testament does not relate any case precisely similar to that of Elisha. The remains of the proto-martyr Stephen are simply committed to the tomb, with much lamentation by devout men (Acts viii. 2); and of the funeral of the first martyred apostle, James, we have no record. It is not, however, to be denied that the book of Acts tells of miracles of healing resembling that of her who was cured by the touch of our Lord's garment (Matt. ix. 20-22). Even the shadow of Peter, it is implied, may have healed the sick; and handkerchiefs or aprons which had been worn by Paul relieved not only the diseased but the possessed (Acts v. 15; xix. 12).

Relics from the fourth to the sixteenth century occupied a large space in the mind of Christendom. The word relics (*reliquiæ*, *λείψανα*) became almost restricted, in theological language, to the bodies (or parts of the bodies) of saints, or, as has been intimated, to memorials of Christ's passion, or instruments which had been used in the torture and execution of martyrs. Inquiries connected with their genuineness are, as is well known to students of ecclesiastical history, conspicuous in the life of the mother of Constantine, St. Helena, who claimed to have discovered the true cross on which our Lord suffered, and in the career of St. Ambrose at Milan. Once at least a real glorious series of campaigns, those of the emperor Heraclius against the barbarian Avars and the Persians (622-628), is connected with a successful endeavor to regain the cross. It is remarkable that the Persians are reported to have kept the cross in its case with the seals unbroken.

Marauding campaigns between monastery and monastery were by no means uncommon; but these sink into insignificance compared with the spoliation exercised by the crusaders from the West who captured and sacked Constantinople in 1203-4.

The next two centuries saw no diminution of such zeal, and there grew up, it can hardly be doubted, an increase of lower motives and of fraud. By the time of the Reformation the condition of matters was such as in many respects to offer a mark for all assailants of the existing state of things, and a practical admission on the part of those in authority that it was to a large extent simply indefensible.

As regards the Church of Rome, although in theory

the events of the sixteenth century may have left its teaching untouched, yet it can hardly be questioned that this is one of the many departments of religious life in which that great commotion, as De Maistre calls it, has in his great words, even among Roman Catholics, worked a most sensible revolution.

Still, however, the Church of Rome stands alone, we believe, in considering the possession of relics an indispensable condition of the performance of the highest acts of public Christian worship. Every altar used for the celebration of mass must, according to Roman Catholic rule, contain some authorized relics. These are inserted into a cavity prepared for their reception, called "the tomb," by the bishop of the diocese, and sealed up with the episcopal seal. A collect in the *Ordo Missæ* assumes their presence, and makes reference to the saints whose relics are thus preserved.

RELIGIONS. Religions, like living organisms, have a history, and therefore this is to be studied first, so far as can be known, how they rise and spread, grow and fade away; how far they are the creations of individual genius, and how far of the genius of nations and communities; by what laws, if it is possible to discover them, their development is ruled; what are their relations to philosophy, science, and art, to the state, to society, and above all to ethics; what is their mutual historical relation, that is, if one of them sprang from another, or if a whole group are to be derived from a common parent, or if they only borrowed from one another and were subject to one another's influence; lastly, what place is to be assigned to each of those groups or single religions in the universal history of religion. The first result of this historical inquiry must be an attempt at a genealogical classification of religions, in which they are grouped after their proved or probable descent and affinity.

There is no difficulty in determining the descent and relationship of religions which have taken rise in historical times, such as Confucianism, Buddhism, Judaism, Christianity, Mohammedanism, and some others of minor importance. But the great majority of ancient religions had their origin in prehistoric times, of which neither documents nor trustworthy traditions are extant. In that case their mutual relation has to be established by reasoning from the myths, ideas, rites, and characteristics common to them.

Comparative mythology and the history of religion leave no doubt that all the religions of the Aryan Indo-Germanic nations, viz., Eastern Aryans (or Indians, Persians, and Phrygians) and Western Aryans or Greeks, Romans, Germans, Norsemen, Letto-Slavs, and Celts), are the common offspring of one primitive Old-Aryan religion.

However, the degree in which the Aryan religions are mutually related is not always the same. None of them came directly from the Old-Aryan religion. They consist of five pairs, each of which must have been first a unity: the Indo-Persian, the Græco-Roman, the Letto-Slavic, the Norse-Teutonic, and the Gaelo-Cymric. The fact that the members of those pairs are more closely allied with one another than with the other members of the family obliges us to assume five prehistoric Aryan religions: the Old East-Aryan, the Old Pelasgic, the Old Windic, the Old German, and the Old Celtic prehistoric religions, forming so many links between those historical religions, and the common parent of all, the primeval Aryan worship, which has been suppressed by Christian religions.

Though there is so much wanting in our knowledge of the Semitic religions, especially as regards those of the pre-Christian Aramæans, of the pre-Islamic Arabs, and of the old Hebrews, all we know about them tends

to prove that they too must have descended from a common source. When we find that the same divinities were worshiped by several North-Semitic nations it might be contended that they were borrowed from one of them, as trade and conquest had brought them from ancient times into close contact with one another. But no such relation existed till the very last centuries of the Assyrian empire between the Northern Semites and the various tribes of the Arabian desert. The myth of the dying and reviving Thammuz, Dumuzi, common to all Northern Semites, seems not to have been current among the ancient Arabs, though some scholars (Krehl, Lenormant) think there are traces of it left in their traditions and rites. Tree worship and stone worship were particularly developed among both Northern and Southern Semites, which is proved by the use of Betyles (בֵּית-אֵל) by the black stone in the Ka'ba, the stone at

Bethel, that in the temple of the great goddess of Cyprus at Paphos, at Edessa, and elsewhere, by the seven black stones representing the planet-gods at Erech (Uruk) in Chaldæa, etc. Finally all Semitic religions without a single exception understand the relation between God and man as one between the supreme lord and king and his subject or slave. They are eminently theocratic, and show a marked tendency to monotheism, which, both in Israel and in Arabia, is the last word of their religious development. It is not so easy to determine the grade of relationship between the different Semitic religions as it is to show that they all descend from a common parent. Moreover the question is complicated by another problem—Whether the Babylonians and Assyrians borrowed the greater part of their religious conceptions and institutions from a foreign, non-Semitic people, the primitive inhabitants of their country, and if this be the case what they then have of their own and what is due to the influence of that ancient civilization. Whatever may be the final solution of this question, we shall not go far wrong if we distinguish the Semitic religions into two principal groups—the one comprising the southern or Arabic, with perhaps the most ancient Hebrew, the other all the Northern Semitic religions from the Tigris to the Mediterranean—leaving it undecided whether the undeniable relationship between the northeastern and the northwestern Semitic religions be due to the influence of the superior culture of the former or to the fact that they all have radiated from a common center. This only is beyond doubt, that the Assyrian religion is a daughter of the Babylonian, and that the Canaanitic and Phœnician modes of worship are closely allied.

The first problem to be solved in respect to African religions is the classification of the Egyptian religion. It is neither Semitic and theocratic nor Aryan and theanthropic. All we know is that the Egyptians themselves mention a people called Punt (the Phut of the Bible), with whom they had commercial relations and whose religion was akin to their own, so much so that they called the country of Punt, on the western Arabian and on the opposite African coast, the Holy Land.

That the primitive religion of southern Mesopotamia, commonly called Accadian or Sumerian, was related to the Egyptian, is also a mere conjecture, which does not seem to be favored by the newly discovered facts. Finally, the scanty remains of the pre-Islamic religion of the Imōshaghī or Berbers, the ancestors of the Libyans (in Egyptian Ribū), the Gætulians, the Mauritanians, and the Numidians resemble in some degree Egyptian customs and notions; but, whether they point to genealogical relationship or are due to early Egyptian influence, it is hard to say. If, as is generally

supposed, the dominant race sprang from Asiatic settlers and conquerors, who long before the dawn of history invaded the country, subjugated the dark-colored inhabitants, and mixed with them, and if it is to these foreigners that the more elevated elements in the Egyptian religion are due, the basis of this religion is of a purely Nigritian character.

All we can say about the other original religions of the dark continent is that they resemble one another in many respects. The prominent characteristic of the Negroes proper, is their unlimited fetichism, combined as usual with tree worship, animal worship, especially that of serpents, with a strong belief in sorcery and with the most abject superstitions, which even Islām and Christianity are not able to overcome.

Among the Abantu or Kaffrarians (Ama-Khosa, Ama-Zulu, Be-Chuana, Ova-Herero), fetichism is not so exuberant. Their religion is rather a religion of spirits. The spirits they worship, not sharply distinguished from the souls of the departed ancestors (Imi-shologu, Barimi), are conjured up by a caste of sorcerers and magicians, Isintonga (Isinyanga, Nyaka), and are all subordinate to a ruling spirit, regarded as the ancestor of the race, the highest lawgiver who taught them their religious rites, but who seems to have been originally a moon-god as the lord of heaven. The Khoi-Khoi or Hottentots, who are not black but brown, and who now live in and near the Cape Colony, also have a supreme deity, called Tsui- or Tsuni-Koab (the wounded knee) by the colonial Hottentots, Heitsi-eibib (wooden face) by the Namaqua. He, too, like the highest god of the Bantu, is the ancestor of the race and the chief of souls and spirits. The great difference between the religions of the Khoi-Khoi and the other Nigritians is the total absence of animal worship and of fetichism by which it is characterized.

What the ancient national religion of the Chinese was can only be gathered from its survivals in the still existing faiths. Confucianism claims to be a restoration of the old and pure institutions of the fathers, though it may just as well be said to be a thorough reform, and Taoism is, according to some European scholars, the original Chinese religion in its latest development. Without venturing to speculate on the origin of the Chinese nationality, nor on the possibility that this ethnic dualism may be the source of the two streams of religious development in China, we have some ground to hold Confucius' reform as the renewal of a much older reform (Chowkung's or even earlier), limited to the learned and the greater part of the upper classes—Taoism on the contrary being a revival of the ancient popular Chinese religion, to which the *Tao-tĕ-King* had to give the appearance of a philosophical basis. Chinese Buddhism does not differ much from the latter, and is now equally despised.

In Japanese religions we have again the same triad, nearly parallel to the Chinese: the old national religion Kami-no-madsu (the way, *i.e.*, the worship, of the gods), called frequently Sin-to (Chinese Shin-tao, the way or worship of the spirits), with the mikado as its spiritual head, just as Chinese Taoism had its popes; Confucianism, imported from China in the seventh century; and Buddhism, imported from Corea and nearly exterminated in the sixth century, but reviving, and at last, in the beginning of the seventh century, triumphant.

The Roman branch of the Ural-Altai religions, all recognizing the same heaven-god Num, Yum, Yummal, Yubmel, Yumala, as supreme. By far the best known of this family are its North-European members, the religions of the Lapps, the Esthonians, and the Finns, but the two last named are not pure specimens of Ural-Altai worship, as they borrowed much from the

Germanic, especially from the Scandinavian, mythology. It is highly probable that the other branches of the same ethnic family, the Mongolian and the Turkish, and the other members of the same branch, *e.g.*, the Magyars, originally did not differ much from the Finnic in religious ideas and customs. Nor do we know in how far the Tibetans, Burmese, Siamese, and other peoples nearly related to the Chinese had originally a similar worship, as all of them are now faithful Buddhists. The question whether the religion of the primitive inhabitants of Mesopotamia (SumérAkkad) has any genealogical relation to that of the Chinese and the Ural-Altaic family, as some scholars now try to prove, is not yet ripe for solution.

Among the American nations, the religion of the Eskimo should be clearly distinguished as having been borrowed from the Ural-Altaic religion. Their division of the world of spirits into those of the sea, the fire, the mountains, and the winds, with Tomgarsuk, the heaven god as the highest, and their belief in the magical power of their sorcerers, the Augekoks, do not differ from those which characterize the Ural-Altaic religions. At any rate the religion of the Eskimo is the connecting link between the latter and those of the American aborigines. That all the other religions of North and South America are most closely allied is generally admitted, and is indeed beyond doubt. However, fetichism and idolatry are much less developed among the Americans; a marked tendency to gloomy rites and bloody self-torture is common to all. They embrace the religion of the Redskins from Canada to the Gulf of Mexico, all of whom have in common the worship of the Great Spirit; the religion of the Aztec race which is spread from Vancouver's Island to Nicaragua; that of the original inhabitants of the Antilles and of the Muyscas in South America, to which branches belonged elevated religious ideas mixed with barbarous rites; also the religion of the Quichua Aymara, which culminated in the sun worship of the Incas in Peru; that of the Caribs and Arowaks, the Brazilian aborigines whose religious notions and customs are said to have been in accordance with the low degree of their civilization, only the Avancanicus having a somewhat advanced sun worship, owing, doubtless, to the ascendancy of Peruvian culture; and finally the religion of the Malayo-Polynesian family, which so far as investigation can determine did not differ more from the Polynesian than do the languages.

What may have been the state of religion before the oldest religion known to us sprang into being, and even before that animistic stage of development which we know only by its survivals in the higher, and its ruins in the still existing lower religions, certain it is that the oldest religions must have contained the germs of all the later growth, and, though perhaps more thoroughly naturistic than the most naturistic now known, must have shown some faint traces, at least, of awakening moral feelings.

With regard to the ethical religions—Buddhism, Christianity, and Mohammedanism—there is a real difference between two at least of the three named, which are still contending with one another for supremacy over the nations of the globe, and the other religious communities which no longer try to make proselytes—between Buddhism and Christianity, on the one hand, and Confucianism, Brahmanism, Jainism, Mazdaism, and Judaism on the other. And this difference, which ought to be maintained, is indeed one of principle, not of fact only.

Buddhism, Islâm, and Christianity were neither national nor particularistic. All of them were the representatives of ideas surpassing so to say the national horizon; all of them had in view, not the special relig-

ious wants of the nation, but more general aspirations of the human heart and mind. Two of them, therefore, were rejected, after a shorter or longer struggle, by the peoples to which their founders belonged by birth; and it is a well-known fact that Mohammedanism, though founded by an Arab, took its fundamental ideas from Judaism and Christianity, and that not the Arabs, but foreign nations, especially the Persians, raised it to the high position which it would not have occupied in the world without them. The national form of the Buddhistic idea was Jainism, that of the Christian idea Ebionitism, and perhaps the Wahhabites may be considered as the national reformers of Mohammedanism; and it is only natural that none of these sects found adherents except among the peoples in the midst of which they arose. Nor were Buddhism, Islâm, and Christianity particularistic. Buddhism "looks for the man; the miseries of existence beset all alike, and its law is a law of grace for all."—So too in its way does Islâm; in the beginning it spreads by conquest, but the faithful of every nationality, whether converted by the force of arms or by the preaching of missionaries, acquire the same rights and dignity as the Arabs. The universalism of Christianity needs no proof. Here, however, the difference begins. We class these three religions under one head, because they resemble one another in so many respects, and because they differ from the other religious communities founded by individuals precisely in that in which they are mutually alike. But we are far from placing them on the same level. Islam, *e.g.*, is not original, not a ripe fruit, but rather a wild offshoot of Judaism and Christianity. Buddhism, though the most widely spread, has never been victorious except where it had to contend with religions standing on no very high degree of development. For a short time it had a footing in Persian countries, but there its influence was neither deep nor durable, and in China it was not even able to overcome Confucianism and Taoism; it seems to have been driven from India by Brahmanism, without being actually persecuted. Both Islam and Buddhism, if not national, are only relatively universalistic, and show the one-sidedness, the one of the Semitic, the other of the Aryan race. The former represents an important religious idea—the absolute sovereignty of the one God, toward whom man, being nothing himself, has only one duty, that of tacit obedience; it exalts the divine, not combining it with, but opposing it to, the human, which it despises, and therefore neglects the development of ethics. Buddhism on the contrary neglects the divine, preaches the final salvation of man from the miseries of existence through the power of his own self-renunciation; and therefore, as it is atheistic in its origin, it very soon becomes infected by the most fantastic mythology and the most childish superstitions. If religion really is the synthesis of dependence and liberty, we might say that Islâm represents the former, Buddhism the latter element only, while Christianity does full justice to both of them. Christianity, the pure and unalloyed at least, has fused dependence and liberty, the divine and the human, religion and ethics, into an indivisible unity.

We now give the following sketch of a morphological classification of religions:

#### I. NATURE RELIGIONS.

##### (a) Polydæmonistic Magical Religions under the control of Animism.

To this class belong the religions of the so-called savages or uncivilized peoples, but they are only degraded remnants of what they once must have been.

##### (b) Purified or organized Magical Religions. Therianthropic Polytheism.

1. <i>Unorganizea.</i>	2. <i>Organized.</i>
Japanese Kami-no-madsu.	The semi-civilized religions of America: Maya, Natchez, Toltecs-Aztecs, Muyscas, Incas in Peru.
The non-Aryan (Dravidian) religions of India, principally in the Deccan.	The ancient religion of the Chinese empire.
Religion of the Finns and Ehsts.	Ancient Babylonian (Chaldæan) religion.
The old Arabic religions.	Religion of Egypt.
Old Pelasgic religion.	
Old Italiote religions.	
Etruscan religion before its admixture with Greek elements (?)	
The old Slavonic religions.	

(c) Worship of manlike but superhuman and semi-ethical beings. Anthropomorphic Polytheism.

The ancient Vaidic religion (India).  
 The pre-Zarathustrian Iranic religion (Bactria, Media, Persia).  
 The younger Babylonian and Assyrian religion.  
 The religions of the other civilized Semites (Phœnicia, Canaan, Aramæa, Sabæans in South Arabia).  
 The Celtic, Germanic, Hellenic, and Græco-Roman religions.

## II. ETHICAL RELIGIONS.

(a) National Nomistic (Nomothetic) religious communities.

Taoism and Confucianism in China.  
 Brahmanism, with its various ancient and modern sects.  
 Janism and primitive Buddhism.  
 Mazdaism (Zarathustrianism), with its sects.  
 Mosaism.  
 Judaism.

(b) Universalistic religious communities.

Islam, Buddhism, Christianity.

There are some vague allusions to an early Babylonian conquest of western Asia, which might account for the agreement of some ancient modes of worship in the Western countries with those of Babylonia; but, before the XVIIIth Dynasty of Egypt (fifteenth or sixteenth century B.C.), the empires on the banks of the Euphrates and Tigris, and that on the banks of the Nile, seem not yet to have come into contact. From that time, at least during the rule of the XIXth Dynasty, not a few Semitic deities were admitted into the Egyptian pantheon. In a well-known hymn the victorious Egyptian king is compared to the Semitic Ba'al, as well as to the national god Mentu.

Modern history of religions is chiefly the history of Buddhism, Christianity, and Islâm, and of their wrestling with the ancient faiths and primitive modes of worship, which slowly fade away before their encroachments, and which, where they still survive in some parts of the world, and do not reform themselves after the model of the dominant religion, draw nearer and nearer to extinction. But the subject is too vast to be treated of in detail here. It has been our object only to show, even for the ancient history of religions, the continuity and coherence which nobody will deny with regard to the modern. In both ancient and modern times, religions spread (1) by the influence of superior civilization, (2) by conquest, (3) by colonization or commerce, (4) by missions. Examples are too numerous and too well known to require mention here.

**REMAINDER, REVERSION.** In the view of English law a remainder or reversion is classed either as an incorporeal hereditament or, with greater correctness, as an estate in expectancy (see **REAL ESTATE**). That is to say, it is a present interest subject to an existing estate in possession called the particular estate, which must determine before the estate in expectancy can become an estate in possession. A remainder or reversion is in strictness confined to real estate, whether legal or equitable, though a similar interest may exist in personalty. The particular estate and the remainder or reversion together make up the whole estate over which the grantor has power of disposition. Accordingly a remainder or reversion limited on an estate in fee simple is void. The difference between a remainder and a reversion, stated as simply as possible,

is that the latter is that undisposed-of part of the estate which after the determination of the particular estate will fall into the possession of the original grantor or his representative, while a remainder is that part of the estate which under the same circumstances will fall into the possession of a person other than the original grantor or his representative.

REMBRANDT, REMBRANDT HARMENS VAN RIJN, the chief of the Dutch school of painting and one of the greatest painters the world has seen, was born in the house No. 3 Weddesteg, on the rampart at Leyden overlooking the Rhine, July 15, 1607.

Rembrandt's earliest pictures were painted in the last four years of his stay at Leyden, from 1627 to 1631. His work was now attracting the attention of the lovers of art in the great city of Amsterdam; and urged by their calls, he removed about 1631 to live and die there. The excellent painter Thomas De Keyser was then in the height of his power, and his influence is to be traced in some of Rembrandt's smaller portraits. The first important work executed by Rembrandt in Amsterdam is *Simeon in the Temple*, of the Hague Museum, a fine early example of the treatment of light and shade and of his subtle color. Between the small *Simeon* of 1631 and the life-sized *Lesson in Anatomy* of 1632 there is a great difference. In the latter we have the first of the great portrait subjects—Tulp the anatomist, the early friend of Rembrandt, discoursing to his seven associates, who are ranged with eager heads round the shortened body. The subject was not new, for it had been treated in former years, but it was reserved for Rembrandt to make it a great picture by the grouping of the expressive portraits and by the completeness of the conception.

Rembrandt's work about this period included one of the greatest portraits of 1634, the superb full length portrait of *Martin Daey*, which with that of *Madame Daey*, painted according to Vosmaer some years later, formed one of the ornaments of the Van Loon collection at Amsterdam. Both now belong to Baron Gustave de Rothschild. The life of Samson supplied many subjects in these early days. The so-called *Count of Gueldres Threatening his Father-in-law* of the Berlin Gallery, has been restored to its proper signification by M. Kolloff, who finds it to be Samson. But the greatest of this series, and one of the prominent pictures of Rembrandt's work, is the *Marriage of Samson* of the Dresden Gallery, painted in 1638. Here Rembrandt gives the rein to his imagination and makes the scene live before us. The story of Susannah also occupied him in these early years, and he returned to the subject in 1641 and 1653. The *Bather* of the National Gallery may also be another interpretation of the same theme. In all of these pictures the woman is coarse in type and lumpy in form, though the modeling is soft and round, the effect which Rembrandt always strove to gain. Beauty of form was outside his art. But the so-called *Danae* (1636) at St. Petersburg is a sufficient reply to those who descry his nude female forms. As flesh painting it glows with color and life, and the blood seems to pulsate under the warm skin. In the picturesque story of Tobit Rembrandt found much to interest him, as we see in the beautiful small picture of the Arenberg collection at Brussels. Sight is being restored to the aged Tobias, while with infinite tenderness his wife holds the old man's hand caressingly. The momentary action is complete, and the picture goes straight to the heart. In the Berlin Gallery he paints the anxiety of the parents as they wait the return of their son. In 1637 he painted the fine picture now in the Louvre of the *Flight of the Angel*; and the same subject is grandly treated by him, apparently about

1645. in the picture exhibited in the winter exhibition at Burlington House in 1885. Reverence and awe are shown in every attitude of the Tobet family. A similar lofty treatment is to be found in the *Christ as the Gardener appearing to Mary* of 1638 (Buckingham Palace).

The year 1642 is remarkable for the great picture formerly known as the *Night Watch*, but now more correctly as the *Sortie of the Banning Cock Company*, another of the landmarks of Rembrandt's career, in which twenty-nine life-sized civic guards are introduced issuing pell-mell from their club houses.

But this year of great achievement was also the year of his great loss, for Saskia, his wife, died in 1642. With her death his life was changed. Bode has remarked that there is a pathetic sadness in his pictures of the *Holy Family*—a favorite subject at this period of his life. All of these he treats with the naïve simplicity of Reformed Holland, giving us the real carpenter's shop and the mother watching over the Infant reverently and lovingly, with a fine union of realism and idealism. A notable example of this feeling is to be found in the *Woman Taken in Adultery* of the National Gallery, painted in 1644 in the manner of the *Simeon of the Hague*. A similar lofty ideal is to be found in his various renderings of the *Pilgrims at Emmaus*, notably in the Louvre picture of 1648, and the same year we have the *Good Samaritan* of the Louvre, the story being told with intense pathos. At this period of his career we come upon a branch of his art on which he left, both in etching and in painting, the stamp of his genius, viz., landscape. In all these pictures light with its magical influences is the theme of the poet-painter. From the number of landscapes by himself in the inventory of his sale, it would appear that these grand works were not appreciated by his contemporaries. The last of the landscape series dates from 1655 or 1656, the close of the middle age or manhood of Rembrandt.

But evil days were at hand. The long-continued wars and civil troubles had worn out the country. Trade and commerce languished, and in Amsterdam hundreds of houses were empty. Rembrandt's brothers had suffered, and money was scarce and nothing could avert the ruin of the painter, who was declared bankrupt in July, 1656, an inventory of all his property being ordered by the Insolvency Chamber. The first sale took place in 1657. The sum realized, under 5,000 guilders, was but a fraction of their value. Driven thus from his house, stripped of everything he possessed even to his table linen, Rembrandt took a modest lodging in the Keizerskroon hostelry, apparently without friends and thrown entirely on himself. But there was no failure here, for this dark year of 1656 stands out prominently as one in which some of his greatest works were produced, as, for example, *John the Baptist Preaching in the Wilderness*, belonging to Lord Dudley, and *Jacob Blessing the Sons of Joseph*, of the Cassel Gallery. After the sale of the house in the Breedstraat Rembrandt retired to the Rosengracht, an obscure quarter at the west end of the city. Here he painted the *Old Man with the Gray Beard* of the National Gallery (1657), and the *Bruyningh, the Secretary of the Insolvents' Chamber, of Cassel* (1658), both leading up to the great portraits of the *Syndics of the Cloth Hall* of 1661. About the year 1663 Rembrandt painted the (so-called) *Jewish Bride* of the Van der Hoop Gallery and the *Family Group of Brunswick*, the last and perhaps the most brilliant works of his life, bold and rapid in execution and marvelous in the subtle mixture and play of colors in which he seems to revel. The woman and children are painted with such love

that the impression is conveyed that they represent a fancy family group of the painter in his old age. In 1668 Titus, the only son of Rembrandt, died, leaving one child, and on October 8, 1669, the great painter himself passed away, leaving two children, and was buried in the Wester Kerk.

REMIGIUS (or REMEDIUS, as the name is spelled in Fredegarius and elsewhere), or REMI, was born of noble parents and, according to a later tradition, in the district of Laon. In one of his own letters, written apparently about 512 A.D., Remigius speaks of himself as having been a bishop for fifty-three years. This throws back his election to about 459; and, as all his earlier biographers agree in making him twenty-one years of age on his appointment to this office, the date of his birth may be fixed at somewhere about the year 438.

Gregory has also preserved the tradition that Remigius was bishop of Rheims for more than seventy years (*De Gloria Conf.*, 89), a fact which inclines us to lay some confidence on the more detailed statement of Hincmar that he died on January 13th, in the ninety-sixth year of his age, after an episcopate of seventy-four years. Hence we may fix upon 533 as the date of his decease, more especially as this conclusion coincides well enough with the little that is known as to the chronology of his two immediate successors.

REMIREMONT, the chief town of an arrondissement of the department of the Vosges, France, seven miles south-southeast of Épinal by rail, on the banks of the Moselle where it is joined by the Moselotte. It is a pretty and well-built town picturesquely surrounded by forest-clad mountains, and commanded by Fort Parnont, one of the line of defensive works along the Moselle. Besides a great cotton spinning-mill (30,000 spindles) brought from Mülhausen after the war of 1870, it possesses tanneries, weaving-factories, and saw-mills; and it trades in timber, cattle, cheese, coopers' wares, etc. The more interesting buildings belong to the ancient abbey, to which the town owes most of its fame. The abbey church was consecrated to Pope Leo IX. in person in 1051. The abbatial residence (which now contains the mairie, the court-house, and the public library) has been twice rebuilt in modern times (in 1750, and again after the fire of 1871), but the original plan and style have been preserved in the imposing front, the vestibule, and the grand staircase. The population of the town was 6,212 in 1871, 7,857 in 1881, and estimated at 10,000 in 1890.

REMONSTRANTS meant originally those Dutch Protestants who, after the death of ARMINIUS (*q.v.*), continued to maintain the views associated with his name, and in 1610 presented to the states of Holland and Friesland a "remonstrance" in five articles formulating their points of departure from stricter Calvinism. Their adversaries met them with a "counter remonstrance," and so were known as the Counter Remonstrants. The conflict continued to rage till 1618-19, when the synod of Dort (see DORT, SYNOD OF) established the victory of the stricter school. The judgment of the synod was enforced by the deposition, and, in some cases, the banishment of Remonstrant ministers; but the government soon became convinced that their party was not dangerous in the State, and in 1630 they were formally allowed liberty to reside in all parts of Holland, and build churches and schools. In 1621 they had also received liberty to make a settlement in Schleswig, where they built themselves the town of Friedrichstadt. This colony still exists. The Remonstrants are now a small body (see HOLLAND), but respected for their traditions of scholarship and liberal thought.

REMSCHEID, a manufacturing town of Rhenish Prussia, in the district of Düsseldorf, sometimes digni-

fed with the title of the "Rhenish Sheffield," is situated about twenty miles to the northeast of Cologne, at a height of 1,120 feet above the sea. It is the center of the German hardware industry, and large quantities of tools, scythes, skates, and other small articles in iron, steel, and brass are annually made here for exportation to all parts of Europe, the East, and North and South America. In 1880 the commune contained 30,029 inhabitants, of whom 11,000 belonged to Remscheid proper, and the rest to the manufacturing villages with which it is grouped. The population in 1890 had increased to 40,500.

REMUSAT, ABEL, a distinguished Chinese scholar, was born at Paris, September 5, 1788. His father, a surgeon, superintended his early education in person, and designed him for the medical profession. Jean Pierre Abel Rémusat graduated with distinction as M.D. in 1813, and for a short time held a hospital appointment, but his heart had long been in other studies. In 1814 a chair of Chinese was founded at the Collège de France, and Rémusat was placed in it. From this time he gave himself wholly to the languages of the Extreme East, and published a long series of useful works, among which his contributions from Chinese sources to the history of the Tartar nation claim special notice. He died at Paris, June 4, 1832, and his *éloge* was written by De Sacy.

RÉMUSAT, CHARLES FRANÇOIS MARIE, COMTE DE, French politician and man of letters, was born at Paris on March 13, 1797. He very early developed political views more decidedly Liberal than those of his parents, and, being bred to the bar, published in 1820 a short pamphlet on jury trial. In 1848 he was elected, and in 1849 reëlected, for the department of Haute Garonne and sat on the Conservative side. But he would not support Louis Napoleon, and had to leave France after the *coup d'état*; nor did he reënter political life at all during the second empire. He died at Paris April 6, 1875.

RENAISSANCE is a term which has recently come into use to indicate a well-known but indefinite space of time and a certain place in the development of the European races. On the one hand it denotes the transition from that period of history which we call the Middle Ages to that which we call Modern. On the other hand it implies those changes in the intellectual and moral attitude of the Western nations by which the transition was characterized. If we insist upon the literal meaning of the word, the Renaissance was a re-birth; and it is needful to inquire of what it was the re-birth. The metaphor of Renaissance may signify the entrance of the European nations upon a fresh stage of vital energy in general, implying a fuller consciousness and a freer exercise of faculties than had belonged to the mediæval period. Or it may mean the resuscitation of simply intellectual activities, stimulated by the revival of antique learning and its application to the arts and literatures of modern peoples. The former has the disadvantage of making it difficult to separate the Renaissance from other historical phases—the Reformation for example—with which it ought not to be confounded. The latter has the merit of assigning a specific name to a limited series of events and group of facts, which can be distinguished for the purpose of analysis from other events and facts with which they are ultimately but not indissolubly connected. In other words, the one definition of Renaissance makes it denote the whole change which came over Europe at the close of the Middle Ages. The other confines it to what was known by our ancestors as the Revival of Learning.

The Renaissance, if we try to regard it as a period, was essentially the transition from one historical stage

to another. It cannot therefore be confined within strict chronological limits. This indecision inherent in the nature of a process which involved neither a political revolution nor the promulgation of a new religious creed, but was a gradual metamorphosis of the intellectual and moral state of Europe, is further augmented by the different epochs at which the several nations were prepared to bear their share in it. England, for example, was still feudal and mediæval when Italy had socially and mentally entered on the modern stadium. There is one date, however, which may be remembered with advantage as the starting-point in time of the Renaissance, after the departure from the Middle Ages had been definitely and consciously made by the Italians. This is the year 1453, when Constantinople, chosen for his capital by the first Christian emperor of Rome, fell into the hands of the Turk.

If we look a little forward to the years 1492–1500, we obtain a second date of great importance. In these years the expedition of Charles VIII. to Naples opened Italy to French, Spanish, and German interference. The leading nations of Europe began to compete for the prize of the peninsula, and learned meanwhile that culture which the Italians had perfected. In these years the secularization of the papacy was carried to its final point by Alexander VI., and the Reformation became inevitable. It must not be imagined that so great a change as that implied by the Renaissance was accomplished without premonitory symptoms and previous endeavors. In the main we mean by it the recovery of freedom for the human spirit after a long period of bondage to oppressive ecclesiastical and political orthodoxy—a return to the liberal and practical conceptions of the world which the nations of antiquity had enjoyed, but upon a new and enlarged platform. This being so, it was inevitable that the finally successful efforts after self-emancipation should have been anticipated from time to time by strivings within the ages that are known as dark and mediæval.

Philosophy attempted to free itself from the trammels of theological orthodoxy in the hardy speculations of some schoolmen, notably of Scotus Etigena and Abelard. The schools meanwhile resounded still to interminable dispute upon abstractions. Are only universals real, or has each name a corresponding entity? From the midst of the Franciscans who had persecuted Roger Bacon because he presumed to know more than was consistent with human humility arose John of Parma, adopting and popularizing the mystic prophecy of Joachim of Flora. The Fraticelli spiritualists, and similar sects who fed their imagination with his doctrine, expired in the flames to which Fra Dolcino, Longino, and Margharita were consigned. It is only certain that at this epoch the fabric of Catholic faith was threatened with various forms of prophetic and Oriental mysticism, symptomatic of a widespread desire to grasp at something simpler, purer, and less rigid than Latin theology afforded.

When due regard is paid to these miscellaneous evidences of intellectual and sensual freedom during the Middle Ages, it will be seen that there were by no means lacking elements of native vigor ready to burst forth. What was wanting was not vitality and license, not audacity of speculation, not lawless instinct or rebellious impulse. It was rather the right touch on life, the right feeling for human independence, the right way of approaching the materials of philosophy, religion, scholarship, and literature, that failed. The courage that is born of knowledge, the calm strength begotten by a positive attitude of mind, face to face with the dominant overshadowing Sphinx of theology, were lacking. We may fairly say that natural and untaught

people had more of the just intuition that was needed than learned folk trained in the schools. But these people were rendered licentious in revolt or impotent for salutary action by ignorance, by terror, by uneasy dread of the doom declared for heretics and rebels. The massive vengeance of the church hung over them, like a heavy sword suspended in the cloudy air. Superstition and stupidity hedged them in on every side, so that sorcery and magic seemed the only means of winning power over nature or insight into mysteries surrounding human life. The path from darkness to light was lost; thought was involved in allegory; the study of nature had been perverted into an inept system of grotesque and pious parable-mongering; the pursuit of truth had become a game of wordy dialectics. The other world with its imagined heaven and hell haunted the conscience like a nightmare. However sweet this world seemed, however fair the flesh, both world and flesh were theoretically given over to the devil. It was not worth while to master and economize the resources of this earth, to utilize the goods and ameliorate the evils of this life, while every one agreed, in theory at any rate, that the present was but a bad prelude to an infinitely worse or infinitely better future. To escape from these preoccupations and prejudices except upon the path of conscious and deliberate sin was impossible for all but minds of rarest quality and courage; and these were too often reduced to the recantation of their supposed errors no less by some secret clinging sense of guilt than by the church's iron hand.

It is just at this point that the revival of learning intervened to determine the course of the Renaissance.

It is obvious that Italian literature owed little at the outset to the revival of learning. The *Divine Comedy*, the *Canzoniere*, and the *Decameron* were works of monumental art, deriving neither form nor inspiration immediately from the classics, but applying the originality of Italian genius to matter drawn from previous mediæval sources. Dante showed both in his epic poem and in his lyrics that he had not abandoned the sphere of contemporary thought. Allegory and theology, the vision and the symbol, still determine the form of masterpieces which for perfection of workmanship and for emancipated force of intellect rank among the highest products of the human mind. Yet they are not mediæval in the same sense as the song of Roland or the Arthurian cycle. They proved that, though Italy came late into the realm of literature, her action was destined to be decisive and alterative by the introduction of a new spirit, a firmer and more positive grasp on life and art. These qualities she owed to her material prosperity, to her freedom from feudalism, to her secularized church, her commercial nobility, her political independence in a federation of small states.

The relation of the plastic arts to the revival of learning is similar to that which has been sketched in the case of poetry. Cimabue started with work which owed nothing directly to antiquity. At about the same time Niccola Pisano studied the style of sculpture in fragments of Græco-Roman marbles. His manner influenced Giotto, who set painting on a forward path. Fortunately for the unimpeded expansion of Italian art, little was brought to light of antique workmanship during the fourteenth and fifteenth centuries. The classical stimulus came to painters, sculptors, and architects chiefly through literature. Therefore there was narrow scope for imitation, and the right spirit of humanism displayed itself in a passionate study of perspective, nature, and the nude. But the perfect plastic art of Italy, the pure art of the Cinque Cento, the painting of Raphael, Da Vinci, Titian, and Correggio,

the sculpture of Donatello, Michelangelo, and Sansovino, the architecture of Bramante, Omodeo, and the Venetian Lombardi, however much imbued with the spirit of the classical revival, takes rank beside the poetry of Ariosto as a free intelligent product of the Renaissance.

In the fields of science and philosophy humanism wrought similar important changes. Petrarch began by waging relentless war against the logicians and materialists of his own day. With the advance made in Greek studies scholastic methods of thinking fell into contemptuous oblivion. The newly aroused curiosity for nature encouraged men like Alberti, Da Vinci, Toscanelli, and Da Porta to make practical experiments, penetrate the working of physical forces, and invent scientific instruments. Anatomy began to be studied, and the time was not far distant when Titian should lend his pencil to the epoch-making treatise of Vesalius. At the same time the texts of ancient authors supplied hints which led to discoveries so far-reaching in their results as those of Copernicus, Columbus, and Galileo. In philosophy, properly so-called, the humanistic scorn for mediæval dullness and obscurity swept away theological metaphysics as valueless. The thinkers of southern Italy, Telesio, Bruno, and Campanella, at last opened the two chief lines on which modern speculation has since moved. Telesio and Campanella may be termed the predecessors of Bacon. Bruno was the precursor of the idealistic schools. All three alike strove to disengage their minds from classical as well as ecclesiastical authority, proving that the emancipation of the will had been accomplished. Humanism in its earliest stages was uncritical. Yet it led in process of time to criticism. The critique of literature began in the lecture-room of Politian, in the printing-house of Aldus, and in the school of Vittorino. The critique of Roman law started under Politian's auspices, and, finally, in the court of Naples arose the most formidable of all critical engines, the critique of established ecclesiastical traditions and spurious historical documents. Valla, by one vigorous effort, destroyed the False Decretals and exposed the Donation of Constantine to ridicule, paving the way for the polemic carried on against the dubious pretensions of the papal throne by scholars of the Reformation. A similar criticism ransacked the moral abuses of the church and played around the very foundations of Christianity. This was tolerated with approval by men who repeated Leo X.'s witty epigram: "What profit has not that fable of Christ brought us!" The same critical and philosophic spirit working on the materials of history produced a new science, the honors of which belong to Machiavelli. What has come to be called a classical education was the immediate product of the Italian Renaissance. The universities of Bologna, Padua, and Salerno had been famous through the Middle Ages for the study of law, physics, and medicine; and during the fifteenth and sixteenth centuries the two first still enjoyed celebrity in those faculties. But at this period no lecture-rooms were so crowded as those in which professors of antique literature and language read passages from the poets and authors, taught Greek, and commented upon the systems of philosophers.

The humanists effected a deeply penetrating change in social manners. Through their influence as tutors, professors, orators, and courtiers, society was permeated by a fresh ideal of culture. To be a gentleman in Italy meant at this epoch to be a man acquainted with the rudiments at least of scholarship, refined in diction, capable of corresponding or of speaking in choice phrases, open to the beauty of the arts, intelligently interested in archæology, taking for his models



of conduct the great men of antiquity rather than the saints of the church. He was also expected to prove himself an adept in physical exercises and in the courteous observances which survived from chivalry.

This picture has undoubtedly a darker side. Humanism, in its revolt against the Middle Ages, was, as we have seen already, mundane, pagan, irreligious, positive. The Renaissance can, after all, be regarded only as a period of transition, in which much of the good of the past was sacrificed while some of the evil was retained, and neither the bad nor the good of the future was brought clearly into fact. It is needful to study at some length the main phenomena of the Renaissance in Italy, because the history of that phase of evolution in the other Western races turns almost entirely upon points in which they either adhered to or diverged from the type established there. Speaking broadly, what France, Germany, Spain, and England assimilated from Italy at this epoch was in the first place the new learning, as it was then called.

Germany was already provided with universities, seven of which had been founded between 1348 and 1409. The cities of Strasburg, Nuremberg, Augsburg, Basel, became centers of learned coteries. Academies in imitation of Italian institutions came into existence, the two most conspicuous, named after the Rhine and Danube, holding their headquarters respectively at Heidelberg and Vienna. Crowned poets emulated the fame of Politian and Pontano. Yet, though the Renaissance was thus widely communicated to the centers of German intelligence, it displayed a different character from that which it assumed in Italy. To a student of the origin of German humanism it is clear that something very different from the Renaissance of Lorenzo de' Medici and Leo X. was in preparation from the first upon Teutonic soil. Far less plastic and form-loving than the Italian, the German intelligence was more penetrative, earnest, disputative, occupied with substantial problems. That attempt to extinguish honest thought prepared the Reformation; and humanism after 1518 was absorbed in politico-religious war.

The point of contact between humanism and the Reformation in Germany has to be insisted on; for it is just here that the relation of the Reformation to the Renaissance in general makes itself apparent. As the Renaissance had its precursory movements in the mediæval period, so the German Reformation was preceded by Wycliffe and Huss, by the discontents of the Great Schism, and by the councils of Constance and Basel. The touch of the new spirit which had evolved literature, art and culture in Italy sufficed in Germany to recreate Christianity. This new spirit in Italy emancipated human intelligence by the classics; in Germany it emancipated the human conscience by the Bible. The indignation excited by Leo X.'s sale of indulgences, the moral rage stirred in northern hearts by papal abominations in Rome, were external causes which precipitated the schism between Teutonic and Latin Christianity.

The part played by Spain in this period of history was determined in large measure by external circumstance. Architecture in Spain, emerging from the Gothic stage, developed an Early Renaissance style of bewildering richness by adopting elements of Arabic and Moorish decoration. Sculpture exhibited realistic vigor of indubitably native stamp; and the minor plastic crafts were cultivated with success on lines of striking originality. Painting grew from a homely stock, until the work of Velazquez showed that Spanish masters in this branch were fully abreast of their Italian compeers and contemporaries. To dwell here upon the Italianizing versifiers, moralists, and pastoral

romancers who attempted to refine the vernacular of the *Romancero* would be superfluous. The Spanish drama, meanwhile, untrammelled by those false canons of pseudoclassic taste which fettered the theater in Italy and afterward in France, rose to an eminence in the hands of Lope de Vega and Calderon which only the English, and the English only in the masterpieces of three or four playwrights, can rival. What has chiefly to be noted regarding the achievements of the Spanish race in arts and letters at this epoch is their potent national originality. The revival of learning produced in Spain no slavish imitation as it did in Italy, no formal humanism, and, it may be added, very little of fruitful scholarship. The Renaissance here, as in England, displayed essential qualities of intellectual freedom, delight in life, exultation over rediscovered earth and man.

We have now to speak of France, which earliest absorbed the influence of the Italian revival, and of England, which received it latest. The Renaissance may be said to have begun in France with Charles VIII.'s expedition to Naples, and to have continued until the extinction of the house of Valois. French architecture was stimulated and developed; painting and sculpture were practiced with originality and power, and literature was quick to respond to Renaissance influences, while French scholarship was hardly less rich, and the revival of learning in those periods had a noble muster-roll of names. The Renaissance of the Low Countries, as elsewhere, had its brilliant age of arts and letters. Flemish and Dutch painting, scholarship and wars of independence gave to the world a Rubens, a Vandyck, a long list of critical scholars and editors; and the Netherlands became the battlefield of Reformation and Counter-Reformation in even a stricter sense than France.

The insular position of England, combined with the nature of the English people, has allowed them to feel the vibration of European movements later and with less of shock than any of the continental nations. Both Renaissance and Reformation had been anticipated by at least a century in England. Chaucer's poetry, which owed so much to Italian examples, gave an early foretaste of the former. Wycliffe's teaching was a vital moment in the latter. But the French wars, the Wars of the Roses, and the persecution of the Lollards deferred the coming of the new age; and the year 1536, when Henry VIII. passed the act of Supremacy through Parliament, may be fixed as the date when England entered definitely upon a career of intellectual development abreast with the foremost nations of the continent. The first period of the English Renaissance was one of imitation and assimilation. Academies after the Italian type were founded. Tragedies in the style of Seneca, rivaling Italian and French dramas of the epoch, were produced. Attempts to Latinize ancestral rhythms, similar to those which had failed in Italy and France, were made. Tentative essays in criticism and dissertations on the art of poetry abounded. It seemed as though the Renaissance ran a risk of being throttled in its cradle by superfluity of foreign and pedantic nutriment. But the natural vigor of the English genius resisted influences alien to itself, and showed a robust capacity for digesting the varied diet offered to it. As there was nothing despotic in the temper of the ruling classes, nothing oppressive in English culture, the literature of that age evolved itself freely from the people. It was under these conditions that Spenser gave his romantic epic to the world, and the Elizabethan drama, which in its totality is the real exponent of the English Renaissance, came into existence. This drama, breathing into antique histories the breath of actual life, embracing the romance of Italy and Spain,

the mysteries of German legend, the fictions of poetic fancy and the facts of daily life, humors of the moment and abstractions of philosophical speculation, in one homogeneous amalgam instinct with intense vitality, this extraordinary birth of time, with Shakespeare for the master of all ages, left a monument of the Renaissance unrivaled for pure creative power by any other product of that epoch. To complete the sketch, we must set Bacon, the expositor of modern scientific method, beside Spenser and Shakespeare, as the third representative of the Renaissance in England. Nor should Raleigh, Drake, Hawkins, the semi-buccaneer explorers of the ocean, be omitted. They, following the lead of Portuguese and Spaniards, combating the Counter-Reformation on the seas, opened for England her career of colonization and plantation. All this while the political policy of Tudors and Stewarts tended toward monarchical absolutism, while the Reformation in England, modified by contact with the Low Countries during their struggles, was narrowing into strict reactionary intolerance. Puritanism indicated a revolt of the religious conscience of the nation against the arts and manners of the Renaissance, against the encroachments of belligerent Catholicism, against the corrupt and Italianated court of James I., against the absolutist pretensions of his son Charles. In its final manifestation during the Commonwealth, Puritanism won a transient victory over the mundane forces of both Reformation and Renaissance, as these had taken shape in England. It also secured the eventual triumph of constitutional independence. Milton, the greatest humanistic poet of the English race, lent his pen and moral energies during the best years of his life to securing that principle on which modern political systems at present rest. Thus the geographical isolation of England, and the comparatively late adoption by the English of matured Italian and German influences, give peculiar complexity to the phenomena of Reformation and Renaissance simultaneously developed on that island. The period of its history between 1536 and 1642 shows how difficult it is to separate these two factors in the re-birth of Europe, both of which contributed so powerfully to the formation of modern English nationality.

RENAIX, a manufacturing town of Belgium, in the province of East Flanders, eight miles by rail south of Oudenarde, with a communal population of 14,089 in 1876, and in 1890 about 15,500. It contains the ruins of a castle built in 1638 by Count John of Nassau-Siegen, and a church with the tomb of St. Hermes, to whom it is dedicated.

RÉNAUDOT, EUSÈBE, theologian and Orientalist, was born in Paris in 1646, and was educated for the church. Notwithstanding his taste for theology and his title of abbé, he never took orders, and much of his life was spent at the French court. He died in 1720.

RENDSEBURG, a town in Prussia, in the province of Schleswig-Holstein, is situated on the Eider, in a flat and sandy district, twenty miles to the west of Kiel. Its present importance rests on the commercial facilities afforded by its connection with the North Sea and the Baltic through the Eider and the Eider Canal, by which a brisk transit trade is carried on in grain, timber, Swedish iron, and coals. The principal industries are cotton-weaving, tanning, and the manufacture of artificial manures; and there is a large iron foundry in the immediate neighborhood. The population in 1880 was 12,776, and estimated at 13,750 in 1890, including a strong garrison.

RENÉ I., duke of Anjou, count of Provence, and titular king of Naples, was the second son of Louis II. of Aragon, king of Naples, and Yolande, daughter of John I. of Aragon, and was born January 16, 1409.

Although his father was crowned king of Naples at Avignon by Pope Clement VII. in 1384, he was unable to make good his claims. After his death Louis III., the elder son, assumed the title, and in 1423 was adopted by Johanna II. of Naples, and obtained possession of the throne. Dying November 15, 1434, he left his claims to his brother René, who was also appointed heir by Johanna II. at her death in the following year. In 1444 he took part at Tours in the peace negotiations between England and France; and, to cement the alliance, Henry VI. espoused his daughter Margaret of Anjou. Subsequently he ceased to concern himself with politics, and devoted his chief attention to literature. He died July 10, 1480.

RENFREW, a county of Scotland, skirting the Firth of Clyde, lies between  $55^{\circ} 40' 34''$  and  $55^{\circ} 57' 45''$  N. latitude, and between  $4^{\circ} 13'$  and  $4^{\circ} 54'$  W. longitude, and is bounded north by the Clyde, northeast by Dumbarton and by Lanark, east by Lanark, south by Ayr, and west by the Firth of Clyde. Its greatest length from west-northwest to east-southeast is  $30\frac{1}{2}$  miles, and its greatest breadth at right angles to this  $13\frac{1}{4}$  miles. The area is 253,793 square miles or 162,427,958 acres, of which 2,021,179 acres are foreshore and 3,621,342 are water. Except a small portion opposite the burgh of Renfrew, the whole county lies to the south of the Clyde. For local purposes the county is divided into an upper and a lower ward, the former embracing the two-thirds lying to the east, and having its district center at Paisley, while the latter contains the parishes of Innerkip, Greenock, Port Glasgow, and Kilmacolm, and has its district center at Greenock. The southern border and western part of the county are hilly, but none of the heights rise very much above sea-level. The central part is undulating and, as much of the higher portion of it is well wooded, the scenery is in some places picturesque. Along the greater part of the northern border is a flat tract of clayey carse-land known locally as the "laich lands," and very fertile in favorable seasons.

The principal river is the Clyde, which forms a considerable portion of the northern boundary; and the other chief streams are the White Cart, Black Cart, and Gryfe. A number of smaller streams flow direct to the Clyde, the most important being the Kip and the Kelly Burn in the west of the county. The principal lochs are Loch Thom and Gryfe Reservoir, two and a half miles south of Greenock; Castle Semple Loch, near the center of the southern border; Long Loch and Loch Goin, further east near the same border; and Balgray and Glen Reservoirs, connected with the Glasgow water supply near the center of the eastern part of the county. The Glasgow, Paisley, and Johnstone Canal, which formerly united these three towns, has since 1882 been laid dry along the greater part of its course and the bed converted into a railway line. The rocks throughout the county are Carboniferous, and almost the whole of the Lower Carboniferous Calciferous Sandstone series is here represented by a thick set of volcanic deposits. The oldest beds are the red sandstones, cornstones, and conglomerates which occupy the extreme west corner between Innerkip and Loch Thom. Farming operations do not differ in detail from those carried on in the adjoining middle and lower wards of Lanarkshire. The climate is very variable; and, as the prevailing west and southwest winds come in from the Atlantic warm and full of moisture, contact with the colder land causes very heavy rains, and the western part of Renfrewshire is one of the wettest districts in Scotland, the mean annual rainfall amounting to over sixty inches. The mean annual temperature is about  $48^{\circ}$ .

Besides the coal, iron, and oil industries already mentioned, the county has extensive, varied, and valuable manufactures of which the chief are at Greenock and Paisley. Elsewhere there are chemical works, engineering works, foundries, and bleaching, dyeing, and weaving works. There are throughout the shire a large number of excellent roads; and numerous lines and branches of the Caledonian and the Glasgow and Southwestern systems afford ample railway communication along the center, north, and west for both general traffic and minerals. The population has risen from 78,501 in 1801 to 216,947 in 1871 and to 263,374 in 1881 (126,743 males, 136,631 females), more than 100,000 of the increase having taken place between 1851 and 1881. Of the whole number 49,681 men and 21,734 women were engaged in industrial handicrafts or dealt in manufactured substances, and of these 7,741 men and 15,547 women were connected with the making of textile fabrics, while 7,086 men and 172 women were connected with the working of mineral substances.

RENFREW, a royal parliamentary burgh and the county town of the above county, is situated in the northeast near the south bank of the Clyde, connected with which is a small harbor. The industries are connected with two shipbuilding yards, a chemical works, a forge, a dyeworks, and weaving. Population in 1881, 5,115, 7,000 in 1890.

RENI, GUIDO, a prime master in the Bolognese school of painting, and one of the most admired artists of the period of incipient decadence in Italy, was born at Calvenzano, near Bologna, on November 4, 1575. He is most usually named Guido. His father was a musician of repute, a player on the flageolet; he wished to bring the lad up to perform on the harpsichord. At a very childish age, however, Guido displayed a determined bent toward the art of form, scribbling some attempt at a drawing here, there, and everywhere. He was only nine years of age when Denis Calvart took notice of him, received him into his academy of design by the father's permission, and rapidly brought him forward, so that by the age of thirteen Guido had already attained marked proficiency. Albani and Domenichino became soon afterward pupils in the same academy.

Toward 1602 he went to Rome with Albani, and Rome remained his headquarters for twenty years. Here, in the pontificate of Paul V. (Borghese), he was greatly noted and distinguished. In the garden-house of the Rospigliosi Palace he painted the vast fresco which is justly regarded as his masterpiece—*Phabus and the Hours preceded by Aurora*. He founded now chiefly upon the antique, more especially the *Niobe* group and the *Venus de' Medici*, modified by suggestions from Raphael, Correggio, Parmigiano, and Paul Veronese. The pontifical chapel of Montecavallo was assigned to Reni to paint; but, being straitened in payments by the ministers, the artist made off to Bologna, where he established a celebrated school, numbering more than 200 scholars. He now left Bologna hardly at all; in one instance, however, he went off to Ravenna, and, along with three pupils, he painted the chapel in the cathedral with his admired picture of the *Israelites Gathering Manna*. The closing years of his life were unproductive of professional results. He died August 18, 1642.

RENNELL, JAMES, probably the most celebrated of English geographers, was born December 3, 1742, near Chudleigh in Devonshire, where his father John Rennell was the owner of a small farm called Waddon. He died March 29, 1830, and was buried in Westminster Abbey.

RENNES, a town of France, formerly the capital of Brittany and now the chief town of the department of

Ille-et-Vilaine, is situated at the meeting of the Ille and the Vilaine, and at the junction of several lines of railway connecting it with Paris (232 miles east-north east), St. Malo (51 miles north), Brest (147 west-north west), etc. It is the seat of an archbishop and the headquarters of the tenth corps d'armée (with a large arsenal and barracks.) The local industries are varied but not extensive. The population of the town in 1886 numbered 62,482.

RENNIE, JOHN, engineer and architect, was the son of a farmer, and was born at Phantassie, East Lothian, June 7, 1761. By Professor Robison of Edinburgh he was introduced to Messrs. Boulton & Watt of Soho near Birmingham, for whom in 1786 he superintended the construction of the Albion flour mills near Blackfriars Bridge, London. It is believed that the difficulties which occurred at the Albion mills in regard to the ebb and flow of the tide first led Rennie to the study of that branch of civil engineering connected with hydraulics and hydrodynamics, in which he became so celebrated as to have no rival after the death of Smeaton. Of the bridges connecting the banks of the Thames at London, three have been built from his designs—Southwark Bridge, in the construction of which he introduced a method of employing cast iron which formed a new epoch in the history of bridge-building; Waterloo Bridge, which then had no parallel for its magnitude, elegance, and solidity; and London Bridge, on the model of Waterloo Bridge. Bridges at Leeds, Musselburgh, Kelso, Newton-Stewart, Boston, New Galloway, and numerous other places bear similar testimony to his skill and taste. His earliest canal project was that of the Crinan Canal, and following it was the Lancaster Canal, which besides other difficulties presented that of an aqueduct over the Lune. But even these works must yield to what he executed in connection with the Government dockyards at Portsmouth, Chatham, Sheerness, and Plymouth. One other effort of his genius falls to be mentioned, the drainage of that vast tract of marsh-land bordering upon the rivers Trent, Witham, Welland, and Ouse which for centuries had baffled the skill of some of the ablest men in that department of civil engineering. In person he was of great stature and strength; and his noble bust by Chantrey, when exhibited in Somerset House, obtained the name of Jupiter Tonans. He died October 16, 1821.

RENO, a growing city on the Truckee river, in Washoe county, Nev., derives its importance from its location as the county seat, as the transfer station for Virginia City, Gold Hill, Carson, and Washoe on the south; Honey Lake, Susanville, and other points on the north; and as the distributing point for a large area of mining territory. The railway facilities embrace the Central Pacific, Virginia and Truckee, and Nevada and Oregon roads, to all of which Reno contributes a large and steadily increasing patronage. The city contains two banks with a cash capital of \$350,000, and \$100,000 surplus, six churches, a female seminary, and other educational establishments, two daily papers, and many stores. The manufacture of carriages, sash, doors and blinds, powder, brooms, etc., is extensively carried on, both steam and water-power, the latter from the Truckee river, being employed in their behalf. The smelting works of the Nevada Land and Mining Company are also located at Reno, and the court-house and state prison are among the public buildings of prominence and importance. The population of the city was 5,000 in 1890.

RENT is classed in English law as an incorporeal hereditament, that is, a profit issuing out of a corporeal hereditament (see REAL ESTATE). A rent issuing out

of an incorporeal hereditament can only be possessed by the crown, or by a subject under statutory authority. Rent is said to lie in *render*, as distinguished from profits à prendre in general, which are said to lie in *prendre*. At the present day rent is generally a sum of money paid for the occupation of land.

Rents as they now exist in England are divided into three great classes—rent service, rent charge, and rent seck. A rent service is so called because by it a tenure by means of service is created between the landlord and the tenant. The service is now represented by fealty, and is nothing more than nominal. A rent charge is a grant of an annual sum payable out of lands in which the grantor has an estate. It may be in fee, in tail, for life, or for years. It must be created by deed or will, and may be either at common law or under the Statute of Uses. The grantor has no reversion, and the grantee has at common law no power of distress. Such power must have been given him by the instrument creating the rent charge. A rent seck (*redditus siccus*) is a rent charge reserved without power of distress. But, as power of distress for rent seck was given by 4 Geo. II. c. 28, the legal effect of such rent has been since the Act the same as that of a rent charge.

*Remedies.*—Rent is due in the morning of the day appointed for payment, but is not in arrear until after midnight. It should be demanded just before sunset. The landlord has besides distress his ordinary remedy by action. In addition special statutory remedies are given in the case of tenants holding over after the expiration of their tenancy.

*United States.*—Agricultural rents are, from the different position of the cultivators of the land, of less importance than in England. The law is in general accordance with that of England. The tendency of modern State legislation is unfavorable to the continuance of distress as a remedy. In some States, such as Ohio and Tennessee, it never existed. Fee farm rents exist in some States, like Pennsylvania, which have not adopted the Statute of *Quia Emptores* as a part of their common law.

REPLEVIN, in law, is a form of action by which goods which have been seized under an illegal distress are taken back (security being given to the amount for which the goods were distrained) and the action of replevin commenced to try the legality of the seizure. When the writ issues against the Sheriff it is served by the Coroner, he being the next highest legal officer in the county. Replevin is a form of action much used for the recovery of personal property illegally levied upon, and affords a ready remedy. The law of replevin was inherited from the English law, and the practice in this country and in England is nearly identical.

REPORTING. The curious among those who seek to trace political developments may, without any great strain on the imagination, find an intimate relation between the growth of newspaper reporting and the growth of democratic institutions; at any rate the two have always been found together. The history of reporting in Great Britain brings out the relationship with much clearness. There was no truly systematic reporting until the beginning of this century, and not until many years afterward did it grow to be a most important, if not the most important, feature in newspapers. There was parliamentary reporting of a kind almost from the time when parliaments began. Single speeches, and even some consecutive account of particular proceedings in parliament, were prepared. But long after newspapers were commonly published no effort had been made to give reports either of the pro-

ceedings of parliament or of those of any other assembly dealing with the public interests. The first attempts at parliamentary reporting, in the sense of seeking to make known to the public what was done and said in parliament, began in a pamphlet published monthly in Queen Anne's time called *The Political State*. Its reports were mere indications of speeches. Later, the *Gentleman's Magazine* began to publish reports of parliamentary debates. Access to the Houses of Parliament was obtained by Cave, the publisher of the magazine, and some of his friends, and they took surreptitiously what notes they could. These were subsequently transcribed and brought into shape for publication by another hand. There was a strict prohibition of all public reporting; but the *Gentleman's Magazine* appears to have continued its reports for some time without attracting the attention or rousing the jealousy of the House of Commons. The publisher, encouraged by the immunity from prosecution by parliament, grew bolder, and began in his reports to give the names of the speakers. Then he was called to account. The latest standing order on the subject at that time was one passed in 1728, which declared "that it was an indignity to, and a breach of, the privilege of this House for any person to presume to give, in written or printed newspapers, any account or minute of the debates or other proceedings; that upon discovery of the authors, printers, or publishers of any such newspaper this House will proceed against the offenders with the utmost severity." Under this and other standing orders, Cave's reports were challenged, as were those of other publishers in other magazines. They were denounced by resolution; and threats of prosecution were made, with the result that the reports appeared still, but without the proper names of the speakers, and under the guise of "Debates in the Senate of Lilliput" or some other like title. Long afterward, in the latter half of the century, the newspapers began to report parliamentary debates more fully, with the result that, in 1771, several printers, including those on the *Morning Chronicle* and the *London Evening Post*, were ordered into custody for publishing debates of the House of Commons. A long and bitter struggle between the House and the public ensued. John Wilkes took part in it. The lord mayor of London and an alderman were sent to the Tower for refusing to recognize the Speaker's warrant for the arrest of certain printers of parliamentary reports. But the House of Commons was beaten. In 1772 the newspapers published the reports as usual; and their right to do so has never since been really questioned. Both Houses of Parliament, indeed, now show as much anxiety to have their debates fully reported as aforesaid they showed resentment at the intrusion of the reporter. Provision has been made in the House of Lords and in the House of Commons for reporters. There are galleries in which they may take notes, and writing rooms in which those notes may be extended. In short, reporting is now one of the best marked of parliamentary institutions.

In the Congress of the United States the reporter is as necessary to the machinery of the body as are the committee clerks. The custom of publishing the proceedings of Congress has never been prohibited, but the establishment of an official organ for publishing the reports is of comparatively recent date. The reports, previous to the establishment of the *Congressional Record*, were printed in the *National Intelligencer*, and before that time in other newspapers in a desultory sort of way. The establishment for the printing of the *Record* will rival that of any of our great dailies. The work of composition begins usually in the afternoon or early in the evening, as the amount of matter may be small or

great, and all documents printed in the *Record* must be ordered to be printed in response to a request of leave so to do. The reports of various documents are furnished from different sources—committee clerks, and official reporters, and stenographers, all contributing to make up the issue. The publication is generally in pamphlet form, and is issued daily during the session of congress. The expenses of the publication are defrayed from appropriations made for the purpose, and the matter of superintendence falls under the care of the public printer.

Parliamentary reporting, important as it is, yet forms a small part of the reporting which is done by the newspapers. All the public expositions of our complicated and busy social and national system are reported with a fullness, and on the whole with an amount of accuracy, that are surprising. Every newspaper of importance has a more or less numerous staff of reporters at its command. In some cases papers have separate staffs in different parts of the country. It is the business of these gentlemen to report all that is worth reporting for their journal. But no newspaper is able to confine its reporting to events in its own neighborhood. It must give to the public full accounts of speeches of prominent public men, no matter where they are delivered. Sometimes a reporter is sent far away to do this work. But, for the most part, speeches of statesmen in different parts of the country are reported for newspapers at a distance by one or other of the news agencies which send down staffs of reporters for the work. In some cases all these modes of working are seen together—there are representatives of individual newspapers from far and near, and there are the staffs of the news agencies.

As a rule, reporters are shorthand writers. That became a necessity when the demand for reporting greatly increased, and when the very words of a speaker had to be given. But what is spoken of as verbatim reporting is in no sense the best. It is a necessity, but to a great extent is merely mechanical. The reporter has acquired dexterity in shorthand writing, and he can read his notes fluently. Far more is required for that better reporting which conveys to the public the full sense of what a speaker has said without giving all his superfluous words. This is an art which is not universally acquired by reporters. They have learned to depend so much upon their notes that they do not learn to exercise their brains. There is much reporting which shortens speeches by wholesale excisions rather than by judicious and intelligent compression. It would, however, be unjust to pass over the many proofs of high intelligence which the reporting in our newspapers contains. The task of the reporter is often not easy. He has, to use a familiar adage, to make many silk purses out of sows' ears; and he does it patiently and well—so well that the author of the material operated upon is often inclined to take all the credit to himself.

So far, the reporting which has been spoken of is that by which speeches and debates are produced in print for the public information. But there is another kind of reporting which ought not to be passed over. What is commonly called "descriptive reporting" has in some cases nearly shouldered the reporting of speeches out of newspapers. Is there a royal progress, or a military display, or a pageant of any kind—the descriptive reporter is called into requisition. He has to describe as best he can all that happens. It is a simple statement of fact to say that newspapers have on many occasions had word pictures from their descriptive reporters which have never been surpassed in prose writing for elegance and vividness and force. The special

correspondent is a "descriptive reporter." He goes to war to describe what he sees. The electric telegraph has made a great change in the manner and perhaps in the character of his work; but he is still among those who help in newspaper reporting.

Mention has been made of the connection of the electric telegraph with reporting; and it has been said that, since the telegraphs have been extended and telegraphing has been cheapened, the sphere of reporting has been widened and the demand for it has increased. No daily newspaper now confines its reporting to the affairs of the part of the country in which it is published. The electric telegraph brings the most distant places within easy reach of every newspaper. It has also made the work of the reporter more arduous and his responsibility greater. He cannot postpone the transcription of his notes to another day. The speech that is not finished in Chicago at midnight must be printed in full in the New York newspaper which goes to press before three o'clock in the morning. The meeting which does not finish at New Orleans till midnight must be reported in the next day's papers in Philadelphia. All this means that the reporter must work under great pressure, and that he must exercise the greatest care in extending his notes. He has no time for revision, no opportunity of amending any doubtful passage. When these drawbacks are considered, it will most likely be felt that the work of reporting is not easy. Yet its importance could not well be overrated. Reporting is the feature in the journalism of to-day which the public could least afford to lose. The editor of a newspaper may influence public opinion, but the reporter furnishes the material for its formation. Fair reporting is indeed a great security for freedom and for moderation. It enables all who can read to see the arguments for and against any proposal; it shows how public bodies discharge their duties; it indicates the wants and wishes, the hopes and fears of the public; it puts within easy reach the means of combating wild and foolish propositions, however superficially attractive they may be; in short, it makes the whole country an open council on all questions affecting the souls and bodies, the education and the government, of the people. It is but fair to add that reporting is done as a rule with great ability and fairness. The reporter rarely carries his likes or his dislikes into his work. He is scrupulously just, and as scrupulously impartial, though it may be that this is not always the opinion of some men who make speeches of which little is seen in the shape of reporting.

REPOUSSÉ. See METAL-WORK and PLATE.

REPRODUCTION. I. ANIMAL REPRODUCTION.

#### § 1. ASEXUAL REPRODUCTION.

As a general account of this process has already been given (see BIOLOGY), and the details of its occurrence in the various groups are described in the articles devoted to them (PROTOZOA, HYDROZOA, TAPEWORM, etc.), it suffices here to recall the very broadest aspect of the phenomena—that asexual reproduction is simply discontinuous growth, and that, as we make an ascending survey of the *Metazoa*, that simple form of discontinuous growth which we term asexual reproduction becomes more and more subordinated to, and at last wholly replaced by, that more differentiated or "sexual" form of reproduction characterized by the union of two heterogeneous cell-elements—never to reappear save in degenerate forms. See SEX.

#### § 2. SEXUAL REPRODUCTION.

In the lowest forms of animal life the process of sexual reproduction is found in its simplest imaginable expression unassociated with any of those complexities

which arise among the higher animals and plants. All that is to be observed is the growth of the reproductive organs, the maturation of their products, and the passive liberation of these—the fecundation of the ovum and the fate of the embryo being entirely left to the circumstances of the environment. In higher forms, however, not only does this process of maturation become more complex and of far more marked influence over the other functions of the organism, but the attraction of the sexes becomes distinct, and leads to new specializations of function and structure.

*Maturation.*—The maturation of the sexes acquires, as has been said, increasing definiteness in the higher forms, where it is associated with various characteristic accompaniments. The profound reaction of reproductive maturity upon the whole system is best marked in birds and mammals, and perhaps most of all in man.

Thus in a young male bird the circulation in the testes is greatly increased, and these organs increase greatly in size and weight and commence to develop spermatozoa. Meanwhile the “secondary sexual characters” of the adult—gayer plumage for alluring the female, or weapons for contest with other males—make their appearance, the voice and note may alter, and a marked increase of strength and courage may appear. Among mammals the changes are of similar order, the secondary sexual characters, of course, differing in detail. The minor changes at puberty in man, associated with the commencement of spermatogenesis are (beside the reflex excitation of erection due to the distension of the seminal vesicles, and the more or less periodic expulsion of their contents during sleep) the growth of hair on the pubic region, and later on the lower part of the face, and the rapid modification of the laryngeal cartilages, and the lengthening of the vocal chords, so rendering the voice harsh and broken during the change and ultimately deepening it by an octave. The marked strengthening of bones and muscles, and the profound physical changes which accompany the whole series of processes, are also familiar. See SEX.

The local and cellular activity within the ovary, which is the fundamental part of maturation in the female, is not less remarkable than that in the testes. That even in lower Invertebrates the enlargement and escape of the ova are part of a normal cellular rhythm is interestingly shown by their not infrequent relapse to the amœboid state, or by the fatty degeneration and death of ova which have not accomplished their destiny. The escape of ripe ova in the Vertebrate ovary is especially remarkable: each Graafian follicle, as it ripens, bursts, expelling its ovum; its cavity contracts; it is filled up by blood, of which the white corpuscles form a framework resembling connective tissue, in which the solids and corpuscles of the serum with coloring matter derived from the hæmoglobin of the latter are retained; and the whole constitutes the “corpus luteum,” which, should pregnancy occur, may persist and undergo further retrogressive changes, or otherwise gradually disappear.

The direct causes of this process of ovulation have been sometimes ascribed to the congestion of the blood-vessels of the ovary and to its own internal turgidity, or to the existence of a slight contractility of its stroma; it seems, however, rather to depend upon the growth and turgescence of the individual follicle. The question of the relation of ovulation to the process of copulation in the higher animals has also been much discussed. Though we certainly know that ovulation is of regular occurrence whether fecundation takes place or not, it seems that in many cases copulation is speedily followed by the liberation of ovum; nor is it difficult to see how the profound nervous and circulatory excitement asso-

ciated with the former process might accelerate the bursting of a follicle. Leopold has conclusively shown, however, that ovulation may also long precede impregnation.

In many forms it is not easy to see how the ova once liberated into the body-cavity find their way safely into the small opening of the discontinuous oviduct. In the frog, however, tracts of the peritoneal epithelium become ciliated, so propelling the ova in the right direction. In Reptiles, Birds, and Mammals the open end of the oviduct is widened and fringed, and lies close to or even touching the ovary; muscular fibers, too, are present, and more or less active movements of this dilated end over the ovarian surface have been alleged to occur. The oviduct once reached, the downward progress of the ovum is insured by the cilia of the epithelial lining, and probably also by peristaltic movements of its muscular coat.

*Menstruation.*—The process of menstruation (menses, catamenia), although from the earliest times the subject of medical inquiry, is by no means yet clearly understood. It occurs usually at intervals of a lunar month in all women during their period of potential fertility (fecundity), and, so far from being confined to the human species, has been observed at the period of “heat” in a large number of Mammals. Though thus clearly a normal physiological process, it yet evidently lies on the borders of pathological change, as evidenced not only by the pain which so frequently accompanies it, and the local and constitutional disorders which so frequently arise in this connection, but by the general systemic disturbance and local histological changes of which the discharge is merely the outward expression and result. The histological facts are briefly as follows: The mucous lining of the uterus consists of a loose vascular connective tissue covered by ciliated epithelium and containing numerous glands of clear alkaline secretion. This mucous lining before the outset of menstruation becomes loose and œdematous, its lymphatics being greatly distended; it thus thickens considerably, pressing against the cervix of the uterus. An extravasation of blood from the capillaries next takes place over the whole surface of the mucous layer, and the discharge is thus set up. This consists at first of blood largely diluted with the secretion of the uterine glands, but soon becomes mixed with detritus from the disintegration of the mucous coat, of which not only the general epithelial cells but those of the neck of the glands, and even part of the subjacent connective tissue, undergo fatty degeneration and fall off, occasionally even in a mass. After from three to six days the blood ceases to appear, and the lost epithelium is rapidly replaced, apparently by proliferation from the necks of the glands. By the ninth or tenth day the mucous coat is fully healed and the beginnings of the next menstrual process recommence.

The age at which the process commences varies with race and climate, with nutrition and growth, with habit of life (*e.g.*, with differences between town and country life), and with mental and moral characteristics. Of these, however, climate seems most important; thus, while in northern Europe the average age is reckoned at the beginning of the fifteenth year, in the tropics it seems to commence in the ninth or tenth. The cessation of menstruation usually takes place between the age of forty-five and fifty, and, somewhat as the secondary characteristics of female puberty coincide with its appearance, a less distinct reduction of these is associated with its close; in many cases secondary resemblances to the masculine type may supervene.

The old theories of menstruation were that it served to rid the system of impure blood, that it simply corresponded to the period of “heat” observed in lower

animals, or, later, that it was associated with ovulation—which indeed seems broadly to correspond with the end of the menstrual period. At present there may be said to be two rival theories. According to the first of these the process is viewed as a kind of surgical “freshening” of the uterus for the reception of the ovum, whereby the latter, during the healing process, can be attached safely to the uterine wall. The other view is exactly the reverse of this. Its upholders regard the growth of the mucous coat before the commencement of the flow as a preparation for the reception of an ovum, if duly fertilized, and the menstrual process itself as the expression of the failure of these preparations—in short, as a consequence of the non-occurrence of pregnancy. A decided majority of gynecologists appear to incline to the latter view.

We have noted above the importance of the copulatory process to secure fertilization of the ovum, and can thus readily understand its occurrence in the higher members of all the more complex animal groups. Though the result is in all cases the same, the process presents curious variations in principle as well as detail. Thus (*e.g.*) the hermaphrodite Earthworms become firmly attached by their characteristic thickened band of fused rings (*clitellum*). Among the higher Crustaceans the spermatozoa are conducted to the ova along the grooves of a modified pair of the appendages of the male, while in Insects the modifications of the posterior abdominal segments and their limbs for copulatory purposes are often extraordinarily complex and varied. In Spiders, again, the spermatic fluid is passed into a receptacle in the chela, and thence pushed into the cloaca. In the higher *Mollusca*, the complex copulatory apparatus of the Common Snail and the process of hectocotylization among the Cephalopods, so curiously analogous to the process in Spiders, are too familiar to need more than mention (see MOLLUSCA, CUTTLE-FISH). In many Fishes no copulatory process exists; thus in any of our Salmon rivers the male fish can be seen voiding the milt upon the ova after their deposition. In many Elasmobranchs a portion of the posterior pair of limbs, presenting very peculiar cartilaginous and glandular structures, though known as “claspers,” seems to be introduced into the cloaca during fertilization. But it is among Amphibians that we find the earliest trace of a true penis; a portion of the cloaca is distinctly eversible in Cæcilians; in Snakes and Lizards paired eversible processes arise from the posterior cloacal wall, while in Chelonians, Crocodiles, and most Birds it is the anterior wall which bears these processes. In Monotremes, too, the organ is distinctly double; in higher Mammals it is single; but the function is in all cases essentially the same. The nervous, muscular, and circulatory mechanisms of the process are described in works on human physiology.

*Gestation and Birth.*—While in the majority of lower forms the offspring leaves the parent as an unfertilized ovum, we have seen even among sponges the impregnation and development of the embryo in its primitive position, and thus almost from the outset of an ascending zoological survey we can recognize the passage from oviparous to viviparous forms. The Invertebrates, however, are mainly oviparous, despite a few exceptions, of which perhaps the most surprising and aberrant are that of *Entoconcha mirabilis*, which exhibits an ordinary Molluscan development within the body of its Holothurian host, and that in what resembles a special ovarian tube, but is really the body of its utterly degenerate parasitic parent. Among insects a certain degree of viviparous development may be reached; and this goes curiously far in the Dipterous Insect *Cecidomyia*, in which larvæ develop within the body of

their parents (themselves at the larval stage), the cavity of which they destroy and burst in order to become free. Thus within the same species there comes about exactly the stage of things in which the ova of a parasite develop at the expense of its host.

Among fishes viviparous birth occurs more commonly; in some Teleosteans the young develop within the ovaries; in many Sharks and Dogfish the development takes place within the oviduct, and in one case (*Mustelus lævis*) an actual placenta is formed by the interdigitation of folds of the yolk sac with those of the oviduct. Even the terrestrial Amphibians usually lay their eggs in water, yet in some types, notably the Alpine Salamander (*Salamandra atra*), development takes place within the oviduct. That this is a clear case of adaptation to the eminently terrestrial environment has indeed been well shown by experiments in which the young larvæ taken from the parent and transferred to pond water developed like ordinary Newts. To all such forms, viviparous in the sense of bringing forth their young alive, the somewhat confusing term “ovoviviparous” is often applied. Birds, and also reptiles, with few exceptions of which the *Ichthyosauria* seem to have presented a striking case, are oviparous; so too, as has been recently established by Caldwell, is the in all respects so curiously bird-like mammal *Echidna*. Its congener *Ornithorhynchus* probably agrees in this; but in Marsupials the embryo is not born until it has reached a comparatively advanced state of development, when it is transferred to the brood pouch or marsupium where the process is completed. In the remaining *Mammalia* intra-uterine development goes much farther, the nutrition of the embryo being, in absence of the abundant food yolk of lower forms, effected by the aid of a placenta analogous but not homologous to that of *Mustelus*, since developed, not from the yolk-sac, but from the allantois (see ANATOMY and MAMMALIA).

The physiological processes of birth show a similar rise in complexity—due chiefly to the increasing strain upon the parental organization which this progress in the nutrition and protection of the embryo during its development involves; for, while an ovum can be extruded by simple ciliary action; or at most by the gentle contractions of the oviduct, the expulsion of the relatively enormous Mammalian fetus involves mechanical difficulties of the most serious kind. And, besides these stresses and strains upon the pelvic basin itself or the muscular and connective tissues of the uterus, vagina, and its outlet, the inevitable rending asunder of the large closely interwoven and highly vascular placenta must evidently occasion an additional physiological disturbance.

*Parental Care*—Not to mention cases of mere concealment of the ova or construction of egg cases, the lowest forms exhibiting such parental care are probably certain Holothurians and Starfishes described by Sir Wyville Thomson during the voyage of the *Challenger*, in which the developing young are borne upon the dorsal surface of the parent. Many Crustaceans carry about their ova during development, and an Amphipod has been described as followed by its newly-hatched young like a hen by its chickens. The female Spider too, though ferocious toward the male, frequently spins a nest and shows some maternal solicitude; but such cases are far commoner among even the lower Vertebrates than the highest Invertebrates. Thus among Fishes the case of the nestbuilding Stickleback is especially familiar; some Siluroids and Lophobranchs (and usually the males) carry about their young—the latter in ventral pouches, the former in the mouth.

But the quaintest examples of care of offspring are

those presented by some of the Amphibians, notably by the Frog *Alytes obstetricans*, where the male winds the string of ova as laid round his body, sits in concealment until their development is sufficiently advanced, and then takes to the water, or in the grotesque Surinam Toad (*Pipa surinamensis*), where the male places the ova one by one in hollows in the loose skin of the back of the female, where they accomplish their development. Reptiles rarely show any care beyond at most burying their ova, but in Birds the evolution of parental care (no doubt associated with the need of high temperature for development) approaches the highest and most general evolution. The case of Mammalia is also too familiar to need any description; but there is evidently good ground for the idea (of late ably popularized by Miss Buckley) that the marked success of Birds and Mammals in the struggle for existence is to be attributed perhaps not less to their peculiar care of offspring than to any advance in organization.

## II. REPRODUCTION OF PLANTS.

The various modes by which plants are reproduced may be conveniently classified in two groups, namely, vegetative multiplication and true reproduction, the distinction between them being this, that, whereas in the former the production of the new individual may be effected by organs of the most various kinds, in the latter it is always effected by means of a specialized reproductive cell. This distinction will become apparent in the following discussion.

*Vegetative Multiplication.*—The simplest case of vegetative multiplication is afforded by unicellular plants. When the cell which constitutes the body of the plant has attained its limit of size, it gives rise to two; either by division or gemmation; the two cells then grow, and at the same time become separated from each other, so that eventually two new distinct individuals are produced, each of which precisely resembles the original organism. A good example of this is to be found in the gemmation of the Yeast plant. This mode of multiplication is simply the result of the ordinary processes of growth. All plant-cells thus grow and divide at some time of their life; but, whereas in a multicellular plant the products of division remain coherent, and add to the number of the cells of which the plant consists, in a unicellular plant they separate and constitute new individuals. In more highly organized plants vegetative multiplication may be effected by the separation of the different parts of the body from each other, each such part subsequently developing the missing members and thus constituting a new individual. This takes place spontaneously, and in a marked manner in Mosses. The main stem gradually dies away from behind forward; the lateral branches thus become isolated, and constitute new individuals.

The remarkable regenerative capacity of plant-members is largely made use of for the artificial propagation of plants. A branch removed from a parent-plant will, under appropriate conditions, develop roots, and so constitute a new plant; this is the theory of propagation by "cuttings." A portion of a root will similarly develop one or more shoots, and thus give rise to a new plant. An isolated leaf will, in many cases, produce a shoot and a root, in a word, a new plant; it is in this way that Begonias, for instance, are propagated. The production of new plants from the leaves occurs also in nature, as, for instance, in the so-called "viviparous" plants, of which *Bryophyllum calycinum* (Crassulaceæ) and many Ferns (*Nephrodium* [*Lastræa*] *Filix-mas*, *Asplenium* [*Athyrium*] *Filix-femina*, and other species of *Asplenium*) are examples. An interesting case of the vegetative development of new individuals from

other plant-organs is afforded by Strasburger's observations on *Cælebogyne ilicifolia*, *Funkia*, *Nothoscordum fragrans*, and Citrus; he found, namely, that in these plants, an adventitious formation of embryos takes place by budding from the tissue of the nucellus bounding the embryo-sac. But it is in the Mosses, of all plants, that the capacity for vegetative propagation is most widely diffused. Any part of a moss, whether it be the stem, the leaves, the rhizoids, or the sporogonium, is capable, under appropriate conditions, of giving rise to filamentous protonema on which new moss-plants are then developed as lateral buds.

In a large number of plants we find that provision is made for vegetative multiplication by the development of more or less highly specialized organs. In Lichens, for instance, there are the *soredia*, which are minute buds of the thallus containing both algal and fungal elements; these are set free on the surface in large numbers, and each grows into a thallus. In the Characeæ there are the *bulbils* or "starch-stars" of *Chara stelligera*, which are underground nodes, and the *branches with naked base* and the *pro-embryonic branches* found by Pringsheim on old nodes of *Chara fragilis*. In the Mosses small tuberous bulbils frequently occur on the rhizoids, and in many instances (*Bryum annotinum*, *Aulacomnion androgynum*, *Tetraphis pellucida*, etc.) stalked fusiform or lenticular multicellular bodies containing chlorophyll, termed *gemmae*, are produced on the shoots, either in the axils of the leaves or in special receptacles at the summit of the stem. *Gemmae* of this kind are produced in vast numbers in *Marchantia* and *Lunularia* among the Liverworts. Similar *gemmae* are also produced by the prothallia of Ferns. In some Ferns (e.g., *Nephrolepis tuberosa* and *N. undulata*) the buds borne on the leaves or in their axils become swollen and filled with nutritive materials, constituting bulbils which fall off and give rise to new plants. This conversion of buds into bulbils which subserve vegetative multiplication occurs also occasionally among Phanerogams, as, for instance, in *Lilium bulbiferum*. But many other adaptations of the same kind occur among Phanerogams, notably among annuals. Bulbous plants, for instance, produce each year at least one bulb or corm from which a new plant is produced in the succeeding year. In other cases, as in the case of the Potato, tubers are developed from subterranean shoots, each of which in the following year gives rise to a new individual. In other cases, again, as in *Dahlia*, *Thladiantha dubia*, etc., tuberous swellings are found on the roots, from each of which a new individual may spring.

*True Reproduction.*—It was mentioned above that the true reproduction of plants is effected by specialized cells; these cells may be generally designated *spores*. The structure of a spore is essentially this: it consists of a nucleated mass of protoplasm, inclosing starch or oil as reserve nutritive material, usually inclosed by a cell-wall. In those cases in which the spore is capable of germinating immediately on its development the cell-wall is a single delicate membrane consisting of cellulose; but in those cases in which the spore may or must pass through a period of quiescence before germination the wall becomes thickened and may consist of two layers, an inner, the *endospore*, which is delicate and consists of cellulose, and an outer, the *exospore*, which is thick and rigid, frequently darkly colored and beset externally with spines or bosses, and which consists of cutin. In some few cases among the Fungi multicellular spores are produced; these approximate somewhat to the *gemmae* mentioned above as highly specialized organs for vegetative multiplication. In some cases, particularly among the Algæ and also in some Fungi



(Peronosporæ, Saprolegniæ, Myxomycetes, Chytridiacæ), spores are produced which are for a time destitute of any cell-wall, and are further peculiar in that they are motile, and are therefore termed *zoospores*; they move, sometimes in an amœboid manner by the protrusion of pseudopodia, but more frequently they are provided with one, two, or many delicate vibratile protoplasmic filaments, termed *cilia*, by the lashing of which the spore is propelled through the water. The zoospore eventually comes to rest, withdraws its cilia, surrounds itself with a cell-wall, and then germinates.

Spores are developed in various ways, and a prefix is in many cases added to the word "spore" to indicate the nature of the process of development. Leaving details for subsequent discussion, we will now confine our attention to the main fact that all spores are developed in one or other of two ways, either *asexually* or *sexually*. In the former case a single reproductive organ gives rise to cells which are capable, each by itself, of developing into a new organism; such an organ is an asexual reproductive organ, and such cells are asexually produced spores. In the latter case the reproductive organs are such that they do not singly give rise to cells capable, each by itself, of developing into a new organism. These are sexual reproductive organs. In some instances the sexual organ does not give rise to reproductive cells at all until it has received into itself more or less of the protoplasmic contents of another different, at least physiologically, sexual organ; and the cells which it then produces are capable, each by itself, of developing into a new organism. In others the sexual organ produces reproductive cells without any such previous fusion of protoplasm, but the cells thus produced are incapable, each by itself, of developing into a new organism. Such cells are *sexual reproductive cells*. It is only by the fusion of two such cells, physiologically different, that a reproductive cell is formed which is capable of developing into a new organism. The fusion either of the protoplasmic contents of two different sexual organs or of two different sexual cells constitutes the *sexual process*. It may take place according to circumstances, either within the organs or, in those cases in which sexual cells are produced and are set free, externally to them. The resulting cells are sexually produced spores.

*Asexual Reproduction*.—Reproduction by means of asexually produced spores is common to nearly all families of plants. It is wanting, among the Algæ, in the Conjugatæ, the Fucaceæ, and the Characeæ, among the Fungi, in a few Peronosporæ (*Pythium vexans*, *Artotrogus*), in *Ancylistes Closterii*, in *Aplanes Braunii*, among the Saprolegniæ; and, among the Ascomycetes, in *Eremascus*, *Sordaria* (*Hypocopra*), *Ascobolus furfuraceus*, *Pyronema* (*Peziza*) *confluens*, *Gymnoascus*, the Collemaceæ, and most other Lichen-Fungi.

In the simplest case the spore is developed from a single cell of the plant, which surrounds itself with the characteristic thick wall. This occurs only in plants of low organization; *Nostoc* and *Bacillus* are examples of it.

In other cases the contents of the cell undergo division, each portion of the protoplasm constituting a spore. Examples of this are afforded, among unicellular plants, by *Yeast* and *Protococcus*, and in multicellular plants by the *Confervaceæ*, the *Ulvaceæ*, and some *Florideæ*.

In this case each cell, the protoplasm of which divides to form spores, may be regarded as a rudimentary reproductive organ of the nature of a *sporangium*. In more highly organized plants special organs are differentiated for the production of spores. In the majority of cases the special organ is a sporangium, that is, a hollow capsule in the interior of which the spores are developed. In the *Thallophytes* the sporangium is a single cell. In

the *Muscineæ* it is a multicellular capsule; in *Riccia*, in which the structure of the capsule is simple, the whole of the internal cells give rise by division to spores; in other *Liverworts*, and in the *Mosses*, in which the structure of the capsule becomes progressively more and more complex, a portion only of the internal cells give rise to spores. In the *Ferns*, *Equisetaceæ*, and *Lycopodiaceæ* the sporangium is multicellular, but simple in structure. This is true also in the *Rhizocarpæ* and in the *Ligulatæ* (*Selaginella*, *Isoetes*), but in these plants there is this peculiarity that there are sporangia of two kinds—some, namely, which produce one, or a few, large spores, *macrospores*, and are hence termed *macrosporangia*, and others which give rise to a large number of small spores, *microspores*, and are hence termed *microsporangia*. The *Phanerogams* also bear two kinds of sporangia, which have received special names:—the macrosporangium, which produces only one mature spore, is termed the *ovule*; the microsporangium, which produces a large number of microspores, is termed the *pollen-sac*. In some cases among the *Fungi* the spores are not produced in the interior of a sporangium, but are formed by abstriction. This occurs in some *Mucorini*, such as *Chætocladium*, in the *Ustilagineæ*, the *Entomophthoræ*, the *Peronosporæ*, the *Ascomycetes*, the *Rusts* (*Uredineæ*), and the *Basidiomycetes*.

These asexually produced reproductive cells are commonly spoken of simply as spores, but in many cases some addition has been made to the word, or an altogether different name is applied to them, in order to mark some peculiarity in their mode of origin, to indicate their order of development, or to assign them without periphrasis to a particular group of plants. Thus, as has been mentioned, *zoöspores* are motile spores unprovided, for a time at least, with a cell-wall; *stylospores* are spores which are developed, not in sporangia, but by abstriction as mentioned above; *tetraspores* is the name given to the spores of the *Florideæ* to denote the fact that four spores are produced by the division of the mother-cell. The *uredospores* of the *Uredineæ* are those which are produced during the summer, whereas the *teleutospores* of these plants are those which are formed in the autumn, at the end of the period of growth. It was the custom, at one time, to speak of the spores of *Fungi* as *conidia*; and at the present time the macrospores and the microspores of *Phanerogams* are better known as embryo-sacs and pollen-grains respectively.

The organs which give rise to the asexually produced spores are usually not confined to a particular part of the plant in the *Thallophytes*. Instances of this do, however, occur among the *Ascomycetous Fungi*—namely, in the *Pyrenomycetes*. Here the production of the stylospores takes place in definite receptacles known as *pycnidia*. In the vascular plants (*Pteridophyta* *Phanerogams*), the development of sporangia, speaking generally, is confined to the leaves. In many of the *Pteridophyta* the sporangiferous leaves do not differ in appearance from the foliage-leaves; but in other cases they undergo considerable modification, as in the *Equisetaceæ*, *Marsiliaceæ*, some species of *Lycopodium* and *Selaginella*, and notably in the *Phanerogams*. In the *Phanerogams* the modification is so great that the sporangiferous leaves have received special names; those which bear the microsporangia (pollen-sacs) are termed the *stamens*, and those which bear the macrosporangia (ovules) are termed the *carpels*. When the sporangiferous leaves are thus modified they are usually aggregated together, and such an aggregate of sporangiferous leaves constitutes a *flower*.

*Sexual Reproduction*.—In nearly all classes of plants above the *Protophyta* spores are formed by a sexual

process; and in those in which no such process can be detected its absence is due, not, as in the Protophyta, to the fact that sexuality has not yet been developed, but to its gradual disappearance. The phenomena of sexual reproduction will be most intelligently stated by tracing them in the different main divisions of the Vegetable Kingdom—the Algæ, the Fungi, the Archeogoniata, and the Phanerogams.

The protophytic Algæ are reproduced by asexually developed spores, but in some forms an indication is already given of the differentiation of these spores into sexual reproductive cells which takes place in the higher forms of the group. In *Protococcus*, for instance, zoöspores are produced, but the zoöspores are not all precisely similar. In some cases the protoplasm of the cell divides only once or twice, the result being the formation of two or four relatively large zoöspores, *macrozoöspores*; in other cases the protoplasm divides a greater number of times so that a considerable number of relatively small zoöspores, *microzoöspores*, are produced. Functionally these zoöspores are alike; they all come to rest, and form new *Protococci*. Among the *Confervoidæ*, which are more highly organized plants than the protophytic Algæ, we find forms, of which *Ulothrix* may be taken as the type, which likewise produce macrozoöspores and microzoöspores in their cells. The macrozoöspores of *Ulothrix* simply come to rest and germinate; they are distinctly asexual spores. The microzoöspores may also do this, but not unfrequently they coalesce in pairs; the product of fusion, the *zygospore*, as it is termed, then develops into a *Ulothrix* filament. This fusion of two similar reproductive cells—this conjugation, as it is termed—is one of the simplest forms of the sexual process; the zygospore is then a sexually produced spore, and the two cells which conjugate to form it are spoken of as *gametes*,—*planogametes* when they possess cilia, *aplanogametes* when they do not.

Comparing *Ulothrix* with *Protococcus*, we see that in both the macrozoöspores are sexual reproductive cells, whereas the microzoöspores of *Ulothrix* exhibit an imperfect sexuality; inasmuch as they may germinate without previous conjugation. The planogametes of *Ulothrix* are, however, to be directly connected with the microzoöspores of *Protococcus*; that is to say, the gametes are to be traced back to asexual spores. This is a point of fundamental importance.

REPSOLD, a family of German instrument makers. JOHANN GEORG REPSOLD was born at Wremen in Hanover on September 23, 1771, became an engineer and afterward chief of the fire brigade in Hamburg, where he started business as an instrument maker early in the present century. He was killed by the fall of a wall during a fire on January 14, 1830. The business has been continued by his sons Georg and Adolf and his grandsons Johannes and Oscar.

REPTILES. Ante-Linnæan writers comprised the animals which popularly are known as tortoises and turtles, crocodiles, lizards and snakes, frogs and toads, newts and salamanders, under the name of Oviparous Quadrupeds or four-limbed animals which lay eggs. Linnæus, desirous of giving expression to the extraordinary fact that many of these animals pass part of their life in the water and part on land, substituted the name of *Amphibia* for the ancient term. Subsequent French naturalists (Lyonnet and Brisson) considered that the creeping mode of locomotion was a more general characteristic of the class than their amphibious habits, and consequently proposed the scarcely more appropriate name of *Reptiles*.

As naturalists gradually comprehended the wide gap existing between frogs, toads, etc., on the one hand,

and the other oviparous quadrupeds on the other, they either adopted the name *Batrachia* for the former and that of *Amphibia* for the latter, or they restricted the term *Amphibia* to Batrachians, calling the remainder of these creatures Reptiles. Thus the term *Amphibia*, as used by various authors, may apply (1) to all the various animals mentioned, or (2) to Batrachians only—and thus it has been used in the article AMPHIBIA in the present work. The term Reptiles is used (1) by some for all the animals mentioned above, and (2) by others, as in the present article, for the same assemblage of animals after the exclusion of Batrachians. Other terms more or less synonymous with Amphibians and Reptiles in their different senses have been used by the various systematists, as we shall see hereafter.

Equally varying are the limits of the term "Saurians," which occurs so frequently in every herpetological treatise. At first it comprised living Crocodiles and Lizards only, with which a number of fossil forms were gradually associated. As the characters and affinities of the latter became better known, some of them were withdrawn from the Saurians, and at present it is best to abandon the term altogether.

#### GENERAL CHARACTERS OF THE CLASS REPTILIA.

Reptiles are vertebrate animals, the skin of which is covered with horny or bony plates (scales or scutes). The heart has two auricles, but with the ventricular chamber generally incompletely divided; two arterial trunks emerge from the right portion of the ventricle; the blood of the arterial and venous systems mixes either in the heart or at the origin of the aortic arches. Respiration takes place by lungs, never by bronchia; portions of the lungs are simple without minute subdivision of the cavity; and the respiratory movements are slow and irregular. In consequence, reptiles are cold-blooded. Their blood-corpuscles are red and nucleated. The thoracic and abdominal viscera are never separated by a complete diaphragm. The intestinal tract and the urogenital organs open into a common cloaca; the oviducts are developed from the Müllerian ducts, and dilated in their lower course for the reception of the ova; all reptiles are oviparous or ovoviparous.

The vertebral column articulates with the skull almost invariably by means of a single convex occipital condyle. The mandible consists of several distinct pieces, of which the articular bone articulates with a quadrate bone, interposed between skull and mandible. When the appendicular parts of the skeleton are present, the sternum is never replaced by membrane bone, and the posterior sternal ribs are attached to a median prolongation of the sternum. The ilia are prolonged farther behind the acetabulum than in front of it; the pubic bones directed downward and forward, and, like the ischia, forming a median symphysis. The metatarsal bones are not ankylosed among themselves or with the distal tarsal bone.

As in birds and mammals, the foetus of reptiles is inclosed in an amnion and allantois (*Amniota*), and nourished from the vitellus of the egg.

In some of the most important characters mentioned reptiles agree with birds, as in the presence of a single occipital condyle, a complex lower jaw articulated to the skull by a quadrate bone, and nucleated blood-corpuscles. The majority of naturalists, therefore, consider the two classes to constitute one of the main divisions of Vertebrates, the *Sauropsida*. At the present epoch, indeed, birds are strikingly differentiated from reptiles, but the discoveries within recent years of a number of extinct birds with reptilian characters offer ample evidence that Birds are descendants of

some branch or branches of the reptilian type, in which the power of flight was developed, and with it other anatomical peculiarities by which birds are now distinguished from living reptiles.

#### THE DIVISION OF REPTILIA INTO ORDERS.

We adopt here a serial arrangement of those orders which seem to be well established, having already referred to the attempts that have been made to arrange these orders into higher groups.

Order 1. *ICHTHYOPTERYGIA* (extinct). Marine reptiles with a cetacean-like naked body and with four limbs formed into paddles, the parts of which after the humerus are not differentiated as to form or function. Tail long. Vertebrae numerous, biconcave; no sacrum. Dorsal vertebrae with double tubercles; ribs movable, the anterior with bifurcate heads. Head large, with long powerful snout, joined to the trunk without neck. Quadrate bone immovably articulated to squamosal. A foramen parietale is present. Orbits very large with a circle of sclerotic plates. A pair of clavicles rest upon an interclavicle and pass laterally to the scapulae; a pair of broad not overlapping coracoids form the posterior part of the pectoral arch. A sternum is replaced by a series of abdominal splints.

Fam. *a. Sauranodontidae*. Edentulous. Genus: *Sauranodon*, from the Jurassic formations of the Rocky Mountain region.

Fam. *b. Ichthyosauridae*. Teeth numerous, implanted in a common alveolar groove. Genus: *Ichthyosaurus*, from Mesozoic strata up to the Chalk.

Order 2. *ANOMODONTIA* (extinct). Lacertiform reptiles, the skull and four limbs of which are Lacertilian in most of their characters. Vertebrae biconcave, four or five of them anchylosed together and forming a sacrum. The tubercular and capitular articulations are separated, the former and longer being on the diapophysis, the latter and shorter on the centrum; ribs movable, the anterior with a bifurcate head. Os quadratum suturally connected with the skull. A foramen parietale is present. Jaws Chelonian and probably cased in horny sheaths; either edentulous or each maxillary bone was armed with a long ever-growing tusk, which sometimes was accompanied by other smaller teeth. The pectoral arch consisted of scapula and coracoid, but a clavicle seems to have been absent. Pelvis very strong, with continuous ischio-pubic symphysis.

Genera: *Dicydonon*, *Galesaurus*.

Order 3. *DINOSAURIA* (extinct). This comprises reptiles of a great diversity of form and size, some adapted for a terrestrial, others for an aquatic life, some carnivorous, the majority herbivorous, but all distinguished by characters leading more or less closely from the Reptilian up to the Avian type. The majority of trunk vertebrae have flat or slightly concave articular ends, sometimes a few of the anterior are convex in front; cervical vertebrae numerous; a sacrum is formed by more than two coalesced vertebrae. Neural arches united to the centra by sutures. Thoracic ribs movable, with a bifurcate head; cervical ribs united to the vertebrae either by suture or anchylosed. Os quadratum suturally connected with the skull. The premaxillary bones are separate, and the rami of the lower jaw united in front by cartilage only. Form of the teeth variable; they are not anchylosed to the bone. Two pairs of limbs are present, of which the hinder pair is the longer and larger, and generally ambulatory. The structure of the pelvis and hind limbs partly Ornithic; the pelvic bones are not coalesced with each other or with the sacrum; the pubis enters into the formation of the acetabulum, and the ilium is prolonged forward in

front of the acetabulum; ischia united in a median ventral symphysis. The head of the femur is placed at a right angle to the condyles; tibia with a procnemial crest, and a ridge for the fibula, which is complete. The proximal row of tarsals is formed by the astragalus and calcaneum only, and the former sometimes anchylosed with the tibia, thus forming the upper portion of the ankle-joint.

Order 4. *ORNITHOSAURIA* (extinct). Reptiles with the fore limb adapted to support a flying membrane, and with the remainder of the skeleton secondarily modified for aerial progression. Vertebrae not numerous, procœlous; from three to six forming a sacrum; cervical vertebrae exceeding in size the others. No neuro-central suture. Anterior ribs with bifurcate heads. Skull large, bird-like, with long jaws. Os quadratum suturally connected with the skull. Orbits very large, with a ring of sclerotic plates. Sternum broad, completely ossified, with a median crest anteriorly. Scapula and coracoid slender, bird-like; no clavicle. Phalanges of the ulnar digit exceedingly elongate. Pelvis weak; hind limb smaller than fore limb. Bones generally hollow, many with pneumatic foramina.

Fam. *a. Pterosauria*. Jaws toothed; scapula and coracoid separate. Genera: *Pterodactylus*, *Rhamphorhynchus*, *Dimorphodon*, from Jurassic formations of Europe; of small or moderate size.

Fam. *b. Pteranodontia*. Edentulous; scapula and coracoid solidly united, the former articulating with the common neural spine of the vertebrae. Genus: *Pteranodon*, from Cretaceous strata of Kansas; specimens with a spread of wing of some twenty feet.

Order 5. *CROCODILIA*. Reptiles with lizard-like body, and long powerful tail adapted for swimming. Limbs short, especially the anterior; five digits in manus and four in pes; only three of the digits are clawed. A dermal armor, consisting of flattened bony scutes, covers the back, and in some genera the abdomen. Teeth in a single row, implanted in distinct sockets. Nostrils generally at or near the end of the snout. Vertebrae with the neuro-central suture persistent. Two sacral vertebrae only. The majority of the cervical and trunk ribs double-headed, attached to the diapophysis and centrum of the vertebrae. From seven to nine of the anterior dorsal ribs are united with the sternum by sternal ribs. Bones of the skull very solid, firmly united by sutures, as is also the quadrate bone. Heart with a double ventricle. Copulatory organ single, situated in the cloaca.

Fam. *a.* (or suborder) *Proœalia*. With procœlous vertebrae. All living genera and the extinct forms down to the Chalk belong to this division.

Fam. *b.* (or suborder) *Amphicœlia*. With amphicœlous vertebrae. All the genera are pre-cretaceous: *Teleosaurus*, *Goniopholis*, *Streptospondylus*, *Steganolepis*, *Galesaurus* (?), *Belodon*.

Order 6. *SAUROPTERYGIA* (extinct). Marine reptiles with long neck, small head, long tail, natatory limbs, and a naked skin. Hind and fore limbs identical in structure and form, transformed into cetacean-like paddles with five digits, which were composed of numerous phalanges and inclosed in a common skin. Teeth in a single row in both jaws, implanted in distinct sockets. Vertebrae amphicœlous, with the neuro-central suture persistent; single-headed ribs are attached to the long diapophyses of the dorsal vertebrae. Sacral vertebrae two. Quadrate bone suturally united with the skull. A parietal foramen. No sclerotic ring. Neither sternal ribs nor sternum are present; but a system of free abdominal ribs is developed. The pectoral arch consists of a pair of large coracoids, meeting in the median

line, and clavicular elements extending from one scapula to the other. Pelvis large, with the ilia, pubes, and ischia not coalesced, and all sharing in the formation of the acetabulum.

These characters may not fully apply to all the genera which have been referred to this order, as some are known from their skulls or other fragments only.

The best known are the PLESIOSAURIANS (*q.v.*) proper—*Neusticosaurus*, from the Trias, with paddles in front and ordinary limbs behind; gigantic forms from the Trias, as *Nothosaurus*, *Simosaurus*, *Pistosaurus* or post-Triassic, as *Plesiosaurus*, and *Pleosaurus*, *Polycotylus*, and *Elasmosaurus* (or *Discosaurus*) from the Lias and Chalk.

Order 7. RHYNCHOCEPHALIA. Lacertiform reptiles, with four limbs. Vertebrae with flat ends; two in the sacrum; the tubercular and articular surfaces are united; ribs single-headed. Os quadratum suturally united with the skull and pterygoid; an osseous infra-temporal bar. Foramen parietale present. Sternum and a system of abdominal ribs well developed. Copulatory organs absent; urinary bladder present.

One recent genus: *Hatteria*. Represented in the Upper Cretaceous and Lower Eocene by *Champsosaurus*, in the Trias by *Rhynchosaurus*, *Hyperodapedon*, and in the Permian by *Proterosaurus*, *Sphenosaurus*, *Telerpeton* (?), *Saurosternum* (?).

Order 8. LACERTILIA. Lizards. Vertebrae generally procœlous, with short or rudimentary transverse processes; sacral vertebrae not exceeding two; ribs single-headed. Os quadratum articulated with the skull. Parts of the aliand orbito-sphenoid regions fibro-cartilaginous. Temporal region without, or with only one, osseous bar. Limbs four, two, or absent; when they are present, a sternum with sternal ribs and a pelvis are developed. Copulatory organs paired; urinary bladder present. Integuments with horny or sometimes bony scutes.

For the numerous recent genera see LIZARDS. Distinguishable representatives of the order appear first in Jurassic formations and thence downward to our period: *Acrosaurus*, *Ardeosaurus*, *Pleurosaurus*, *Saphiosaurus*, *Atoposaurus*, and *Homœosaurus* from the Oölite; *Nuthetes*, *Saurillus*, *Macellodon* from the Wealden; *Dolichosaurus*, *Acteosaurus*, *Coniosaurus*, *Rhaphiosaurus* from the Chalk. From Tertiary formations in Europe numerous small remains are known, while those described from Australia belonged to much larger forms, showing more or less affinities to the lizards of the present Australian fauna.

A distinct division of this order includes the extinct Mosasaurians, which are, in fact, the Pinnipedes among Lacertilians. Their limbs, of which they had two pairs, are transformed into paddles; by their long snake-like body and large size the marine reptiles form the nearest approach in nature to the modern creature of imagination, the "Sea-Snake." There is no question that they deviate more from the Lacertilian type than any of the other fossil forms mentioned above, especially in some of their cranial characters, which are more Ophidian. Hence Cope placed them into a distinct order of reptiles, *Pythonomorpha*. Their body was covered with osseous scutes.

Besides *Mosasaurus*, remains of which have been known and described since the year 1766, a number of other genera from Cretaceous rocks of Europe and North America have been distinguished by Owen, Cope, Marsh, and Dollo: *Liodon*, *Clidastes*, *Sironectes*, *Platecarpus*, *Baptosaurus*, *Diplotomodon*, *Edestosaurus*, *Holosaurus*, *Lestosaurus*, *Tylosaurus*, *Pterycollasaurus*, *Plioplatecarpus*.

Order 9. OPHIDIA. Snakes. Vertebrae procœlous

extremely numerous; no sacrum; ribs single-headed. No chevron bones on any of the vertebrae. Not only the quadrate bone is movably articulated to the skull, but also the suspensorium and the bones of the palatal maxillary apparatus are movable; brain capsule entirely osseous. No quadrato-jugal arch. No foramen parietale. Rami of the mandible united by ligament. No trace of anterior extremities, and posterior only sometimes rudimentally indicated. Copulatory organs paired; urinary bladder absent. Integuments folded into regularly arranged scales.

For the numerous recent genera see SNAKES. Fossil forms are scarce, and do not appear before the Eocene (*Laophis*, *Palœophis*, *Paleryx*).

Order 10. CHELONIA. Tortoises and turtles. Cervical and dorsal vertebrae not numerous. The dorsal vertebrae and expanded ribs (with the exception of *Sphargis*), are united into a carapace, the elements of which are immovable, and which is completed ventrally by a number of dermal bones, a true sternum being absent and replaced by a plastron. All the bones of the skull are suturally united, with the exception of the mandible and hyoid; the dentary portion of the mandible consists of one bone only. Pectoral arch consisting of the scapula, with which the precoracoid is united, and the coracoid. Clavicles are represented by the anterior elements of the plastron. The pelvis consists of the usual bones, but is not attached to a sacrum. Two pairs of limbs. No teeth, these being replaced by horny sheaths of the jaws. Copulatory organ single. Integuments consisting of horny scutes covering the carapace, and of scales and tubercles on the soft parts.

For the numerous living genera see TORTOISES. Remains of extinct tortoises are found from the Trias downward, but they do not show any approximation to some other reptilian type, or indicate a successive development. The most generalized type, *Sphargis*, is not older (according to present evidence) than some of the more specialized genera, its earliest representative being the remarkable *Protostega* from North-American cretaceous formations. Some of the Tertiary fossils exceeded in size the largest of living forms, such as the Himalayan *Colossochelys*, the German *Macrochelys*, the North-American *Atlantochelys*.

#### THE ANATOMY OF REPTILES.

As the principal features known of the anatomy of extinct reptiles have been sufficiently noticed in the several separate articles devoted to them, this chapter will deal almost exclusively with the general structure of living forms.

Inasmuch as the class of reptiles is one of the classes which make up that great primary zoölogical division known as "vertebrate animals," they of course possess all those structural characters which are common to that division (see VERTEBRATA). They also possess in common a certain number of structures which they share with birds (see SAUROPSIDA), and which will be indicated in our notice of the different sets, or systems, of organs which compose the bodies of the animals of which this article treats.

Every reptile has a body made up of a head, a trunk, and a tail, though, as in some *Lacertilia* and many *Ophidia*, these regions are not marked off one from another by any constriction or noticeable alteration of diameter. The posterior aperture of the alimentary tube always marks the termination of the trunk and the commencement of the tail. In some kinds of reptiles—as, *e.g.*, in the genera *Anguis* and *Amphisbæna* among the *Lacertilia*, and in such forms as *Typhlops* and *Uropeltis* among the *Ophidia*—the whole body consists of little more than a very elongated trunk with a small

head at one end and a short or even quite rudimentary tail at the other.

REPUBLICAN PARTY.—The Republican party must be held to date its origin as a national organization from June 18, 1856, the day on which the first national convention known as Republican, met in Philadelphia. That convention was composed of delegates selected under a call of a widespread character. It invited to its counsels all who opposed the repeal of the Missouri Compromise, all who opposed the extension of slavery into the territories, all who favored the admission of Kansas as a free State—all in effect who opposed the dominant faction of the Democratic party. To this convention came anti-slavery Whigs, Free-Soilers, Abolitionists, Knownothings, and Democrats who could not stomach the dictation of the Southern wing of their party. The platform adopted denied the right of Congress or any Territorial legislature to legalize slavery in any territory of the United States, blamed the Pierce administration for the attempt to force slavery upon Kansas, and demanded the immediate admission of Kansas as a free State. It pronounced against polygamy, advocated the construction of a Pacific railroad by government aid, favored appropriations for river and harbor improvements, and in general terms declared for the Constitution, the rights of the States and the perpetuation of the Union.

The Convention completed its work by placing in nomination for President and Vice-President respectively, John C. Frémont, "the Pathfinder," and William L. Dayton, of New Jersey. The Democratic convention nominated James Buchanan, of Pennsylvania and John C. Breckinridge of Kentucky. The American or "Knownothing" party nominated Millard Fillmore, of New York and A. J. Donaldson, of Tennessee. The Democratic nominees carried 19 States out of the 31 then included in the Union, the Republicans carried 11, and Maryland supported the Knownothing ticket. Buchanan had 174 electoral votes, Fremont 114, Fillmore 8. All the slave States and five of the free States went Democratic, but Buchanan failed to obtain a majority of the popular vote, and had the Knownothing ticket been out of the way it is more than probable that the new party would have swept the field at its first essay in politics.

Just before Buchanan's inauguration the Supreme Court of the United States, through Chief Justice Taney, rendered a decision in the famous case of Dred Scott. Although the Chief Justice did not say, as it is often alleged that he did say, that "a negro had no rights which a white man was bound to respect," he and the majority of the Court held that negroes were property, that they could be carried into territories of the United States at the will of their owners, and that their possession like that of other chattels must be protected to the owner. The issue of this decision gave great satisfaction to the Southern Democrats, and equally incensed the anti-slavery sympathizers of the North. Among these were many Democrats. There were many men also, who while content to recognize slavery in the States where it had so long prevailed, were absolutely opposed to its extension north of the limits fixed by the Missouri Compromise. The battle over the admission of Kansas was a long and bloody one. New England sympathizers with abolition sent men, money and arms into the Territory; Missourians of pro-slavery tendencies resisted them by force and fraud. The pro-slavery men carried a Territorial constitution with a slavery provision in it, and the Free-Soilers sought to outwit them by organizing as a State. Congress, then Democratic in both branches,

refused to admit Kansas as a State under the "free" clause, and President Buchanan declared in favor of the Lecompton (pro-slavery) constitution and urged Congress to admit Kansas as a State under that document. The people of Kansas, however, by a majority of over 10,000 decided not to avail themselves of this offer, and it was not until 1861, when the secession of the Southern representatives left Congress with a Republican majority in both houses, that Kansas was finally admitted as a free State.

As the time for choosing a successor to Buchanan approached the situation became intensified. The Democratic party [see Democratic Party, Vol. iv., page 1974] split on the slavery question, and at the Convention held in Charleston, S. C., in April, 1860, a break in the ranks occurred. The Southern delegates stuck by the Dred Scott decision; the Douglas element supported the "Squatter Sovereignty" idea of their leader. In the result two Democratic tickets were placed in the field, Douglas and Johnson representing the Northern wing, who were content to leave the question of slavery in the Territories to the people of those territories, while Breckinridge (then Vice-President) and Joseph Lane, of Oregon, stood for the Southern and pro-slavery element.

The Republican nominating convention met at Chicago and placed in nomination Abraham Lincoln, of Illinois and Hannibal Hamlin, of Maine. The platform reasserted that of 1856, pronounced decidedly against the extension of slavery in the Territories, and favored a protective tariff. The election resulted in the success of the Republican ticket. In addition to the candidates named the "American" party placed in nomination John Bell, of Tennessee, and Edward Everett, of Massachusetts. These candidates succeeded in carrying 3 States—Virginia, Kentucky and Tennessee, with 39 electoral votes. Douglas got 3 votes from New Jersey and 9 in Missouri. Breckinridge obtained 72 votes of the slave States, and Lincoln carried every free State, except that he lost 3 votes in New Jersey. As far as the popular vote was concerned Lincoln had nearly 500,000 more than Douglas, but 350,000 less than the combined Democratic vote. The Bell ticket polled nearly 600,000 votes. The Democrats still had control of Congress and it was not until after the secession of the Southern members that the Republicans obtained control of the legislative department.

Lincoln assumed office March 4, 1861, when eleven States had practically gone out of the Union. The moribund Congress had proposed a resolution providing for non-interference with slavery, but this, although recommended anew by the new President, was lost with everything else of a pacific or compromise character in the echoes of the cannon-shot at Fort Sumter. When the Southern Senators and Representatives withdrew from Congress the Republicans attained a control which they held for thirteen years. The history of the Civil War and of the period of reconstruction is the history of the Republican party during those years. That history is told elsewhere [see article on UNITED STATES in Vol. x.] and we can only note here the special political features.

The Thirty-seventh Congress (March, 1861, to March, 1863) was called upon to deal with exigencies never contemplated when its members were chosen. Its successor, also strongly Republican, bore up the hands of Lincoln, who in June, 1864, received a renomination by the Republican National Convention. By this time it had become evident that slavery was the cause and constituted the strength of the Rebellion, and that to suppress the latter it was absolutely necessary to abolish

the former. Lincoln's notification of September, 1862, had been followed by the Emancipation Proclamation of January 1, 1863, which "freed the slaves where it could not get at them." But as a war measure it proved itself what Lincoln styled it, "a fit and necessary war measure in suppressing said rebellion." In May, 1864, the Senate passed the Thirteenth Constitutional Amendment (that abolishing slavery), but the measure did not obtain the necessary two-thirds vote in the House and went over to the next Congress. In December, 1865, it was adopted by twenty-seven States and was incorporated in the organic law.

The National Convention of the Republican party which renominated Mr. Lincoln in 1864, named Andrew Johnson, the energetic military governor of Tennessee, as vice-president. The Convention demanded the complete extirpation of slavery and pronounced against any form of compromise with those in arms against the government. The Democratic Convention, which met at Chicago in August, 1864, nominated George B. McClellan, of New Jersey, and George H. Pendleton, of Ohio, and raised the direct issue with the Republicans by declaring the war a failure. They demanded a cessation of hostilities and a convention of the States for the purpose of restoring peace "on the basis of the Federal Union of the United States."

The people of the United States (eleven States then in rebellion not voting) pronounced emphatically in favor of the Republican policy. Lincoln received 212 electoral votes from twenty-two States; McClellan got the twenty-one votes of New Jersey, Delaware and Kentucky. On the popular vote Lincoln had a majority of over 400,000.

The accession of Andrew Johnson to the presidency after the assassination of Mr. Lincoln brought about a fierce conflict between the executive and the legislative branches of the government. Backed by a two-thirds majority in both Houses the Republicans passed over the presidential veto the freedmen's bureau bills, the civil rights bill, the tenure of office bill and the several measures of reconstruction, and finally they impeached Johnson before the Senate and came within an ace of securing a conviction. Their failure to accomplish this end was due to the action of a few of their own men, who ranked with the ablest of their party, and who paid for their self-assertiveness by the sacrifice, in some cases at least, of their political future.

In 1868 the Republican party chose as its standard-bearer the most successful general of the Civil War, Ulysses S. Grant, and associated with him on the ticket Schuyler Colfax, of Indiana, formerly Speaker of the House of Representatives. The Republican platform indorsed the policy of reconstruction which had been inaugurated, and practically the campaign was decided on the war issues. The Democratic party named Horatio Seymour, of New York, and Francis P. Blair, of Missouri, and denounced the reconstruction measures as a failure. Grant received 214 of the 294 electoral votes (three States not voting), and had a popular majority of over 300,000. During his first administration the Fifteenth Constitutional Amendment was adopted and by this the negroes were granted every right of citizenship.

The opposition to the re-election of General Grant in 1872 took the shape of an outside movement. A good deal of opposition had been shown inside the Republican ranks to the reconstruction policy, and the evils of "carpet-bag" government in several of the Southern States had been impressed upon many good Republicans. A gathering of the disgruntled was held at Cincinnati under the guise of a "Liberal Republican" Convention, and this body nominated Horace

Greeley, an old-time Whig and Abolitionist, and B. G. Brown, of Missouri, on a platform of general forgiveness and hopeful trust. The Democratic Convention adopted both candidates and platform, but a great many straight-out Democrats repudiated their action. In the result Grant received 2.6 electoral votes out of a total of 352, and as Mr. Greeley died before the electoral colleges met the sixty-six votes given in six States for him were scattered. Henry Wilson, of Massachusetts, was chosen vice-president on this occasion. In 1872 occurred the CREDIT MOBILIER (*q. v.*) exposures and the "salary grab" act was passed. There was a good deal of trouble in the South during General Grant's second term over the conflicting claims of rival State governors and legislatures. In 1874 the Democratic party secured a majority in the Lower House of Congress, which they held uninterruptedly until March, 1881.

The Republican National Convention, which met at Cincinnati in June, 1876, approved the legislation of previous Republican administrations, took strong ground in respect to the enforcement of the constitutional amendments, declared the United States to be "a nation, not a league," and indorsed civil service reform. Rutherford B. Hayes, of Ohio, and William A. Wheeler, of New York, received the nominations. The Democracy met at St. Louis, denounced the tariff, made some promises of reform and economy, and nominated Samuel J. Tilden, of New York, and Thomas A. Hendricks, of Indiana. The fight was a close one. The Democratic candidates carried the "Solid South" (South Carolina, Florida and Louisiana disputed) and in the North had New York, New Jersey, Indiana and Connecticut—a total of 184 electoral votes certain, and one less than the necessary majority. The Republican managers claimed 185 votes, including those of the three Southern States mentioned, and finally by the award of the Electoral Commission [See UNITED STATES, Vol. x., page 6029] Mr. Hayes was declared elected. During his administration the resumption of specie payments was effected. He experienced considerable difficulty in his relations with Congress and during his administration the divisions in the Republican party became marked. The "stalwart" wing objected strongly to the methods of Mr. Hayes and much feeling was displayed in the choice of delegates to the convention called to nominate a candidate in succession to him. This convention, which was held at Chicago, was marked by incidents of an exciting and dramatic character. The friends of General Grant undertook to present his name for a third term and made a strong fight on his behalf. John Sherman and James G. Blaine were also prominent candidates, and in the end a compromise candidate was found in the person of General James A. Garfield, of Ohio, many years prominent in Congress and then United States Senator-elect from his State. With him was associated Chester A. Arthur, of New York, the representative of the "stalwart" division. The platform included a protective tariff plank, while the Democrats advocated a "tariff for revenue only." They placed in nomination General Winfield S. Hancock, of Pennsylvania, and William H. English, of Indiana. The Republican candidates received 214 electoral votes; the Democrats 155. Garfield had a plurality of 7,018 of the popular vote over Hancock, but there was a Greenback-Labor ticket in the field, which polled over 300,000 votes. The House of Representatives became Republican at this election, thus giving that party entire control of the government. President Garfield was shot by a crazy politician in July following his inauguration and died three months later. Mr. Arthur, who succeeded him, did something

toward reconciling the warring factions within the party, but failed to receive a renomination. The National Convention, which met at Chicago in June, 1884, nominated James G. Blaine, of Maine, for president, and John A. Logan, of Illinois, for vice-president. The Republican platform declared for a protective tariff and otherwise was a repetition of previous utterances. The Democratic party nominated Grover Cleveland, of New York, and Thomas A. Hendricks, of Indiana, on a platform of tariff for revenue only. Disaffection among New York Republicans lost Blaine a number of votes and Cleveland carried the State by a few hundreds. The vote of New York was once more decisive and in the electoral colleges Cleveland had 218 votes; Blaine 182. The South voted solidly Democratic. Cleveland's popular vote was 23,000 more than that of Blaine. The House of Representatives became Democratic.

During the administration of Mr. Cleveland the Republican party retained control of the Senate and were thus enabled to prevent the Democratic members of the House from redeeming their pledges in regard to tariff reform legislation. In 1888 the Democratic National Convention re-indorsed their tariff policy and renominated Cleveland, with Allen G. Thurman, of Ohio, for vice-president. The Republican convention met at Chicago, nominated Benjamin Harrison, of Indiana, and Levi P. Morton, of New York, and declared for a protectionist policy. The Republicans carried every northern State with the exception of New Jersey, and secured the election of Harrison by 233 electoral votes against 168 given for Cleveland. The House became Republican (as the Senate already was), and so remained until the elections of the fall of 1890 completely reversed the conditions and returned an overwhelming Democratic majority to the Fifty-second Congress, the principal reason for this popular revolt being the passage of a new high-tariff measure, championed by Mr. McKinley, a Republican member from Ohio.

**REPUDIATION.** It has happened at certain times in the history of many countries that a course of public policy has been adopted, either on account of bad internecine government or costly foreign war, which has resulted in the nation concerned contracting large obligations in excess of its ability to pay. With nations as with individuals the temptation to avoid present trouble at the risk of future liability; to remove an existing financial unpleasantness by incurring one which posterity is to share in, is almost irresistible.

When an individual or a trading corporation amenable to the laws of a state finds himself or itself in straits of this character, there is a remedy known as bankruptcy. The State, through its courts, steps in, realizes the effects of the trading concern which has come to a stop, pays the creditors such a dividend as may be left after the expenses of administration have been met, and so that particular trading firm drops out of existence. But nations cannot be dealt with in this way. There is no international court of bankruptcy to divide their assets among their creditors, and in the natural course of things there never can be. Nations have a decided antipathy to being wiped out, and would resist to the death the enforcement of any such form of international bankruptcy law. It is true that in Egypt the two great powers of France and England stepped in and announced that they would administer the affairs of that country for the benefit of its creditors—most of whom were either English or French. But such a course is only practicable where no active national life exists; could never be adapted to a free people; and even in the case quoted France has withdrawn from the dual

control, and England, after an expenditure of many millions, would only be too glad to let go if she could.

The nation, therefore, which can neither pay, borrow more to go on with, nor be absolved by law, has but one resource, and that is repudiation. When France, after its expulsion of the elder branch of the Bourbons, established a republic and brought upon itself the task of defending its territory against united Europe, the rotten fabric fell. A system of irredeemable paper money based on the confiscated lands of the aristocrats and the church, was tried, but, like all panaceas of its kind, the remedy proved worse than the disease. In the result the old debt of France was wiped out, for the whole forces of the earth would not have sufficed to collect it. After the reconstitution of France under Napoleon I. its credit was established by the wisdom of its rulers and the thrift of its people, and to-day, although the national debt of France is enormous, it is all owed to its own people, and its credit ranks with the highest. Great Britain has always paid its debts and the interest thereon, and its national debt is far lower, and its credit higher than that of any other nation of its strength. Meantime, Russia, Austria, Spain, Portugal, Turkey, the new kingdom of Italy, not to speak of the minor states of Europe and the world, have gone on increasing their debts at a rate which leaves no room for hope of the avoidance of an ultimate general crash. In the case of some of the states quoted, and in that of many of the South American Republics, repudiation in whole or in part has been already made. The word has an ugly sound, but so have the words "usurious interest," and it is entirely true that those who advanced money to such states as stand in the delinquent list, advanced a good many thousand millions less than the face value of their claims, and did so on the poorly-guaranteed promise of extortionate interest.

What has been said of the status of such of the great powers of Europe as have honestly met their obligations, applies with even more force to the republic of the United States. For many years it grew in strength, scarcely disturbed by foreign troubles, and at the outbreak of the great Civil War its indebtedness was less than the municipal indebtedness of many a great city of to-day. The war came, and it cost thousands of millions to bring it to a successful conclusion. Much of this money was borrowed at high rates of interest. There was a question raised, to which the indefiniteness of some of the contracts gave a color, as to whether the cheap money borrowed should be paid back in dear money, but fortunately the good sense of the people united with their instinct of fairness, and the United States met its creditors with an honest one hundred cents on the dollar. Since the war the debt has been so reduced that its burden is as nothing, and the stability thus given to the public credit is seen in the fact that the rate of interest has been reduced one-half, while the bondholders obstinately decline to take money offered to them in full of their claims, or to surrender their bonds until they are fully matured.

In considering the partial repudiation by some of the individual States of the Union of their public indebtedness, there are some interesting points to note. We have said that nations, unlike individuals, cannot be sued or adjudicated upon as bankrupts. Independent nations, however, can be compelled by foreign powers to carry out obligations incurred to the citizens of such foreign powers, the compelling force being commercial reprisals or war. But the federated States of the Union cannot be individually attacked in this way, while under the eleventh amendment to the constitution citizens of their own or of other States cannot sue a State in the United States courts. There is therefore

an absence of the means of enforcement which places contracts between such States and their creditors on a somewhat different footing to those made by, for instance, the European powers, or the independent South American republics. Somewhat early in the history of the Republic certain of the States failed to meet, temporarily, at least, the payment of the interest on loans made to them. The commercial depression which followed 1837 brought about this consequence, although it could not justify it. Pennsylvania repudiated in part in 1842, but afterward paid up in full. Maryland in the same year suspended payment upon a debt of \$12,000,000 contracted for internal improvements, but she also straightened matters out later. Mississippi, Michigan, and Louisiana refused payment of certain claims, but in each case it was because of an alleged informality of some kind.

The so-called repudiation by certain of the Southern States since the Rebellion is susceptible of another name. The war left them bankrupt and desolate, while the extinction of slavery had ruined individual property owners. In several of the States the "carpet-bag" legislatures contracted indebtedness at ruinous rates of interest, voted vast sums in aid, or on pretense of aiding, railroads, and in many cases these loans were, to say the least, of a collusive if not fraudulent character. When the people of South Carolina again acquired control of their own affairs they found themselves confronted by an empty treasury and an enormous debt. They were forced to repudiate—that is, they repudiated the action of their unfaithful legislators, who had held the offices which they abused against the will of the people. In several instances, as in Georgia, Florida, and Louisiana, the courts decided against the validity of the bonds. Louisiana asserted the unconstitutionality of certain issues, and North Carolina repudiated \$12,000,000 of railroad bonds on the ground of collusion. South Carolina ascertained its true indebtedness so far as possible, and scaled it to fifty cents on the dollar. But in this case the validity of the consolidated bond then issued was afterward questioned. In Virginia the chief trouble grew out of the fact that a great portion of her territory had been violently separated from her without provision being made for a partition of the debt between the two divisions. West Virginia declined to pay any part, and Virginia made a provision for funding what she held to be her quota. Subsequently the coupons of these bonds were practically repudiated, and for a long time the re-adjusters, repudiators, and other divisions kept up their fight over the disputed debt.

REQUENA, a town of Spain, in the province of Valencia, forty-one miles to the west of that city on the road to Cuenca, occupies a strong position near the river Oleana in the rocky mountainous district called Las Cabrillas separating Valencia from Castile. The population of the municipality in 1877 was 13,527.

REQUISITION is the name applied to the demand made by the Governor of one State on the Governor of another State of a common confederation for the surrender of a criminal who has committed a crime in the one and escaped to the territory of the other. The essence of a successful requisition is that the crime for which the criminal is claimed shall be an offense against the laws of both States. The relations of the different States of the American Union are such to each other that the requisition exists merely by comity, and not by right, the same degree of independence existing between the States in this regard as exists between independent nations. In a limited degree, the same rule of action as regards honoring a requisition applies also. In numerous instances calls have been made by the executive of a State upon the executive of another for the

surrender of an alleged criminal, and the calls not complied with. An important doctrine in connection with the requisition is that a person shall not be taken from a State on one charge and then tried for another. He shall only be tried on the charge specified in the warrant or indictment accompanying the requisition papers. In case of requisition, the warrant of arrest and indictment (if there be one made) must invariably accompany the requisition papers, which must bear the official seal of the secretary of the commonwealth demanding custody of the alleged criminal. Any irregularity in these details will infallibly lead to the discharge of a person so held, if the case be brought before a court on a writ of *habeas corpus*. For procedure in analogous cases between two nations, see EXTRADITION.

RESERVOIR. Any receptacle for storing up for use a fluid is commonly called a reservoir, although there is no reason why the term should be so limited, as the meaning is simply a place of reserve. For its ordinary use see WATERWORKS.

RESHAL, *i.e.*, RABBENU SHELOMOH LORIA (or Luria, *vulgo* Lurye), was one of the famous "Five Sages" (Rabbis) of the sixteenth century. He was chief rabbi of Lublin, where he died in 1573.

RESHD. See RASHT.

RESINA, a town of Italy, six miles southeast of Naples and practically a southern continuation of Portici, is well known as the usual starting place for tourists on their way up Vesuvius, and as the nearest town to the buried city of Herculaneum. It had 13,626 inhabitants in 1881 (commune 15,593).

RESINS. A resin is a secretion formed in special resin canals or passages of plants, from many of which, such as, for example, coniferous trees, it exudes in soft tears, hardening into solid masses in the air. Otherwise it may be obtained by making incisions in the bark or wood of the secreting plant. Resin can also be extracted from almost all plants by treatment of the tissue with alcohol, and it is formed by the oxidation of essential oils, many authorities being of opinion that all true resins, which are in chemical composition oxidized hydrocarbons, result primarily from the action of oxygen on essential oils. Resinous substances are further produced by the dry distillation of numerous organic compounds and by the drying of fatty drying oils. Certain resins are obtained in a fossilized condition, amber being the most notable instance of this class, and African copal and the kaurie gum of New Zealand are also procured in a semi-fossil condition.

The following are the principal resins:

I. *Copalline or Varnish Resins*:—African Copal or Gum Animé; Mexican Copal, from *Hymenea* sp.; Brazilian Copal, from *Hymenea* sp. and *Trachylobium Martianum*; Piney Resin, or White Dammar, *Vateria indica* and *V. acuminata*; Sal Dammar, *Shorea robusta* and other species; Dammar of *Hopea robusta*; Black Dammar, from *Canarium strictum*; Mastic, *Pistacia Lentiscus* Lac; East Indian Dammar; Kaurie or Coudie Resin, *Dammara australis*; Sandarach, from *Callitris quadrivalvis*; Dragon's Blood.

II. *Soft or Oleo-Resins*:—Manila Elemi, from *Canarium commune*; Mexican Elemi, *Amyris elemifera*; Brazilian Elemi, *Icica Icicariba* and other sp.; Tacamahac (American); *Elaphrium tomentosum*; Tacamahac (East Indian), *Calaphyllum Inophyllum*; Wood Oil, *Dipterocarpus turbinatus*; Chian Turpentine, *Pistacia Terebinthus*; Turpentine, Common Frankincense, and Thus from various *Coniferæ*; Balsam of Canada, *Abies canadensis*.

III. *Fragrant Oleo-Resins and Gum-Resins*:—Myrrh, *Balsamodendron Myrrha*; Bdellium or Googul, *Balsamodendron Roxburghii*; Balsam of Gilead or



Mecca Balsam, *Balsamodendron Berryi*; Olibanum or Frankincense, *Boswellia Carteri*, etc.; Benzoin *Styrax Benzoin* and *Balsamodendron Mukul*; Solid Styrax, *Styrax officinalis*; Liquid Storax, *Liquidambar orientalis*; Balsam of Peru, *Myrospermum periferum*; Balsam of Tolu, *Myrospermum toluiferum*; Labdanum or Ladanum, *Cistus creticus*, var. *labdaniferus*.

IV. *Fetid Gum Resins*.—Ammoniacum, *Dorema ammoniacum*; Asafoetida, *Ferula Narthex* and *F. Scorodosma*; Galbanum, *Ferula galbaniflua* and *F. rubri-caulis*; Opoponax, *Opoponax Chironium*; Sagapenum, *Ferula* sp.; Sarcocol.

V. *Medicinal Resins*.—Gamboge, *Garcinia* sp. Guaiacum, *Guaiacum officinale*; Euphorbium, *Euphorbia resinifera*; Balsam of Copaiba, *Copaifera officinalis*.

VI. *Extract Resins* form a class of products principally important from a medicinal point of view. They embrace Scammony from *Convolvulus Scammonia*, Jalap Resin from *Ipomea Jalapa*, Podophyllum Resin from *Podophyllum peltatum*, Churrus from Indian Hemp (*Cannabis sativa*), Cubeb Resin from *Cubeba officinalis*; and many other medicinal products owe their virtues to resinous bodies present in them.

**RESPIRATION.** The continued existence of an amœba in a pool of water, or of a white blood-cell in the *liquor sanguinis*, depends upon a continual interchange of substances between the organism and the surrounding medium. The substances in question pass from the medium into the organism in a certain chemical form; they pass from the organism into the surrounding medium with their chemical form modified. Regarding merely the initial and final stages of this reconstitution of chemical form, we may speak of it as being of the nature of an oxidation. This view does not profess to be comprehensive; nevertheless, it is true that the metabolic and anabolic processes of cells, taken as a whole, resemble combustion at least to this extent that oxygen and oxidizable carbon take part in them, and that carbon dioxide results from them. Partly as a matter of tradition, and partly as a matter of convenience, physiologists have described the introduction of oxygen into the organism and the emission of carbon dioxide from it as the complementary portions of one process of *respiration*. Although such a combined consideration is not strictly philosophical, inasmuch as it leaves out of view the introduction of the carbon into the organism, yet it is extremely convenient because the two processes referred to do in all classes of the animal kingdom from the highest to the lowest, involve the same organs and tissues in their performance. Respiration may, therefore, be defined as the aggregate of those processes which are concerned in the introduction of oxygen into the system and the escape of carbon dioxide from it.

Respiration in the higher animals may therefore be divided into (1) internal respiration, or the interchange of oxygen and carbon dioxide between the cells of the body and the fluid drenching them, and (2) external respiration, or the gaseous interchange taking place in the special respiratory organs (lungs, gills). The first is really a part of NUTRITION (*q.v.*); the second, or respiration proper, is the subject of the present article.

#### THE MOVEMENTS OF RESPIRATION.

##### *Structure of the Organs of Respiration.*

In order to understand the movements it is necessary first to know the structure of the air passages and thorax.

**Anatomy of the Air Passages.**—The essential organs of respiration consist of an air tube called the *trachea*, communicating at its upper end with the mouth and bifurcating below into two *bronchi*, one on the right hand and one on the left. Each bronchus divides and

subdivides, diminishing in calibre at every division until a diameter of about  $\frac{1}{40}$  is attained; such a diminutive bronchial tube is called a *bronchiole*. Every bronchiole is a cylindrical tube which divides dichotomously and rapidly several times, and finally terminates in irregular *alveolar passages*. The sides of the alveolar passages, and of the subdividing bronchioles in less abundance, are studded with hemispherical dilatations called air cells or *alveoli*. The terminal portion of an alveolar passage, with its air cells, is sometimes spoken of as an *infundibulum*—a term we may wisely forget at once, since it points to a distinction where no essential difference exists. The alveoli cluster in great abundance about the alveolar passages, and, although we have spoken of them as hemispherical, they are in reality made polygonal by mutual compression. They are surrounded by connective tissue of a very elastic quality, which gives to their delicate walls a firm support, and is so disposed about them that all the alveoli derived from one bronchiole are more closely knit together than they are bound to those of a neighboring bronchiole; hence we may speak of a bronchiole with the assemblage of its members as a *lobule*, a term of peculiar importance since it will be evident on reflection that each lobule contains all the essential parts of a lung—is in fact a lung in miniature. By connecting tissue the lobules are compacted to form lobes, of which two on the left side and three on the right go to make up the respective lungs.

The blood-vessels of the lung are of two sorts, nutritive and functional, *i.e.*, concerned in the function of the organs. The former are called *bronchial*, and arise from the aorta or intercostal arteries. They serve to nourish the tissues of the lung, and the blood they contain finds its way, in part into the bronchial veins and thence into the vena azygos, intercostal vein, or superior vena cava, and in part into veins of the functional system. The latter system of vessels consists of the *pulmonary arteries*, which arise in the right ventricle and run through the lung substance *pari passu* with the bronchial tubes to the lobules. Here they branch into a dense network of capillaries which spread over the outside of the alveoli, enmeshing them so tightly as to indent their walls. From the capillaries the blood flows into pulmonary venules which run together to form the large *pulmonary veins*, which open into the left auricle. The pulmonary venules may anastomose freely, but the arteries never do so. The veins possess no valves.

The lymphatic vessels of the lung abound in all parts, but are usually described as having a threefold distribution—(a) in the layer of tissue beneath the membrane investing the whole lung, (b) in the perivascular tissue, and (c) in the peribronchial tissue. When fine carbon particles are introduced into the alveoli of the lung they find their way with the greatest ease into the inter alveolar tissues, and finally come to lie in the three positions just referred to, as may be demonstrated in the lung of any coal miner. The lymphatics of the membrane investing the lung communicate with the free surface of that membrane by means of openings not unlike the stomata of leaves.

The lungs, with the heart and great vessels, are the chief organs contained in the thorax, or that division of the great body cavity which lies above the diaphragm. Each lung is invested with a membrane called *pleura*, which plays a most important part in the mechanism of respiration.

**The Thorax.**—The chest or thorax is formed by the dorsal section of the *spinal column* behind, with the *ribs* that spring from it on each side, and the *sternum*, which lies between the end of the ribs, in front. The

ribs, speaking generally, are bowed with their concavity turned toward the interior of the chest; and if we consider the plane of each rib, *i.e.*, that plane in which the arched rib would (approximately) lie flat, we shall find that it declines from the horizontal in a twofold manner—first, the rib-plane slopes from behind downward and forward, and, secondly, it slopes on each side from the mesial plane of the body downward and outward. The ribs 1–7 are connected with the sternum by means of pieces of cartilage, which really form the anterior portion of each rib arch; these ribs are called “true”; the eighth, ninth and tenth ribs are united by cartilage, not to the sternum, but to the cartilages of the seventh, eighth, ninth and tenth ribs respectively; these ribs are called “false;” the eleventh and twelfth ribs are called “floating” because they are unattached anteriorly. Each rib has a *head*, by which it is joined to the vertebral bodies constituting the spinal column; a *tubercle* or shoulder at a little distance away from the head, by which, in all cases, except those of the tenth and eleventh ribs, it is joined to the transverse process of a vertebra; an *angle* or rough line a little beyond the tubercle, where the rib, rather suddenly, begins to sweep forward; and a *neck*, the part intervening between the head and tubercle. The space between the ribs is filled up by two layers of muscles, called *intercostal*—an outer or superficial layer, whose fibers run from above downward and forward, and a deeper internal layer, whose fibers cross those of the former. The outer layer is not found between the costal cartilages in front, nor the inner layer between the costal necks behind. The upper opening of the thorax is filled by the windpipe blood-vessels and other structures passing into or out of the thorax. The floor of the thorax is formed by

*The Diaphragm.*—This consists of a thin arched muscular partition, whose fibers spring from the edge of the lower opening of the thorax and converge toward a sheet of tendon in the center, which is shaped somewhat like a trefoil leaf. We may group the muscular fibers of the diaphragm according to the quadrant from which they spring:—(1) a vertebral portion, whose fibers stretch down to be attached in two well-marked columns or pillars to the bodies of some of the lumbar vertebræ and by tendinous arches to the transverse processes of the first lumbar vertebra and the twelfth rib; (2) a sternal portion, which springs from the back of the tip of the sternum, and from the sheath of the rectus abdominis muscles below it; (3) and (4) two lateral or costal portions, which spring from the lower edge of the thorax all round from the tip of the twelfth rib to the junction between the sixth and seventh costal cartilage where the sternal portion begins. The whole diaphragm forms a dome or cupola projecting so far into the thorax that the lateral vertical portions of the dome lie in close apposition to the walls of the thorax. The top of the dome is somewhat flat and the right moiety of the top is on a higher level than the left, the highest point corresponding with the level of the junction of the right fifth rib with the sternum.

*Other Muscles of Respiration.*—The ribs are movable in the sense that each rib plane, which has been described as declining in two ways from the horizontal plane, may be made to approach the horizontal, and may afterward return to its original position. To accomplish these movements various muscles are provided, the exact position of which need not be very fully described. Suffice it to say that in general they arise from the vertebral axis, or from some extra-thoracic fixed point, and take hold of the movable parts of the thorax in such a manner that they can pull them up or pull them down.

*Dimensions of the Thorax.*—The circumference of

the chest just below the level of the arms is about thirty-four and one-fourth inches in men, and thirty-two inches in women. At the level of the tip of the sternum it is thirty-two and thirty and one-third inches respectively. The measurement from clavicle to lower edge of thorax varies very much in different cases. The transverse diameter above the nipple is about ten to ten and one-half inches in men, and about nine and one-half to nine and three-fourths inches in women. The antero-posterior diameter, measured from the spines of the vertebræ behind to the surface of the chest in front is in the upper part of the chest about six and one-half inches, and in the lower seven and one-third inches. The right half of the chest is generally somewhat larger than the left, because its muscles are usually better developed.

*Normal Respiration.*—If the naked body of a person asleep or in perfect inactivity be carefully watched, it will be found that the anterior and lateral walls of the chest move rhythmically up and down, while air passes into and out of the nostrils (and mouth also if this be open) in correspondence with the movement. If we look more closely we shall find that with every uprising of the chest walls the membranous intercostal portions sink slightly as if sucked in, while at the same time the flexible walls of the abdomen bulge as if protruded by some internal force. If respiration be in the slightest degree hurried these motions become so marked as to escape the attention of no one. The elevation of the chest walls is called *inspiration*, their depression *expiration*. Inspiration is slightly shorter than expiration, and usually there is a slight pause or momentary inaction of the chest between expiration and the following inspiration. Apparatuses for measuring the excursion of a given point of the chest wall during respiration are called *thoracometers* or *stethometers*. Apparatuses for recording the movements of the chest are called *stethographs* or *pneumographs*.

*Frequency of Respiration.*—The frequency of respiration during perfect rest of the body is 16 to 24 per minute, the pulse rate being usually four times the rate of respiration; but the respiratory rhythm varies in various conditions of life. The following are the means of many observations made by Quetelet: at the age of one year the number of respirations is 44 per minute; at 5 years, 26; from 15 to 20 years, 20; from 25 to 30, 16; from 30 to 50, 18.1. Muscular exertion always increases the frequency of respiration. The higher the temperature of the environment the more frequent is the respiration. Bert has shown that with higher atmospheric pressures than the normal the frequency of respiration is diminished while the depth of each inspiration is increased. The frequency of respiration diminishes until dinner time, reaches its maximum within an hour of feeding, and thereafter falls again; if dinner is omitted, no rise of frequency occurs. The respiratory act can be interrupted at any stage, reversed, quickened, slowed, and variously modified at will, so long as respiration is not stopped entirely for more than a short space of time; beyond this limit the will is incapable of suppressing respiration.

*Depth of Respiration.*—The depth of respiration is measured by the quantity of air inspired or expired in the act; but the deepest expiration possible does not suffice to expel all the air the lungs contain. The following measurements have been ascertained, and are here classified according to the convenient terminology proposed by Hutchinson. (1) *Residual air*, the volume of air remaining in the chest after the most complete expiratory effort ranges from 100 to 130 cubic inches. (2) *Reserve or supplemental air*, the volume of air which can be expelled from the chest after an ordinary

quiet expiration, measures about 100 cubic inches. (3) *Tidal air*, the volume of air taken in and given out at each ordinary respiration may be stated at about twenty cubic inches. (4) *Complemental air*, the volume of air that can be forcibly inspired over and above what is taken in at a normal inspiration, ranges from about 100 to 130 cubic inches. By *vital capacity*, which once had an exaggerated importance attached to it, is meant the quantity of air which can be expelled from the lungs by the deepest possible expiration after the deepest possible inspiration; it obviously includes the complemental, tidal, and reserve airs, and measures about 230 cubic inches in the Englishman of average height, *i. e.*, 5 feet 8 inches (Hutchinson). It varies according to the height, body, weight, age, sex, position of the body, and condition as to health of the subject of observation.

*Certain Concomitants of Normal Respiration.*—If the ear be placed against the chest wall during ordinary respiration we can hear with every inspiration a sighing or rustling sound, called “vesicular,” which is probably caused by the expansion of the air vesicles; and with every expiration a sound of a much softer sighing character. In children the inspiratory rustle is sharper and more pronounced than in adults. If a stethoscope be placed over the trachea, bronchi, or larynx, so that the sounds generated there may be separately communicated to the ear, there is heard a harsh to-and-fro sound during inspiration and expiration which has received the name of “bronchial.”

In healthy breathing the mouth should be closed and the ingoing current should all pass through the nose. When this happens the nostrils become slightly expanded with each inspiration.

*Composition of Air in the Air Cells.*—The whole of the air of the lungs is not expelled at each breath, some remaining in the depths as residual air lodged in the alveoli or air cells. Hence we cannot assume, from an examination of expired air, that we know the constitution of the air in the recesses of the lungs where it comes most intimately into contact with the blood. To attain such knowledge it is necessary to examine the deeper air directly, and the air is obtained for such purposes by means of a lung catheter. In this way it has been ascertained that the alveolar air of a dog's lung contained about 3.8 per cent.  $\text{CO}_2$  at a time when the expired air contained about 2.8 per cent. As to the amount of O we may safely assume that the alveolar air never in ordinary circumstances contains less than 10 per cent. when the expired air contains 16 per cent.

During twenty-four hours an average person would take in about 10,000 grains of oxygen in respiration, and give out about 12,000 grains of carbon dioxide, corresponding to 3,300 grains of carbon; at the same time nine ounces of water would be exhaled. These quantities vary, however, within wide limits according to the conditions of age, sex, atmospheric pressure, and the like. Thus, for example, in young persons the O absorbed is relatively greater than the  $\text{CO}_2$  given off, and a child gives off twice as much  $\text{CO}_2$  in relation to its body weight as an adult. Again, males after the first few years of life give off more  $\text{CO}_2$  than females. When the external temperature is so low as to depress the body temperature, less  $\text{CO}_2$  is given off; if it is so high as to raise the body temperature, the  $\text{CO}_2$  is increased. If, however, the surrounding medium is cooler than the body but not cold enough to lower the body temperature, more O is taken in, and more  $\text{CO}_2$  is given out; and *vice versa*. Muscular exercise also increases considerably the  $\text{CO}_2$  given off; and more  $\text{CO}_2$  is given off a short time after a meal than during fasting, especially when the meal includes substances rich in car-

bon. Speaking generally, alcohols, ethers, tea, etc., diminish the  $\text{CO}_2$ ; but the results are not constant. Again, while the number and depth of the respirations do not influence the formation of  $\text{CO}_2$  in the body, they affect the removal of that which is already formed. Increased rate of respiration and increased depth of respiration both cause an absolute increase in the quantity of  $\text{CO}_2$  expired, although with reference to the total amount of air which passes into and out of the lungs during such labored breathing the  $\text{CO}_2$  is relatively diminished. Lastly, when the atmospheric pressure is diminished, as in ballooning, respiration becomes difficult,  $\text{CO}_2$  is imperfectly removed from the body, and the blood contains less O. When pressure is increased, respiration is easy and slow (2-4 per minute), the capacity of the lungs increases, the activities of the tissues are marked, and as a result of this more O is absorbed and more  $\text{CO}_2$  is excreted.

We may now consider the physical conditions of the blood in the lungs. Venous blood is hurried into the capillaries surrounding the air cells; much of its hæmoglobin has been “reduced” (or deprived of its dissociable oxygen), and, further, it is rich in carbon dioxide, which it has obtained from the active tissues in distant organs. In the alveolar walls it comes into relationship with the air of the alveoli; probably these are filled with air which never contains less than 10 per cent. of oxygen, and which (in the dog, be it remembered), contains 3.8 per cent. of  $\text{CO}_2$  at a time when the expired air contains 2.8 per cent. Are these conditions such that, owing to the physical laws described, oxygen must pass into the blood, and carbon dioxide out of it? First, as regards the oxygen. An atmosphere containing 10 per cent. of oxygen implies a partial O-pressure of 76 mm. of mercury (10 per cent. of 760 mm.); as this is far above the dissociation point (25 mm.) of oxyhæmoglobin, it is clear that any reduced hæmoglobin present would greedily absorb oxygen from such an atmosphere. When the air breathed is much rarefied, the case is different; the partial O-pressure in the alveoli may be so far reduced that the absorption of O by the blood becomes most difficult or impossible. As regards the carbon dioxide the matter is not so clear; but, inasmuch as air drawn from the depth of the lung by means of a catheter contains (in a dog) 3.8 per cent. of  $\text{CO}_2$ , while at the same time the venous blood of the right side of the heart possesses a  $\text{CO}_2$  tension of approximately the same percentage, we may assume that  $\text{CO}_2$  escapes from the pulmonary capillaries into the alveoli until equilibrium ensues. It is, however, conceivable that the epithelium of the air cells may assist the elimination of  $\text{CO}_2$  from the blood by a process of true excretion independently of the above merely physical considerations.

When the entrance of air to the lungs is entirely prevented the phenomena of dyspnoea and asphyxia begin to appear. At first respiration is deeper and more frequent than usual (dyspnoea), the extraordinary muscles being called into play in both inspiration and expiration; the heart beats more quickly at first, but afterward more slowly; this is the *first stage*. It is succeeded by the *second stage*, in which the violence of respiration is less marked, although the coördination of the act is more irregular; indeed toward the end of the stage respiratory movements merge in general convulsions of the whole body. Throughout this stage expiration is more marked than inspiration, and the pressure of the blood in the blood-vessels is very great. The *third stage* is one of exhaustion, which supervenes suddenly, and is marked by loss of consciousness, dilated pupils, and absence of the powers of reflex action. The animal seems dead, except that at long intervals feeble inspiratory gasps

occur. Finally there comes one great inspiratory effort: the mouth is fixed wide open, the head thrown back, the body arched backward, the nostrils dilated, and the pulse after a second or two is indistinguishable (asphyxia). The whole series of events lasts from three to five minutes if the interruption to the entrance of air has been absolute. After death the right side of the heart, with the vessels immediately opening into it, viz., the venæ cavæ and veins of the neck and the pulmonary artery, are engorged with black blood containing little or no oxy-hæmoglobin. The left side of the heart and the systemic arteries are contracted and empty. All these phenomena are best explained by the known power of venous blood to stimulate the nervous centers. As the blood becomes more and more venous it stimulates more powerfully the great nerve-centers of the medulla oblongata. The respiratory center is stimulated, especially its expiratory portion; and, finally, the whole muscular centers of the spinal system are excited, causing general convulsions. The vaso-motor center is stimulated, causing the rise of blood-pressure in the early stage. The slowing of the heart during the close of the first and second stages is due to stimulation of the vagus cardio-inhibitory center in the medulla. Finally the centers become exhausted from the impurity of the blood bathing them, and their activity fails altogether.

RESTIF, NICOLAS EDME, called RESTIF DE LA BRETONNE (the form RETIF, though occasionally used by the author himself, and adopted by M. Monselet, has the less authority), was born at Sacy in the present department of the Yonne, France, on October 23, 1734. He was apprenticed to a printer at Auxerre, and, having served his time, went to Paris. It was not till five or six years after his marriage that Restif appeared as an author, and from that time to his death on February 2, 1806, he produced a bewildering multitude of books (amounting to something like 200 volumes, and many of them printed with his own hand) on almost every conceivable variety of subject. The most noteworthy are *Le Pied de Fanchette*, a novel (1769); *Le Pornographe* (same date), a plan for regulating prostitution which is said to have been actually carried out by the emperor Joseph II.; *Le Paysan Perversi* (1774), *La Vie de Mon Père* (1779), a really remarkable monument of filial piety; *Les Contemporaines* (forty-two vols., 1780-85), *Ingénue Saxancour*, also a novel (1789); and lastly, the extraordinary autobiography of *Monsieur Nicolas* (sixteen vols., 1794-97); in which at the age of sixty he has set down voluminously his remembrances, his notions on ethical and social points, his hatreds, and above all his numerous or innumerable loves real and fancied. In 1795 he received a gratuity of 2,000 francs from the government, and just before his death Napoleon gave him a place in the ministry of police, but which he did not live to take up. He died in 1806.

RESTOUT, JEAN, French painter, born at Rouen, March 26, 1692, was the son of Jean Restout, the first of that name; and of Marie M. Jouvenet, sister and pupil of the well-known Jean Jouvenet. In 1717, the Royal Academy having elected him a member on the work which he had executed for the Great Prize, he remained in Paris, instead of proceeding to Italy, exhibited at all the salons, and filled successively every post of academical distinction. He died on January 1, 1768. His works, chiefly of vast size—altarpieces—were much engraved by Cochin, Drevet, and others, his diploma picture may still be seen at St. Cloud.

RESTOUT, JEAN BERNARD, son of the above, was born at Paris, February 22, 1732, and died in the same city on July 18, 1797. In 1758 he won the Great Prize, and on his return from Italy was received into the Acad-

emy. Roland brought him into notice by appointing him keeper of the Garde Meuble, but this piece of favor nearly cost him his life during the Terror: he was cast into prison and was only saved from the guillotine by the reaction of Thermidor. The St. Bruno painted by him at Rome is in the Louvre.

RETFORD, EAST, a market town and borough of Nottinghamshire, England, is situated on the Idle and on the Great Northern and Manchester, Sheffield, and Lincolnshire Railways, thirty-six miles north-east of Nottingham by rail, and eight south-west of Gainsborough. There is a large trade in corn, cheese, and hops, and the town possesses iron foundries, paper and corn mills, and india-rubber works. The population of the municipal borough in 1871 was 3,194, but in 1878 the area was extended to 4,532 acres, and in 1891 the population was 10,603.

RETHEL, ALFRED, historical painter, was born at Aix-la-Chapelle in 1816. He very early showed an interest in art, and at the age of thirteen he executed a drawing which procured his admission to the academy of Düsseldorf. Here he studied for several years, and produced among other works, a figure of St. Boniface which attracted much attention. At the age of twenty he removed to Frankfort where he studied under Philip Veit; and in 1842 he began a most striking and important series of designs dealing with the crossing of the Alps by Hannibal, in which the weird power which animates his later art becomes first apparent. In 1844 Rethel visited Rome, occupying his time both in study and production, and in 1846 he returned to Aix, and commenced his Charlemagne frescoes. But the strain of production, aggravated by a lack of sympathy, and by vexatious delays and interferences, produced a most injurious effect upon both the health and the spirits of the artist. While he hovered between madness and sanity, "with a mind"—as Mr. Ruskin has said in reference to the very parallel case of William Blake—"disturbed, but not deceived, by its sickness, nay, partly exalted by it," Rethel produced some of the most striking, individual, and impressive of his works. He painted *Nemesis Pursuing a Murderer*, and *Death the Avenger*, a skeleton appearing at a masked ball, scraping daintily, like a violinist, upon two human bones. The drawing haunted the memory of his artist friends and disturbed their dreams; and, in expiation, he produced his pathetic design of *Death the Friend*, a skeleton draped in long monk's robes, tolling solemnly the passing bell in a church tower, while beside the open window, lit by the last sunset radiance, sits an old sexton, with the peaceful face of a quiet departure. Rethel also executed a powerful series of drawings—*The Dance of Death*—suggested by the Belgian insurrections of 1848. Rethel died at Düsseldorf on December 1, 1859.

His picture of *Peter and John at the Beautiful Gate of the Temple*, is preserved in the Leipsic Museum, and his *St. Boniface* and several of his cartoons for the frescoes at Aix in the Berlin National Gallery. His life by Wolfgang Müller von Königswinter has been published.

RETZ, JEAN FRANÇOIS PAUL DE GONDI, CARDINAL DE, was born at Montmirail in 1614, the third son, and according to Tallemant des Béaux was made knight of Malta on the very day of his birth. The death of his second brother, however, destined him for a closer connection with the church. Retz's uncle was archbishop of Paris, and, despite the very unclerical leanings of the future cardinal which were not corrected by the teachings of St. Vincent de Paul, who was his tutor, the intentions of his family never varied respecting him. In 1643 Anne of Austria procured for him the ap-

pointment of coadjutor to the archbishop of Paris, and subsequently he was made Cardinal. He exercised no small influence in the election of Alexander VII, and on more than one occasion formally served as envoy from Louis XIV to Rome. He died at Paris August 24, 1679.

REUBEN, eldest son of Jacob and of Leah (Gen. xxix. 32), plays no great part in the patriarchal legend; in the Elohist version of the story of Joseph he appears in a somewhat favorable light, but in Gen. xxxv. 22 he is charged with a grave offense, which, in Gen. xlix. 4, is given as a reason why the tribe which called him father did not take in Hebrew history the place proper to its seniority. The Reubenites settled east of the Jordan on the Moabite border. In Judges v. they are described as a pastoral tribe which took no share in the patriotic movement under Barak and Deborah.

REUCHLIN, JOHN, the first great German humanist, and the restorer of Hebrew and in large measure also of Greek letters among his countrymen, was born February 22, 1455, at Pforzheim in the Black Forest, and died at the baths of Liebenzell, June 30, 1522.

RÉUNION, formerly BOURBON, an island in the Indian Ocean, belonging to France and considered one of her more important colonies. St. Denis, the capital, stands on the north side in  $20^{\circ} 51'$  S. latitude and  $53^{\circ} 9'$  E. longitude. The island has an area of 721,314 acres or 1,127 square miles. The whole island is the result of a double volcanic action. First there arose from the sea a mountain whose summit is approximately represented by Piton des Neiges (10,069 feet), and at a later date another crater opened toward the east, which, piling up the mountain mass of Le Volcan, turned what was till then a circle into an ellipse forty-four miles by thirty-one. Eruptions, though not infrequent (thirty were registered between 1735 and 1860) are seldom serious; the more noteworthy are those of 1745, 1778, 1791, 1812, 1860, 1870, 1881. Basaltic or vitreous lavas rich in chrysolite are the usual products, and it is hardly possible to conceive of a discharge sufficient in volume to overflow the "ramparts" and carry destruction to the rest of the island. Besides the Piton des Neiges (10,069 feet high), the Bory Peak (8,612 feet), and the Burning Peak (8,294), the principal summits in Réunion are the Grand Bénard (9,490), Morne L'Angevin (7,845), and Cimandef (7,300). Hot mineral springs are found in various parts of the island.

Vertically Réunion may be divided into five zones. The first or maritime zone contains all the towns and most of the villages, built on the limited areas of level alluvium occurring at intervals round the coast (128 miles). In the second, which lies between 2,600 and 4,000 feet, the sugar plantations make a green belt round the island and country houses abound. The third zone is that of the forests; the fourth that of the plateaus, where European vegetables can be cultivated; and above this extends the region of the mountains, which occupies more space than any of the others.

The fauna of Réunion is not very rich in variety of species; it lies midway between the Indian and the African type. In the forest region of the island there is an abundant growth of timber. The gardens of the coast districts display a marvelous wealth of flowers and shrubs, partly indigenous and largely gathered from all parts of the world. Fruits grown in the island are—the banana, the cocoa-nut, bread-fruit, and jack-fruit, the bilimbi, the carambola, the guava, the litchi, the Japanese medlar, the mangosteen, the tamarind, the chirimoya, the papaya, etc. Sugar, introduced in 1711 by Pierre Parat, is now the staple crop of Réunion,

a greater proportion of the soil being devoted to it than to all other objects of cultivation. The average produce of the sugar crop in the five years 1873-77 was 35,493 tons of sugar with 777,710 gallons of syrup and treacle; from 1878 to 1883 the averages were 35,580 tons (40,176 in 1883) and 816,455 gallons. Rum is largely distilled, and is the favorite drink of all classes. Vanilla, coffee and cloves are grown, while potatoes, beans, manioc, sweet potatoes, and yams of local growth furnish a considerable amount of food, the far more important article rice has to be imported from India and Madagascar. India also sends castor-oil, wheat, and lard; Australia, flour and wheat; England, coal; the Cape and Muscat, salt fish; Buenos Ayres and Montevideo, mules and horses; the United States petroleum (largely used throughout the island), lard, pork, and pitch-pine.

The complete absence of natural harbors has all along been a great hindrance to the commercial development of Réunion. Since 1848 an artificial harbor capable of containing forty vessels has been constructed at Pointe des Galets at the northwest corner of the island. The port is connected by rail with La Possession on the one hand and with the Rivière des Galets on the other, and thus communicates with the railway which was completed in 1881 round the coast from St. Pierre, by St. Paul, St. Denis, etc., to St. Benoît, a distance of eighty-three and one-quarter miles. This line is carried through a tunnel nearly six and one-half miles long between La Possession and St. Denis, the latter the capital of the island, lies on the north coast. It is built in the form of an amphitheater and presents a most attractive appearance from the sea. Covering as a commune an area of 37,065 acres, it has a population of 30,835 according to the census of 1881, an increase of 18,000 since 1837. It has an abundant supply of pure water. Though the harbor is only an open roadstead, it has hitherto been the most frequented in the island. St. Pierre, the chief town of the leeward arrondissement, has a communal area of 98,190 acres and a population of 27,748. Its artificial harbor, commenced in 1854, but afterward interrupted, and resumed in 1881, has room for five or six vessels besides coasting craft.

The population was 185,179 in 1872, 183,529 in 1878, and 179,639 in 1885. The males are largely in excess of the females (97,961 to 72,773 in 1882), owing to the number of agricultural laborers introduced from abroad for a term of years. Various elements have been added to the population since the middle of the century—coolies from India in large numbers, Africans from the east coast, Chinese and Anamites, Malays, etc. The immigration of the Indian coolies is controlled by a convention between the British and French Governments of date July 1, 1881.

RÉUS, a town of Spain, in the province of Tarragona, is situated at the foot of a chain of hills in a fertile plain about four miles from the sea. It is connected by rail with Tarragona, nine and one-half miles to the east, and with Lerida, fifty-four and one-half miles to the northwest. It consists of two parts, the old and the new, and next to Barcelona itself, is the most flourishing manufacturing center in Catalonia, the staples being silk and cotton; imitations of French wines are also extensively made, and the miscellaneous industries include tanning, distilling, and the like. The cotton factories exceed eighty in number, and one of them employs upward of 600 hands. Most of the traffic of Réus passes through the comparatively sheltered port of Salou, four miles distant. The population of Réus in 1889 was 28,000.

REUSS is the name of two small sovereign principalities of the German empire, with a joint area of 440

square miles, forming part of the complex of Thuringian states, and consisting, roughly speaking, of two principal masses of territory, separated by the Neustadt district of the duchy of Saxe-Weimar. The more southerly and much the larger of the two portions belongs to the bleak, mountainous region of the Frankensteinwald and the Voigtland, while the northern portion is hilly but fertile. The chief rivers are the Elster and the Saale. About 37 per cent. of the total surface is occupied by forests, while 40 per cent. is under tillage, and 19 per cent. in meadow and pasture.

REUSS-GREIZ, or REUSS ÄLTERER LINIE, with an area of 122 square miles, belongs to the larger of the two main divisions above mentioned. The soil is on the whole little favorable for agriculture, but cattle-rearing is carried on with some success. No less than 63 per cent. of the inhabitants are supported by industrial pursuits, the chief products of which are the woolen fabrics of Greiz, the capital, and the stockings of Zeulenroda, both largely exported. The population of the principality in 1889 was 59,782.

REUSS-SCHLEIZ, or REUSS JÜNGERER LINIE, with an area of 318 square miles, includes part of the southern and the whole of the northern of the two main divisions above indicated, touching Bavaria on the south and Prussian Saxony on the north. The former portion is known as the Oberland, the latter as the Unterland. Owing to the fertility of the Unterland, agriculture is carried on here with greater success than in Reuss-Greiz, fully one-quarter of the population being supported by tillage and cattle-breeding. The industrial activity is, however, also large, supporting one-half of the population. The principal product consists, as in Reuss-Greiz, of woolen goods, and the manufacture centers in the capital, Gera, a busy town with 27,118 inhabitants. A considerable trade is carried on in the products of the manufactories, and in timber, cattle, and slate. The iron mining of the Oberland is limited by the want of sufficient railway communication. Large quantities of salt are yielded by the brine springs of Heinrichshall. In 1889 Reuss-Schleiz contained 110,330 inhabitants.

REUTER, FRITZ, the greatest writer in Platt Deutsch, was born on November 7, 1810, at Stavenhagen, in Mecklenburg-Schwerin, a small country town which had few means of communication with the rest of the world. Until his fourteenth year Reuter was educated at home by private tutors. In 1832 he went to the university of Jena. The German Governments, alarmed by the revolutionary agitation of 1830, were on the alert to detect symptoms of popular discontent; and a formidable riot at Frankfort in 1833 gave them an excuse for treating the universities with great harshness. Reuter was arrested by the Prussian Government; and condemned to death for high treason. This monstrous sentence was commuted by King Frederick William III. of Prussia to imprisonment for thirty years in a Prussian fortress. In 1840 he was set free, an amnesty having been proclaimed after the accession of Frederick William IV. to the Prussian throne, and from that date onward was almost continuously engaged in literary pursuits. He died at Eisenboch June 12, 1874.

Reuter is the most realistic of the great German writers. To the dreamers of the romantic school he has not the faintest resemblance, nor does he ever attempt to describe ideally perfect characters. The men and women of his stories are the men and women he knew in the villages and farm-houses of Mecklenburg, and the circumstances in which he places them are the circumstances by which they were surrounded in actual life. Reuter's only serious defect as an artist is that he fails to maintain the due proportion between the different parts of his

stories. If an idea attracts him, he cannot resist the temptation to unfold its full significance, whether or not it is in organic relation with his scheme as a whole. To some extent, however, the reader is compensated for these interruptions by happy strokes of humor which would have been rendered impossible had Reuter forced himself to adopt a more rigid method.

REUTLINGEN, a manufacturing town of Würtemberg, situated in a fertile and pretty district on the Echatz, an affluent of the Neckar, near the base of the Achalm, and twenty miles to the south of Stuttgart. It is a quaint but well-built town, with numerous picturesque houses and a fine Gothic church of the thirteenth and fourteenth centuries, overtopped by a lofty spire. The tanneries of Reutlingen are extensive, producing large quantities of leather; and its other industrial products are very multifarious, including cotton, woolen, and knitted goods, lace, ribbons, hats, shoes, paper, machinery, hardware, and lime. To fruit-growers Reutlingen is interesting as a seat of a celebrated pomological institute, while the Christian-socialist refuges of Pastor Werner are widely known in philanthropic circles. In 1889 the town contained 17,609 inhabitants.

REVAL, or REVEL, a seaport of Russia, capital of Esthonia, is situated in a bay on the southern coast of the Gulf of Finland, in 59° 27' N. latitude and 24° 45' E. longitude, 230 miles west of St. Petersburg by rail. The city consists of two parts—the "Domberg" or "Dom," which occupies a hill, and the lower town on the beach—and is surrounded by pleasant suburban houses with gardens. Water is brought from Lake Järväkylä by an aqueduct. The pleasant situation of the town, surrounded by beautiful parks, attracts in summer thousands of people for sea-bathing.

The population of Reval has increased rapidly since it has been connected by rail with St. Petersburg and the Baltic Port, thirty miles distant; it reached 50,490 in 1881, against 27,325 in 1867, of whom one-third are Germans, the remainder Esthonians, with a few Russians and Jews. It is at present (1890) estimated at 60,000. Nearly 15,000 inhabitants belong to the Greek Church. The manufactures are not important, but trade grows steadily. In 1882 the exports (grain, spirits, etc.) were \$5,731,220, the imports (coal, iron, chemicals, etc.) \$34,291,235. Both exports and imports had, by 1889, increased fully 25 per cent. It has regular steam communication with St. Petersburg, Helsingfors, Königsberg, etc.

REVELATION, BOOK OF. The book of the New Testament called "Revelation of John" (*Ἀποκάλυψις Ἰωάννου*) so long passed for the most obscure and difficult document of early Christianity that scholars hesitated to apply to it the historico-critical method of investigation. Since this hesitation has been overcome, it appears that the matter of the book is neither obscure nor mysterious, although many special points still remain to be cleared up. Without being paradoxical we may affirm that the Apocalypse is the most intelligible book in the New Testament, because its author had not the individuality and originality of Paul or of the author of the Fourth Gospel, and because historically we can trace and comprehend its author's position much better than we can, for instance, the theology of Paul.

The revelation proper begins with iv. 1—the first three chapters forming an introduction (the seven letters to the seven churches of Asia Minor, which are prefixed, are marked by poetical beauty and power of language). The future is written in a book with seven seals, which the Lamb opens one after the other, (iv., v.) The opening of each seal brings a plague upon the earth, (vi.) Before the seventh seal is opened, the church of the latter day is itself sealed that it may be

preserved harmless from the assaults of the powers of hell, (vii.) At the opening of the seventh seal seven angels with trumpets appear on the scene, each of whom blows a trumpet-blast as a prelude to new horrors on the earth, (viii., ix.) With the sixth trumpet the preliminary judgments are at an end, (hence the episode ch. x.) The judgment proper begins with the fall of Jerusalem, (xi.) Then the seventh trumpet sounds as the signal for the last dread horrors, and for the final judgment of the world and of all wickedness. This is preceded, however, by a description of the preservation of the church of the latter days (xii.), forming one of those pauses in the narrative which give the reader breathing time and relieve the horror of the description by the introduction of scenes of peace and words of comfort. The power of the world that opposes Christ (the Roman empire) is described along with all its devilish accomplices (xiii.), and (xiv.) its destruction is by anticipation set forth in figures. The seven angels follow with the seven vials of wrath, which are poured forth, and represent the beginning of the final catastrophe, (xv., xvi.) This final catastrophe, involving the imperial city, the antichristian emperor, his governors, and, last of all, the devil himself, is described in xvii.—xx. 3—xix. 11 *seq.* forming the climax, when Christ himself appears on a white horse and vanquishes all his foes. The devil is chained in the bottomless pit for a thousand years; during this time the saints of the latter days—not all believers—reign with Christ. After the devil has been released once more and has made war on the holy city, he is forever overthrown and the last judgment follows, (xx.) In xxi.—xxii. 5 the glory of the heavenly and eternal Jerusalem is set forth. In xxii. 6–21 several epilogues may be detected.

The above analysis will have shown the essential unity of the book. The more attentively we scan the connection of the descriptions with each other the more clearly do we perceive the unity, the artistic and systematic arrangement, of the book. This is completely overlooked by those who fancy that in the seven seals, the seven trumpets, the seven vials of wrath, the whole course of the judgment is simply repeated in ever new imagery. Leaving all other objections out of account, this supposition is refuted by the simple observation that the author has not merely placed the different scenes side by side but has linked them together in such a way that each scene follows as a consequence from the scene before. A correct perception of the plan of the book further negatives the opinion of older scholars and of Völter in modern times (*Die Entstehung der Apokalypse*, 1882) that the book consists of different parts by different authors.

That the book is not written by a disciple of the apostle Paul, that its author is filled with Jewish hatred and abhorrence of the heathen state, that in other ways traces of the Jewish spirit crop up here and there in the Apocalypse, is beyond question. But many critics, especially the so-called Tübingen school, as well as Renan, Mommsen, and others, have gone still farther; the author of the Apocalypse, say they, was an Ebionite and a decided opponent of the apostle Paul.

The point in dispute is of the highest importance for the proper understanding of the history of primitive Christianity. If the Tübingen school is right, the Pauline epoch was followed in Asia Minor by an Ebionitic epoch, and in this case Catholicism may very well be the product of a compromise between Paulinism and Jewish Christianity.

The arguments to prove the Ebionitism of the Apocalypse are insufficient; rather, we should say, the Apocalypse shows us a Christianity free from the law, free from national prejudices, universal, and yet a Christi-

anity which is quite independent of Paul. It is this that constitutes the high importance of the book.

All impartial scholars are now agreed that in chapters xiii. and xviii. of the Apocalypse we must look for the key to the comprehension of the book as well as to the question of the date of its composition. That the beast (xiii. 1 *seq.*; xvii. 3 *seq.*) is the Roman empire, that the seven heads are seven emperors, that the woman (xvii. 3–9) is the city of Rome, that the ten horns (xiii. 1; xvii. 3, 12 *seq.*) are imperial governors—all this is now beyond dispute. Also it is settled that a Roman emperor will be the antichrist, and that the author abhorred nothing so much as the worship of the emperor. Hence it is very probable, and has been maintained by Mommsen especially on good grounds, that the second beast (xiii. 11) is meant to describe the imperial representatives in the provinces, especially the Roman governors in the Asiatic continent. Finally, almost every one regards the year 64 as the *terminus a quo* of the composition of the book, inasmuch as the bloody persecution of the Christians in Rome (xiii. 7; xvii. 6; xviii. 20–24) is presupposed in the narrative.

But, while scholars are at one on these points, they still differ on the question of the person of antichrist. The one side affirm that the author regarded Nero returned from the grave as antichrist; the other side deny this, and try to identify antichrist either with Domitian or with an emperor not defined. But the grounds on which they combat the former hypothesis are of little moment. That the antichrist of the Apocalypse is Nero returned to life results from the following considerations:—

(1) In ch. xiii. 3 it is said that one of the heads of the beast received a deadly wound but was afterward healed to the astonishment of the world. Now if it is settled that the beast is the Roman empire, and that by the heads are designated the emperors, the statement is only applicable to Nero, in whose death it is well known that the people did not believe, many persons expecting that he would return from the East. (2) In xvii. 8, 11 one head is identified with the whole animal, and of the animal it is said that "it was and is not and will come again," meaning that the eighth head is not a new one but one of the seven. From this it necessarily follows that in the author's view the antichrist will be an emperor who has reigned once already and who represents the whole wickedness of the empire (the beast) concentrated and embodied in himself; but this can only be Nero, for of no other emperor was the report current in the empire that he would come again, and no emperor but Nero had instituted a persecution of the Christians. (3) In xiii. 18 it is said that the number of the beast—that is, according to the Hebrew art of Gematria, the sum of the numerical values of the letters of his name—is the number of a man, and is 666. Down to 1835 this saying was a riddle which no man could read, though Irenæus (v. 30) had attempted an explanation; he thought of Teitan, Evanthes, Lateinos. But in 1835 Fritzsche, Benary, Reuss, and Hitzig discovered simultaneously that the numerical values of the words קסר נרון ("Emperor Neron") = 100 + 60 + 200 + 50 + 200 + 6 + 50 = 666. The old variant 616 must be regarded as a confirmation of this explanation, for 616 is = קסר נרו ("Emperor Nero"). It may certainly appear strange that the calculation is made according to the numerical value of the Hebrew letters, while the book is written in Greek; but, as there is no doubt that the author has thought as a Semite from first to last, it is not surprising that he has set forth his great secret in Hebrew letters (comp. Ἀρμαγεδών, xvi. 16). (4) Down to the fifth century it was believed by Western Christians that Nero would come again and be the

antichrist or his precursor. In the East also this belief can be shown (see the Sibylline oracles) to have still existed in the second century.

For these four reasons it is certain that the author of the Apocalypse believed that Nero would come again, and regarded him as the antichrist. He wrote under the impression of the story current in the East that Nero had gone to the Parthians and would return with them to reclaim his empire.

Hence the Apocalypse was written after the summer of 68 A.D., but the question still remains whether it was written under Galba, or Vespasian, or Domitian. Most of the scholars who accept the right explanation of the antichrist suppose it to have been written under Galba; the beginning of Vespasian's reign is preferred by Lücke (whose earlier opinion was different), Bleek, Böhmer, and also Düsterdieck and Weiss; Mommsen upholds the later years of Vespasian; but the old tradition of the church represents the work as written under Domitian and even toward the close of his reign.

That the Apocalypse was written at some place on the west coast of Asia Minor has never been doubted by any critic of note.

The tradition of the church ascribes the Apocalypse to the apostle John, and the Tübingen school has felt bound in this case to agree with tradition. Within the last twenty years or so the question has been much complicated by being mixed up with the question of the origin of the Fourth Gospel; all, however, agree that the book was written by a born Jew. At present the following views are maintained—(1) the Gospel and the Apocalypse of John are by the apostle John (Ebrard, Hengstenberg and his school, Hofmann and his school, Kliefoth); (2) the Gospel is by an unknown author, the Apocalypse is by the apostle John (Baur, Schwegler, Kostlin, Hilgenfeld); (3) the Gospel is by the apostle John, the Apocalypse is by a man called John, the otherwise known presbyter, who had no wish to be taken for the apostle (Lücke, Bleek, Ewald, Credner, De Wette, Neander, Reuss, Düsterdieck, Keim, Holtzmann, etc.); (4) the Apocalypse is by another John, one of the apostle's disciples, who afterward received the tacit approval of the apostle, so that the Revelation passed in the church as a work of the apostle (Renan); (5) the Apocalypse was foisted on the apostle John without his knowledge (Volckmar, etc.) Of these views the first and fourth may be summarily dismissed, the latter because Renan has not brought forward even the shadow of a proof, the former because the differences between the Apocalypse and the Gospel in language and opinions are too great to allow us to suppose that the books are by the same author. But the following considerations speak against the apostle John as author—(1) the so-called "Alogi" (Epiph. *Hær.*, li.) denied that the work was by the apostle, and declared that it came from Corinth and hence was a forgery; (2) the author of the Apocalypse does not style himself an apostle, and nowhere does he designate himself as a personal disciple of Jesus or as an eye-witness; (3) the author speaks (xxi. 14) in such an objective way of the twelve apostles of the Lamb that it is scarcely credible that he himself belonged to them; (4) the descriptions of Christ in the Apocalypse are psychologically scarcely intelligible on the assumption that they were written by a personal disciple of the Lord. On these grounds we must say that, though not quite impossible, it is very improbable that the apostle John was the author of the Apocalypse. But not less improbable is the supposition that the real author wished to pass for the apostle John and fathered the work on him.

In this difficult subject absolute certainty is unattainable, but the supposition that the Revelation was

written by an unknown Christian of Asia Minor, and that the name of John is a later addition in order to ascribe the Revelation to the apostle John, labors under fewer difficulties than any other that has hitherto been started. That, thus introduced, John is not expressly designated as apostle need not surprise us, for at the beginning of the second century every one in Asia Minor knew who "John the servant of God" was. The epistles also with the heading "the elder" are meant to be regarded as written by the apostle John, although they do not contain the title apostle.

REVERSION. See REMAINDER.

REVIVAL OF LEARNING. See RENAISSANCE.

REWAH, the principal native state in Bâghelkhand, and Central India Agencies. It has an area of about 10,000 square miles; it is bounded on the north by the British districts of Banda, Allahabad, and Mirzapur in the Northwestern Provinces; on the east by Mirzapur district and by native states in Chutia-Nagpur; on the south by the districts of Chhatisgarh, Mandla, and Jabalpur in the Central Provinces; and on the west by other native states of Bâghelkhand. Rewah state is divided into two well-defined portions. The northern and smaller division is the plateau lying between the Kaimur range of hills and that portion of the Vindhyas known as Binjh, is for the most part cultivated and well peopled; the soil varies from a rich black loam to a sandy laterite; but in the greater part of this area good land predominates, and rich harvests both of kharif and of rabi crops are generally obtained. The country to the south of the Kaimur Hills comprises by far the largest portion of the state; but here cultivation is restricted to the valley between the hills and the Sone river, and to a few isolated patches in scattered parts of the wild and magnificent forest wastes. Rewah is rich in minerals and forests. Operations lately undertaken to determine the extent of its coal fields have proved highly successful. Until very recently Rewah possessed no roads to speak of or means of internal communication; but good progress is now being made, and by this means it is anticipated that the state will soon develop its rich resources. The principal river is the Sone; another important river is the Tons; but none of the rivers are navigable.

The population of the state in 1881 was 1,305,124 (654,182 males, 650,942 females). The chief town is Rewah, situated in 24° 31' 30" N. latitude and 81° 20' E. longitude, and containing in 1881 a population of 22,016.

REYNOLDS, SIR JOSHUA, English portrait-painter, was born at Plympton Earl, in Devonshire, on July 16, 1723. He was educated by his father, a clergyman and the master of the free grammar school of the place, who designed his son for the medical profession. But the boy showed a distinct preference for painting. It was at length decided that the lad should devote himself to art, and in October, 1741, he proceeded to London to study under Thomas Hudson, a mediocre artist, a native of Devonshire, who was popular in the metropolis as a portrait-painter. Reynolds remained with Hudson for only two years, and in 1743 he returned to Devonshire, where, settling at Plymouth Dock, he employed himself in portrait painting. By the end of 1744 he was again in London, and painted the portraits of Captain Hamilton, father of the marquis of Abercorn, of Mrs. Field, of Alderman Tracy, now in the Plymouth Athenæum, and of the notorious Miss Chudleigh, afterward duchess of Kingston. To this period, or perhaps to one slightly later, is referable the artist's excellent oval bust portrait of himself, which was included in the Grosvenor Gallery Exhibition of 1884. At Christmas, 1746, he was recalled to Plympton to attend the last hours of his father, after



whose death he again established himself, now with two of his sisters, at Plymouth Dock, where he painted portraits, and, as he has himself recorded, derived much instruction from an examination of some works by William Gandy of Exeter. In December, 1749, he sailed for Leghorn, and thence made his way to Rome.

After a residence of two years in Rome, Reynolds, in the spring of 1752, spent four months in visiting Parma, Florence, Venice, and other important cities of Italy; and after a brief stay in Devonshire, he established himself as a portrait painter in St. Martin's Lane, London, whence he afterward removed to Great Newport Street, and finally in 1760, to Leicester Square, where he continued to paint till his death. During the first year of his residence in London he had made the acquaintance of Doctor Johnson, which, diverse as the two men were, became a friendship for life. To him Burke and Goldsmith, Garrick, Sterne, Bishop Percy, and, it seems, Hogarth, were before long added. At the hospitable dinner table of Reynolds such distinguished men enjoyed the freest and most unconstrained companionship, and most of them were members of the "Literary Club," established at the painter's suggestion in 1754.

In December, 1768, the Royal Academy was founded, and Reynolds was elected, by acclamation, its first president, an honor which more than compensated for his failure to obtain the appointment of king's painter, which the previous year had been bestowed on Allan Ramsay, a more courtly but more commonplace artist. In a few months the king signified his approval of the election by knighting the new president, and intimating that the queen and himself would honor him with sittings for portraits to be presented to the Academy. In 1784, on the death of Ramsay, Reynolds was appointed painter to the king. Two years previously he had suffered from a paralytic attack; but, after a month of rest, he was able to resume his painting with unabated energy and power. In the summer of 1789 his sight began to fail; he was affected by the *gutta serena*, but the progress of the malady was gradual, and he continued occasionally to practice his art till about the end of 1790. Toward the end of 1791 it was evident to the friends of Reynolds that he was gradually sinking. For a few months he suffered from extreme depression of spirits, the result of a severe form of liver complaint, and on February 23, 1792, this great artist and blameless gentleman passed peacefully away.

RHADAMANTHUS, in Greek mythology, a son of Zeus and Europa and brother of Minos, king of Crete. At first he helped his brother to rule his island empire. His justice earned him the admiration of his subjects and the jealousy of his brother, wherefore he fled to Bœotia, where he wedded Alcmene. On account of his inflexible integrity he was made one of the judges of the dead in the other world. According to Plato, Rhadamanthus judged the souls of Asiatics, while Æacus judged those of Europeans, and when they could not agree Minos had a casting vote.

RHÆTIA was the name given in ancient times to a province of the Roman empire, which included a considerable tract of the Alpine regions that separated the great valleys of the Po and the Danube, comprising the districts occupied in modern times by the Grisons and the Austrian province of Tyrol.

The name of the Rhætians is first mentioned by Polybius, but merely incidentally, and they played no part in Roman history till after the fall of the republic. In the time of Strabo their territory was considered as extending from the Lakes of Como and Garda to that of Constance (the Lacus Brigantinus), while the allied people of the Vindelici, who had shared in their contest against the Roman arms, as well as in their final sub-

jugation, extended down the northern slope of the Alps as far as the Danube. By far the greater part of this extensive region was occupied by rugged mountains. Some of the valleys, however, which extended on the south side down to the plains of Italy, were rich and fertile.

The boundaries of the Roman province were repeatedly changed. At first it appears to have comprised all Vindelicia, so as to have extended to the Danube from its sources to its confluence with the Inn. But at a later period this northern tract was separated from the central mountain region, and the two were named Rhætia Prima and Rhætia Secunda. The only important town in the northern part of the province was the Roman colony of Augusta Vindelicorum, which still retains the name of Augsburg. The same is the case with Curia, now Chur or Coire, the capital of the Grisons, and Brigantia (Bregenz), which gave name in ancient times to the lake now called the Lake of Constance.

RHAZES. An Arabian physician of the tenth century.

RHEA, the name given in 1752 by Möhring to a South-American bird which, though long before known and described by the earlier writers—Nieremberg, Marcgrave, and Piso (the last of whom has a recognizable but rude figure of it)—had been without any distinctive scientific appellation. Adopted a few years later by Brisson, the name has since passed into general use, especially among English authors, for what their predecessors had called the American ostrich. The resemblance of the rhea to the ostrich is at once perceived, but the differences between them scarcely less soon noticed, for some of them are very evident. The former, for instance, has three instead of two toes on each foot, it has no apparent tail nor the showy wing-plumes of the latter, and its head and neck are clothed with feathers, while internal distinctions of still deeper significance have since been dwelt upon by Prof. Huxley (*Proc. Zool. Society*, 1867, pp. 420-422) and the late Mr. W. A. Forbes (*op. cit.*, 1881, pp. 784-787), thus justifying the separation of these two forms more widely even than as families. Structural characters no less important separate the rheas from the emeus. Its breeding habits are precisely those which have been already described in the case of other Ratite birds; and though considerably smaller than the ostrich, and, as before stated, wanting its fine plumes, the rhea in general aspect far more resembles that bird than the other *Ratita*. The feathers of the head and neck, except on the crown and nape, where they are dark brown, are dingy white, and those of the body ash-colored tinged with brown, while on the breast they are brownish-black, and on the belly and thighs white. The *Rhea darwini* differs materially from the earlier known *R. americana*.

Its bill is shorter than its head; its tarsi are reticulated instead of scutellated in front, with the upper part feathered instead of being bare; and the plumage of its body and wings is very different, each feather being tipped with a distinct whitish band, while that of the head and neck is grayish-brown. A further distinction is also asserted to be shown by the eggs—those of *R. americana* being of a yellowish-white, while those of *R. darwini* have a bluish tinge. Some years since Mr. Sclater described a third and smaller species, more closely resembling the *R. americana*, but having apparently a longer bill, whence he named it *R. macrorhyncha*, more slender tarsi, and shorter toes, while its general color is very much darker, the body and wings being of a brownish-gray mixed with black. The precise geographical range of these three species is still undetermined. While *R. americana* is known to

extend from Paraguay and southern Brazil through the state of La Plata to an uncertain distance in Patagonia, *R. darwini* seems to be the proper inhabitant of the country last named, though M. Claraz asserts (*op. cit.*, 1885, p. 324) that it is occasionally found to the northward of the Rio Negro, and moreover, that flocks of the two species commingled may be very frequently seen in the district between that river and the Rio Colorado. On the "pampas" *R. americana* is said to associate with herds of deer (*Cariacus campestris*), and *R. darwini* to be the constant companions of guanacos (*Lama huanaco*)—just as in Africa the ostrich seeks the society of zebras and antelopes. As for *R. macrorhyncha*, it was found by Forbes (*Ibis*, 1881, pp. 360, 361) to inhabit the dry and open "sertoes" of northeastern Brazil.

RHEA (or RHEEA) FIBER is a textile material yielded by one or more species of *Böhméria* (nat. ord. *Urticacæ*), plants found over a wide range in India, China, the Malay Peninsula and island, and Japan. Rhea is also capable of being grown in temperate latitudes, and has been experimentally introduced into the south of France and Algeria. Among the Chinese much care is bestowed on the cultivation of Chu or Tchou Ma, as rhea is called by them, and they prepare the fiber by a tedious and costly process of selection and manual labor. The plant thrives in hot, moist, shaded situations; it throws up from three to five crops of stems in the course of a season, although not more than three crops are reckoned on. Each such crop may yield about 250 pounds of marketable fiber per acre, that total output being exceeded only by the jute crop. The stems when either ripe or cut down, stripped of leaves and branchlets, and, either split or whole, are freed from their cortical layers till the bast layer is exposed. In this state they are made up in small bundles and placed where they receive strong sunlight by day and dews by night for several days, after which the fibrous bast layer is peeled with ease off the woody core, and the separated fibers are thereafter treated with boiling water to remove as far as possible adherent gummy and resinous matter in which the fibers are imbedded in the stalks. The fiber so obtained is usually bleached by exposure on the grass, and it comes into the market as brilliant white filaments with a fine silky gloss, having a strength, luster, and smoothness unequaled by any other vegetable fiber.

RHEGIUM. See REGGIO.

RHEIMS, a city of France, chief town of an arrondissement of the department of Marne, lies eighty-one miles east-northeast of Paris (ninety-nine miles by rail) on the right bank of the Vesle, a tributary of the Aisne, and on the canal which connects the Aisne with the Marne. To the south and west rise the "montagne de Rheims" and the vine-clad hills where the wine is grown which constitutes the chief object of the industry and commerce of the town.

The spinning and weaving of wool is carried on in seventy factories, employs 10,000 hands, and annually turns \$17,500,000 worth of raw material into flannels, merinoes, cloth, blankets, etc. Dyeing and "dressing" are carried on in the outskirts of the town. Fifty firms with 2,000 workmen are employed in the champagne manufacture; the cellars are vast excavations in the chalk rock. Rheims is also famous for its biscuits, gingerbread, and dried pears. Machinery, chemical products, candles, soap, stained glass, common glass, and paper are also manufactured. In respect of population (95,683 in 1889) Rheims ranks as the eleventh city of France.

Rheims (Durocortorum), an important town in the time of Cæsar, made voluntary submission to the

Romans and by its fidelity throughout the various Gallic insurrections secured the special favor of its conquerors. Christianity was introduced about the middle of the fourth century. In the tenth century Rheims had become a center of intellectual culture, Archbishop Adalberon, seconded by the monk Gerbert (Sylvester II.), having founded schools where the "liberal arts" were taught. Adalberon was also one of the prime authors of the revolution which put the Capet house in the place of the Carolingians. The treaty of Troyes (1420) ceded it to the English, who had made a futile attempt to take it by siege in 1360; but they were expelled on the approach of Joan of Arc, who in 1429 caused Charles VII to be duly consecrated in the cathedral. A revolt at Rheims caused by the salt tax in 1461 was cruelly repressed by Louis XI. The town sided with the League (1585), but submitted to Henry IV. after the battle of Ivry. In the foreign invasions of 1814 it was captured and recaptured; in 1870-71 it was made by the Germans the seat of a governor-general and impoverished by heavy requisitions.

RHEINGAU. See RHINE.

RHENANUS, BEATUS, a German humanist, was born about 1485 at Schlettstadt in Alsace, where his father, a native of Rheinau, was a prosperous butcher. He received his early education in Schlettstadt, and afterward (1503) went to Paris, where he came under the influence of Faber Stapulensis; here, among his other learned pursuits, we must include that of correcting the press for Henry Estienne. In 1511 he removed to Basel, where he became intimate with Erasmus, and took an active share in the publishing enterprises of Frobenius. Some time after 1520 he became a comparatively wealthy man through the death of his father; returning to Schlettstadt he devoted himself to a life of learned leisure, enlivened with free epistolary and personal intercourse with Erasmus, Reuchlin, Pirckheimer, Lasky, and many other scholars of his time. He died at Strasburg, while returning from Baden in Switzerland, whither he had gone for his health, in 1547.

RHENISH PRUSSIA. See PRUSSIA, RHENISH.

RHETICUS, RHÆTICUS, a surname given to GEORGE JOACHIM, born in 1514, and appointed professor of mathematics at Wittenberg in 1537. His first appearance before the public was in the character of an enthusiastic convert to the newly broached opinions of Copernicus. No sooner had he adopted these opinions than, resigning his chair, he repaired to Frauenberg to sit at the feet of their great promulgator. All his energy was forthwith devoted to the new system, and, as has been mentioned under COPERNICUS, it was he who superintended the printing of the *De Orbium Revolutione*. Rheticus now commenced his great treatise, *Opus Palatinum de Triangulus*, containing tables of cosines, sines, tangents, etc., for every ten seconds calculated to ten paces, and continued to work at it while he occupied his old chair at Wittenberg, while he taught mathematics at Leipsic, while he traveled over different parts of the Continent, and indeed up to his death in Hungary in 1576. The *Opus Palatinum* of Rheticus was published by Otho in 1596.

RHETORIC. A lost work of Aristotle is quoted by Diogenes Laertius (viii. 57) as saying that Empedocles "invented" (*εὑρεῖν*) rhetoric; Zeno, dialectic. This is certainly not to be understood as meaning that Empedocles composed the first "art" of rhetoric. It is rather to be explained by Aristotle's own remark, cited by Laertius from another lost treatise, that Empedocles was "a master of expression and skilled in the use of metaphor"—qualities which may have found scope in his

political oratory, when, after the fall of Thrasydæus in 472 B.C., he opposed the restoration of a tyranny at Agrigentum.

Rhetoric is properly an art. This is the proposition from which Aristotle sets out. It is so because, when a speaker persuades, it is possible to find out why he succeeds in doing so. Rhetoric is, in fact, the popular branch of logic. Now hitherto, Aristotle says, the essence of rhetoric has been neglected for the accidents.

Here we may venture to interpolate a comment which has a general bearing on Aristotle's *Rhetoric*. It is quite true that, if we start from the conception of rhetoric as a branch of logic, the phantom of logic in rhetoric claims precedence over appeals to passion. But Aristotle does not sufficiently regard the question—What, as a matter of experience, is most persuasive? The phantom of logic may be more persuasive with the more select hearers of rhetoric; but rhetoric is not for the more select; it is for the many, and with the many appeals to passion will sometimes, perhaps usually, be more effective than the semblance of the syllogism. And here we seem to touch the basis of the whole practical vice, in the old world's views of rhetoric, which, after Aristotle's day, was ultimately Aristotelian. No formulation of rhetoric can correspond with fact which does not leave it absolutely to the genius of the speaker whether reasoning (or its phantom) is to be what Aristotle calls it, the "body of proof" (*σῶμα πίστεως*), or whether the stress of persuading effort should not be rather addressed to the emotions of the hearers. This is a matter of tact, of instinct, of oratorical genius.

But we can entirely agree with Aristotle in his next remark, which is historical in its nature. The deliberative branch of rhetoric had hitherto been postponed, he observes, to the forensic. We have already seen the primary cause of this, namely, that the very origin of rhetoric in Hellas was forensic. The most urgent need which the citizen felt for this art was not when he had to discuss the interests of the city, but when he had to defend (perhaps) his own property or his own life. The relative subordination of deliberative rhetoric, however unscientific, had thus been human. Aristotle's next statement, that the master of logic will be the master of rhetoric, is a truism if we concede the essential primacy of the logic element in rhetoric. Otherwise it is a paradox; and it is not in accord with experience, which teaches that speakers incapable of showing even the ghost of an argument have sometimes been the most completely successful in carrying great audiences along with them. Aristotle never assumes that the hearers of his rhetorician are as *οἱ χάριεντες*, the cultivated few; on the other hand, he is apt to assume tacitly—and here his individual bent comes out—that these hearers are not the great surging crowd, the *ὄχλος*, but a body of persons with a decided though imperfectly developed, preference for sound logic.

What is the use of an art of rhetoric? It is fourfold, Aristotle replies. Rhetoric is useful, first of all, because truth and justice are naturally stronger than their opposites. When awards are not duly given, truth and justice must have been worsted by their own fault. This is worth correcting. Rhetoric is, then, (1) *corrective*. Next, it is (2) *instructive*, as a popular vehicle of persuasion for persons who could not be reached by the severer methods of strict logic. Then it is (3) *suggestive*. Logic and rhetoric are the two impartial arts; that is to say, it is a matter of indifference to them, as arts, whether the conclusion which they draw in any given case is affirmative or negative. Suppose that I am going to plead a cause, and have a sincere conviction that I am on the right side. The art of rhetoric will suggest to me what might be urged on the other

side; and this will give me a stronger grasp of the whole situation. Lastly, rhetoric is (4) *defensive*. Mental effort is more distinctive of man than bodily effort; and "it would be absurd that, while incapacity for physical self-defense is a reproach, incapacity for mental defense should be no reproach." Rhetoric, then, is corrective, instructive, suggestive, defensive. But what if it be urged that this art may be abused? The objection, Aristotle answers, applies to all good things except virtue, and especially to the most useful things. Men may abuse strength, health, wealth, generalship.

The function of the medical art is not necessarily to cure, but to make such progress toward a cure as each case may admit. Similarly it would be inaccurate to say that the function of rhetoric was to persuade. Rather must rhetoric be defined as "the faculty of discerning in every case the available means of persuasion." Suppose that among these means of persuasion is some process of reasoning which the rhetorician himself knows to be unsound. That belongs to the province of rhetoric all the same. In relation to logic, a man is called a "sophist" with regard to his moral purpose (*προαίρεσις*), *i. e.*, if he knowingly uses a fallacious syllogism. But rhetoric takes no account of the moral purpose. It takes account simply of the faculty (*δύναμις*)—the faculty of discovering any means of persuasion.

Aristotle's *Rhetoric* is incomparably the most scientific work which exists on the subject. It may also be regarded as having determined the main lines on which the subject was treated by nearly all subsequent writers. It might, indeed, be said of Aristotle's treatise that it is rather a Philosophy of Rhetoric than a Rhetoric power. It is a body of abstract principles and general rules. These will enable the student to dissect a good speech; but, by themselves, they will not go far toward enabling him to make one. Aristotle's purpose was to annex rhetoric to the realm of science. He succeeded, as far as success was possible. During the three centuries from the age of Alexander to that of Augustus the fortunes of rhetoric were governed by the new conditions of Hellenism. Aristotle's scientific method lived on in the Peripatetic school.

Cicero's rhetorical works are to some extent based on the technical system to which he had been introduced by Molon at Rhodes, and by other contemporary teachers. But Cicero made a further independent use of the best among the earlier Greek writers, Isocrates, Aristotle, and Theophrastus. Lastly, he could draw, at least in the later of his treatises, on a vast fund of reflection and experience. The same thought is present to Quintilian, in whose great work, *De Institutione Oratoria*, the scholastic rhetoric receives its most complete expression, (*c.* 90 A.D.) Quintilian treats oratory as the end to which the entire mental and moral development of the student is to be directed. After Quintilian, the next name which deserves to be signalized in the history of the art is that of Hermogenes, who continued for nearly a century and a half to be one of the chief authorities in the schools. Longinus (*c.* 260 A.D.) published an *Art of Rhetoric* which is still extant; and the more celebrated treatise *On Sublimity* (*περὶ ὑψους*), if not his work, is at least of the same period. About 315 A.D. Aphthonius composed the "exercises" (*προγυμνάσματα*), which suspended the work of Hermogenes. At the revival of letters the treatise of Aphthonius once more became a standard text-book. Much popularity was enjoyed also by the exercises of Ælius Theon, (380 A.D.)

Vespasian (70-79 A.D.), according to Suetonius, was the first emperor who gave a public endowment to the teaching of rhetoric. But it was under Hadrian and

the Antonines (117-180 A.D.) that the public chairs of rhetoric were raised to an importance which made them objects of the highest ambition. The complete constitution of the schools at Athens was due to Marcus Aurelius. The Philosophical School had four chairs (*θρόνοι*)—Platonic, Stoic, Peripatetics, Epicurean. The Rhetorical School had two chairs, one for "sophistic," and the other for "political" rhetoric. By "sophistic" was meant the academic teaching of rhetoric as an art, in distinction from its "political" application to the law-courts. The "sophistical" chair was superior to the "political" in dignity as in emolument, and its occupant was invested with a jurisdiction over the youth of Athens similar to that of the vice-chancellor in a modern university.

In the mediæval system of academic studies, grammar, logic, and rhetoric were the subjects of the trivium, or course followed during the four years of undergraduateship. Music, arithmetic, geometry, and astronomy constituted the quadrivium, or course for the three years from the B.A. to the M.A. degree. These were the seven liberal arts. According to Hallam (*Lit. Eur.*, vol. i.), the idea of a trivium and quadrivium dates from the sixth century. In the Middle Ages, the chief authorities on rhetoric were the latest Latin epitomists, such as Martianus Capella (fifth century), Casiodorus (fifth century), or Isidorus (seventh century).

After the revival of learning, the better Roman and Greek writers gradually returned into use. Some new treatises were also produced. Leonard Cox (died 1549) wrote *The Art or Craft of Rhetoryke*, partly compiled, partly original, which was reprinted in Latin at Cracow. The *Art of Rhetorique* by Thomas Wilson (1553), afterward secretary of state, embodied rules chiefly from Aristotle, with help from Cicero and Quintilian. About the same time, treatises on rhetoric were published in France by Tonquelin (1555), and Courcelles (1557). At Cambridge in 1570 the study of rhetoric was based on Quintilian, Hermogenes, and the speeches of Cicero viewed as works of art. An Oxford statute of 1588 shows that the same books were used there. In 1620 George Herbert was delivering lectures on rhetoric at Cambridge, where he held the office of public orator. The decay of rhetoric as a formal study at the universities set in during the eighteenth century. The fortunes of rhetoric in the modern world, as briefly sketched above, may suffice to suggest why few modern writers of ability have given their attention to the subject. The best modern book on the subject is Whately's *Elements of Rhetoric*.

The conditions of modern life, and especially the invention of printing, have diminished the importance which belonged in antiquity to the art of speaking. But few would deny that a large measure of value may still be claimed for rhetoric in the more comprehensive sense which Whately gives to it, as the art of argumentative composition. His treatise, the work of an able and also witty man, will be found instructive and entertaining even by those who do not go to it for a discipline. Nor can it fail to suggest a further remark. While abounding in fresh thought and modern illustration, it constantly reminds us that, in almost all essentials, the art of rhetoric must be regarded as the creation of Aristotle.

RHEUMATISM, a constitutional disease having for its chief manifestations inflammatory affections of the fibrous textures of joints and other parts, together with a liability to various complications. Acute rheumatism, frequently called rheumatic fever, is mainly characterized by inflammation affecting various joints, with a tendency to spread in an erratic manner, and accompanied with much pain, febrile disturbance and perspiration.

An attack of acute rheumatism is usually ushered in by chilliness or rigors followed with feverishness and a feeling of stiffness or pain in one or more joints, generally those of larger or medium size, such as the knees, ankles, wrists, shoulders, etc., which soon becomes intense, and is accompanied with severe constitutional disturbance and prostration. The patient lies helpless in bed, unable to bear even the weight of the bed-clothes. The face is flushed, and the whole body bathed in perspiration, which has a highly acid reaction and a sour disagreeable odor. The temperature is markedly elevated ( $103^{\circ}$  to  $105^{\circ}$ ), the pulse rapid, full, and soft; the tongue is coated with a yellow fur; and there are thirst, loss of appetite, and constipation. The urine is diminished in quantity, highly acid, and loaded with urates. At first the pain is confined to only one or two joints, but soon others become affected, and there is often a tendency to symmetry in the manner in which they suffer, the inflammation in one joint being shortly followed by that of the same joint in the opposite limb. The affected joints are red, swollen, hot, and excessively tender. The inflammation seldom continues long in one articulation, but it may return to those formerly affected. In severe cases scarcely a joint large or small escapes, and the pain, restlessness, and fever render the patient's condition extremely miserable.

An attack of acute rheumatism is of variable duration, sometimes passing away in the course of a few days, but more frequently lasting for many weeks. Occasionally, when the disease appears to have subsided, relapses occur which bring back all the former symptoms and prolong the case, it may be for months. Again, after all acute symptoms have disappeared, the joints may remain swollen, stiff, and painful on movement, and the rheumatic condition thus becomes chronic. After an attack the patient is much reduced in strength and pale-looking for a considerable time, but should no complication have arisen there may be complete recovery, although doubtless there remains a liability to subsequent attacks. This disease derives much of its serious import from certain accompaniments or complications which are apt to attend its progress. Among these may be mentioned excessive fever (hyperpyrexia), which is sometimes developed in a sudden and alarming manner, the temperature rising quickly to  $108^{\circ}$ - $110^{\circ}$  or more, and thus endangering life. Indeed in most of such instances death speedily follows, unless prompt treatment be resorted to. Another danger is the occurrence of serious head symptoms in the form of delirium or excitement, which may exist in conjunction with hyperpyrexia or independently. Chorea, or St. Vitus' dance, is also an occasional accompaniment of acute rheumatism. Besides these, other complications pertaining to the respiratory organs, such as pleurisy, pneumonia, bronchitis, etc., sometimes arise in the course of the disease, as well as certain disorders of the skin. But the most frequent and important of all are those affecting the heart. Pericarditis (inflammation of the investing membrane of the heart) and endocarditis (inflammation of the lining membrane of the heart) are the two most common forms which these heart complications assume, and it is the latter which is specially important as tending to lay the foundation for valvular heart disease (see HEART). It is the liability to these inflammatory heart affections that causes special anxiety during the earlier stages of an attack of acute rheumatism, when it would appear they are more apt to occur. The risk of cardiac complications seems to be greater the younger the patient, and doubtless the foundation of organic heart disease is often laid in early childhood, when, as is now well known, rheumatism is by no means uncommon.

Chronic rheumatism appears occasionally to be developed as the result of the acute form, but is more frequently an independent constitutional affection, and is usually a complaint of later life. It differs from acute rheumatism in being less frequently attended with fever and constitutional disturbance, and less liable to dangerous complications, but on the other hand it is much more apt to produce permanent alterations in the joints and parts affected. The chief symptoms are pain and stiffness in movement, more particularly when the efforts begin to be made, becoming less after the limbs and body have been in exercise. Creaking or cracking noises accompany the movements. The pain is apt to be increased during the night, and is besides markedly influenced by the state of the atmosphere, cold and damp aggravating it.

The treatment differs in the two forms of the disease. As regards acute rheumatism the general management of the case from the outset requires attention. The patient should be placed in bed between blankets, and should wear a flannel shirt, the front and arms of which should be opened to admit of the examination of the heart and of the joints. Movements of all kinds should be as far as possible avoided. The affected joints should be enveloped in cotton wool, kept in position by a light bandage. Sometimes the bathing of these parts with warm water containing opium or other sedative affords relief. The local application of blisters in the neighborhood of the painful joints, as proposed by Dr. Herbert Davies, is in some instances followed with benefit, but is obviously applicable only where the rheumatism is limited in its extent. The same may be said of the local application of electricity to the joints. Constitutional remedies are of undoubted value in this disease, and the number of available agents for this purpose is so large that mention can only be briefly made of some of the more approved. For long the alkalis, especially the salts of potassium, were the chief remedies resorted to, and for them it was claimed that they shortened the attack, relieved pain, and prevented heart complications. They are certainly very valuable in many instances. Of late a new series of substances has been tried with great success, namely salicin (first suggested for acute rheumatism by Dr. T. J. MacLagan), salicylic acid, and salicylate of soda. These remedies, which are known to have a powerful effect in reducing febrile temperatures, appear to exercise a special influence in acute rheumatism, not merely by lowering the fever, but by relieving pain and cutting short the attack, thereby lessening the risk of complications. From twenty to thirty grains of these drugs every two hours require to be given for about twenty-four hours in order to produce the desired effect, and the quantity is reduced as the acute symptoms subside. Tonics, such as iron and quinine, have also been employed in acute rheumatism, but their advantage is more apparent in the convalescence, when there are anæmia and debility, rather than in the height of the disease. In the dangerous complication of hyperpyrexia the cold bath (in which the water is quickly cooled down from 94° to 68°) has frequently been successful in speedily lowering the temperature and saving life.

In chronic rheumatism the remedies are innumerable. This form of the disease is less under the power of medicinal agents than the acute, although much may be done to alleviate the suffering produced by it as well as to limit its extension. Alkalies in combination with sulphur, iodine, arsenic, and tonics, such as iron, quinine, cod-liver oil, etc., are the most serviceable remedies. Turpentine is also recommended. Friction of the affected parts with stimulating or soothing lini-

ments, counter-irritation with blisters, iodine, or the button cautery are useful local applications, as is also galvanism. Hot baths or Turkish baths may occasionally be used with advantage. The mineral waters and baths of various well-known resorts are of undoubted benefit. Warmer climates during the colder season, where practicable, are also to be recommended, as well as every other measure calculated to improve the general health.

**RHEUMATOID ARTHRITIS.** This term is employed to designate a chronic inflammatory affection of joints, involving specially the synovial membranes and articular cartilages, of slow development and progressive character, resulting in stiffening and deformity of the parts. This disease is held by some to partake of the nature of both rheumatism and gout (hence occasionally termed rheumatic gout); others regard it as simply a variety of chronic rheumatism; while in the opinion of several eminent authorities it is an independent constitutional affection occurring in persons with a strumous or tubercular tendency. The disease in most cases is slowly developed, and shows itself first by pain and swelling in one joint (knee, wrist, finger, etc.) which soon subside and may remain absent for a considerable time. Sooner or later, however, another attack occurs either in the joint formerly affected or in some other, and it is noticed that the affected articulation does not now regain its normal size but remains somewhat swollen. The attacks occur with increasing frequency gradually involving more joints, until in course of time (for its progress is very chronic), scarcely an articulation in the body is free from the disease. This disease often lasts for many years, sometimes continuing for a lengthened period without much change, but tending gradually to progress and to render the patient more and more helpless. It is less amenable to treatment than rheumatism, the remedies for which are not found to be of much value in this disease. Most success is obtained if it is recognized early and measures are taken to strengthen the patient's general health. The best medicinal agents are iron, quinine, codliver oil, arsenic. Chalybeate mineral waters, such as those of Schwalbach, Spa, Pyrmont, etc., are often of service. Locally blisters or milder counter-irritation to the affected joints, as well as the employment of galvanism, may be advantageously resorted to.

**RHEYDT**, a manufacturing town of Rhenish Prussia, is situated on the Niers, fourteen miles to the west of Düsseldorf. The principal products of its numerous factories are silk, cotton, woollen, and mixed fabrics, iron goods, machinery, lamp wicks, and roofing pasteboard. Dyeing and finishing are also carried on. The most prominent buildings are the old parish church and a new one erected in 1866. Rheydt is an ancient place, but its industrial importance is of very recent growth. At the beginning of the present century it did not contain more than 2,000 to 3,000 inhabitants, whereas in 1880 the population of the municipal commune was 19,087, two-thirds of whom were Protestants.

**RHIN, HAUT-**, a department of France before 1871.

**RHINE** (Lat. *Rhenus*, Germ. *Rhein*, Pr. *Rhin*, Dutch *Rhijn*) the chief river of Germany and one of the most important in Europe, is about 800 miles in length and drains an area of 75,000 square miles. The distance in a direct line between its source in the Alps and its mouth in the German ocean is 460 miles. About 250 miles of its length are in Switzerland, 450 in Germany, and 100 in Holland; but the German half is in every respect so much the more important that it is no misnomer to call the Rhine a German river, even if the word German be confined to its modern political signification. The name Rhine, which is apparently of Celtic origin,

is of uncertain import, but has been supposed to mean "flowing" or "clear."

The Hinter Rhein has its cradle in the Rheinwald glacier, near the St. Bernardino Pass, 7,270 feet above the sea and 40 miles south of Reichenau. The Vorder Rhein contributes the greater volume of water to the joint stream, but the Hinter Rhein belongs to a more developed system. Beyond Reichenau the united stream, 150 feet in width, bears the name of Rhine without any qualifying epithet. It is now navigable for rafts, and small boats begin to be seen a little further on, at Coire, where it turns to the north. Between the lake Constance and Basel the Rhine flows toward the west and practically forms the boundary between Germany and Switzerland. At Schaffhausen, in penetrating the barrier of the Jura, it forms the imposing falls of the Rhine, where it is precipitated over a ledge of rock in three leaps fifty to sixty feet in height. Near Lauterburg, where the river encounters the gneiss of the Black Forest, is a series of formidable cataracts, and about fifteen miles lower down are the rapids of Rheinfelden. At Basel, which it reaches after a tortuous course of 250 miles, though it is only about a third of that distance from its source in a direct line, the Rhine turns once more to the north and enters Germany. Its breadth here is between 550 and 600 feet, while its surface now lies no more than 800 feet above the sea, showing that the river has made a descent of 6,900 feet by the time it has traversed a third of its course. From Basel to Mainz the Rhine flows through a wide and shallow valley, bordered on the east and west by the parallel ranges of the Black Forest and the Vosges. Its banks are low and flat, and numerous islands occur. At Mannheim the river is nearly 1,500 feet in width, and at Mainz, where it is diverted to the west by the barrier of the Taunus, it is still wider. It follows the new direction for about twenty miles, but at Bingen it again turns to the north and begins a completely new stage of its career, entering a narrow valley in which the inclosing rocky hills abut so closely on the river as often barely to leave room for the road and railway on the bank. This is the most beautiful part of the whole course of the river, abounding in the ruined castles, the romantic crags, the sunny vineyards, and the picturesque lateral ravines that have combined to make the Rhine so favorite a resort of lovers of natural beauty. At Coblenz the valley widens and the river is 1,200 feet broad, but the hills close in again at Andernach, and this ravine-like part of its course cannot be considered as ending till below the Seven Mountains, where the river expands to a width of 1,300-1,600 feet. Beyond Bonn and Cologne the banks are again flat and the valley wide, though the hills on the right bank do not completely disappear till the neighborhood of Düsseldorf. Further on the country traversed by the Rhine is perfectly level, and the current becomes more and more sluggish. On entering Holland, which it does below Emmerich, its course is again deflected to the west. Within Holland the banks are so low as to require at places to be protected by embankments against inundations. The river now loses its individuality in a number of separate branches, and the name of Rhine has often arbitrarily clung to the smaller arm after a bifurcation.

The Rhine is said to receive, directly or indirectly, the waters of upward of 12,000 tributaries of all sizes. Leaving out of account the innumerable glacier streams that swell its volume above the Lake of Constance, the most important affluents to its upper course are the Wutach, the Alb, and the Wiese, descending on the right from the Black Forest, and the Aar, draining several Swiss cantons on the left. In the Upper Rhenish

basin, between Basel and Mainz, the tributaries, though numerous, are mostly short and unimportant. The Ill and the Nahe on the left, and the Neckar and the Main on the right are, however, notable exceptions. Before joining the Rhine the Ill runs almost parallel with it and at no great distance for upward of fifty miles. In the narrow part of the valley, between Bingen and Cologne, the Rhine receives the waters of the Lahn and the Sieg on the right, and those of the Moselle (bringing with it the Saar) and the Ahr on the left. Still lower down, but before the Dutch frontier is reached, come the Ruhr and the Lippe on the right, and the Erft on the left.

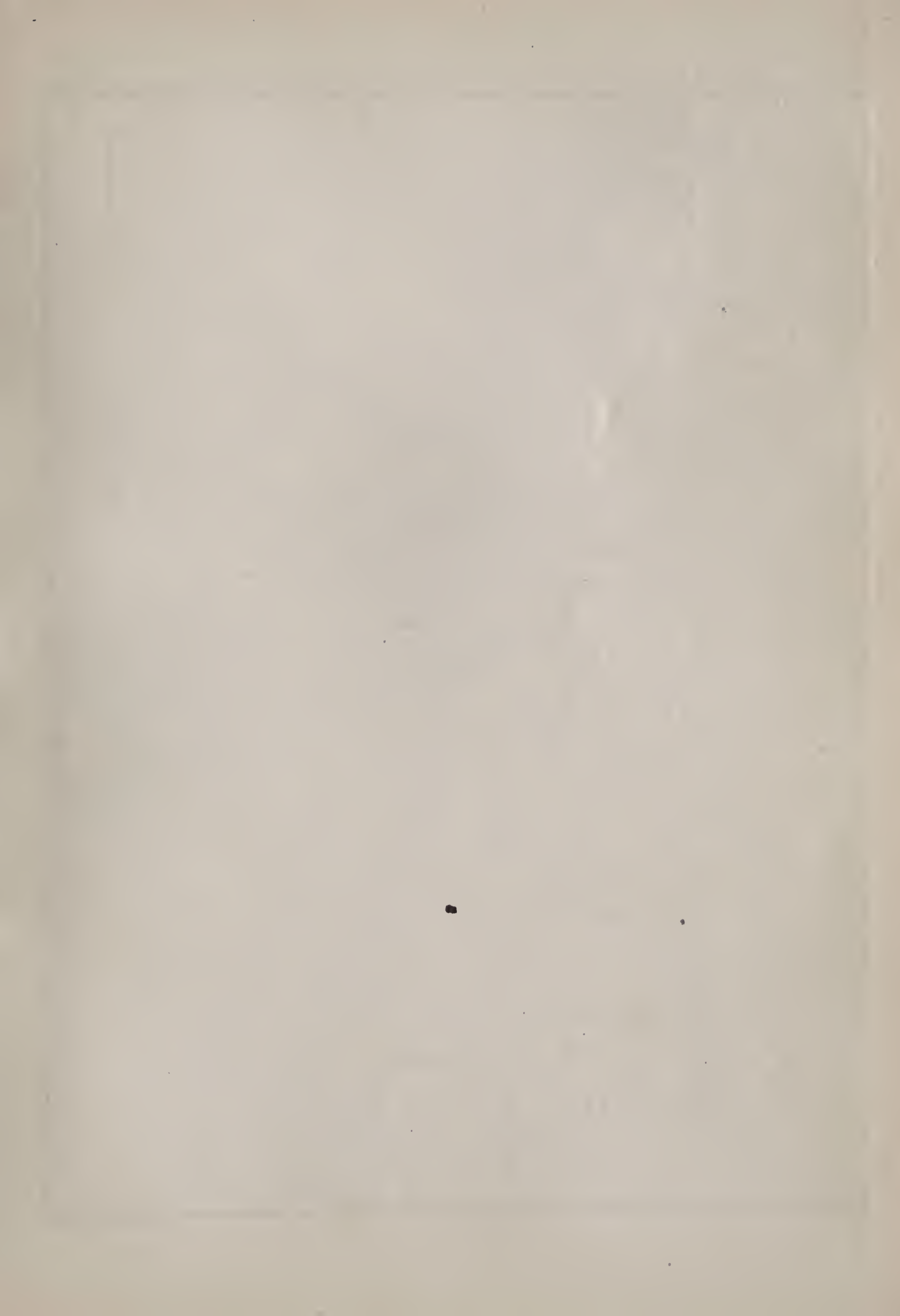
The Rhine connects the highest Alps with the mud banks of Holland, and touches in its course the most varied geological periods; but the river valley itself is, geologically speaking, of comparatively recent formation.

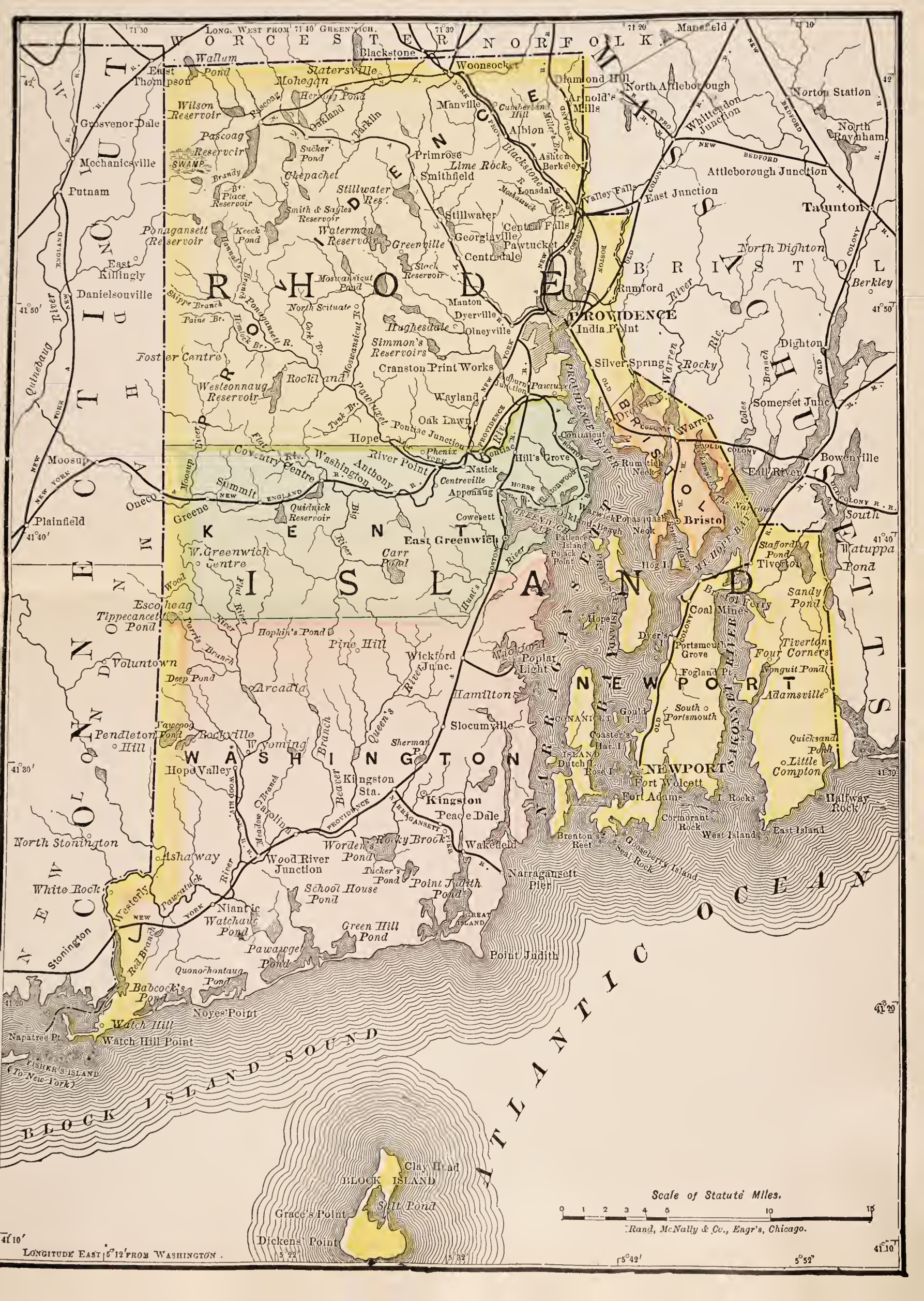
The river has been one of the chief waterways of Europe from the earliest times; and, as its channel is not exposed to the danger of silting up like those of the Elbe and the Oder, it has always been comparatively easy to keep it open.

The introduction of steam has greatly increased the shipping on the Rhine. The first Rhine steamer was launched in 1817; and now the river is regularly traversed by upward of a hundred, from the small tug up to the passenger saloon-steamer. The steamboat traffic has especially encouraged the influx of tourists, and the number of passing travelers may now be reckoned as between one and two millions annually. The river is navigable without interruption from Basel to its mouth, a distance 550 miles, of which 450 lie within Germany.

The long array of ancient and flourishing towns along its banks bear witness to the great importance of the river. These are most frequent in the upper Rhenish basin and again below Bonn, the places in the narrower part of the valley being generally more remarkable for their picturesque situation than for their commercial or political influence. Politically the Rhine has always played a great part; and it would require no great straining to write a history of this majestic river which would also be a history of the western half of continental Europe. For 200 years the Rhine formed the boundary between the Roman empire and the Teutonic hordes; and during that period the left or Roman bank made prodigious strides in civilization and culture. At the partition of the domains of Charlemagne in 843 A.D. the Rhine formed the boundary between Germany and the middle kingdom of Lotharingia; but by 870 it lay wholly within the former realm. For nearly 800 years it continued in this position, the frontier of the German empire coinciding more or less with the line of the Rhine. During the early Middle Ages the bank of the Rhine formed the most cultured part of Germany, basing its civilization on its Roman past. The Thirty Years' War exercised a most prejudicial effect upon the district of the Rhine; and the peace of Westphalia gave France a footing on the left bank of the hitherto exclusively German river by the acquisition of Alsace. The congress of Vienna (1815) restored the lower part of the Rhenish valley to Germany, but it was not till the war of 1870-71 that the recovery of Alsace and Lorraine made the Rhine once more "Germany's river, not Germany's frontier."

The Rhine has always exercised a peculiar sort of fascination over the German mind, in a measure and in a manner not easily paralleled by the case of any other river. "Father Rhine" is the center of the German's patriotism and the symbol of his country. In his literature it has played a prominent part from the *Nibe*





Worcester Norfolk  
Providence  
Rhode Island  
Newport  
Kingston  
Woonsocket  
Pawtucket  
East Providence  
Providence  
Bristol  
Tiverton  
North Providence  
South Providence  
Westerly  
Narragansett  
Block Island  
Atlantic Ocean  
Atlantic Sound  
Providence River  
Pawtucket River  
Woonsocket River  
Narragansett River  
Moshassuck River  
Blackstone River  
Cumberland River  
Moose River  
Quinebaug River  
Woonsocket  
Providence  
Pawtucket  
East Providence  
Providence  
Bristol  
Tiverton  
North Providence  
South Providence  
Westerly  
Narragansett  
Block Island  
Atlantic Ocean  
Atlantic Sound  
Providence River  
Pawtucket River  
Woonsocket River  
Narragansett River  
Moshassuck River  
Blackstone River  
Cumberland River  
Moose River  
Quinebaug River

Scale of Statute Miles.



Rand, McNally & Co., Engr's, Chicago.

LONGITUDE EAST 5° 12' FROM WASHINGTON.

5° 42'

5° 52'



*lungenlied* to the present day; and its weird and romantic legends have been alternately the awe and delight of his childhood.

RHINOCEROS, a name applied by the ancients to an animal the most striking external peculiarity of which is certainly the horn growing above its nose (*ῥινόκερως*, nose-horn).

The various existing and extinct species are grouped into a family, *Rhinocerotidae*, which is a division of the Perissodactyle (odd-toed) section of the great order of *Ungulata* or hoofed mammals, of which section the tapirs and horses are the only other surviving members.

The *Rhinocerotidae* are all animals of large size, but of little intelligence, generally timid in disposition, though ferocious when attacked and brought to bay, using the nasal horns as weapons, by which they strike and toss their assailant. Their sight is dull, but their hearing and scent are remarkably acute. They feed on herbage, shrubs, and leaves of trees, and, like so many other large animals which inhabit hot countries, sleep the greater part of the day, being most active in the cool of the evening or even during the night. They are fond of bathing and wallowing in water or mud. None of the species have been domesticated. Animals of the group have existed in both the Old and New Worlds since the beginning of the Miocene period. In America they all became extinct before the end of the Pliocene period. In the Old World their distribution has become greatly restricted, being no longer found in Europe and North Asia, but only in Africa and in portions of the Indian and Indo-Malayan regions.

RHODE ISLAND, one of the six New England States, and the smallest in extent of all the States, is one of the original thirteen which formed the American Union. It has an actual land area of only 1,054.6 square miles, the waters of Narragansett Bay, its chief physical feature, comprising an additional area of not far from 360 square miles. It lies between  $41^{\circ} 18'$  and  $42^{\circ} 3'$  N. latitude and  $71^{\circ} 6'$  and  $71^{\circ} 55'$  W. longitude, its greatest length from north to south being about forty-eight miles, and its greatest width from east to west about thirty-five miles. It is shut in on the east and north by Massachusetts, and on the west by Connecticut, while its southern shores are washed by the Atlantic Ocean.

The geological formation of the western portion of the State is chiefly that of the Montalban gneiss, which characterizes a great part of southern New England, but under the bay and to the east of it is an extensive coal-bearing formation, from which at different times upward of 750,000 tons of coal have been taken. The only other important deposit is one of magnetic oxide of iron. The climate of Rhode Island, though variable, differs from that of the exposed coast of Massachusetts Bay in the absence of harassing east winds; while the proximity of the southern parts of the State (Newport and vicinity) to the Gulf Stream results in an atmosphere of unusual warmth and moisture, and at the same time comparatively equable. No great extremes, either of heat or of cold, are experienced in the State.

The earliest authentic estimate of population is that of 7,181 in 1708. The War of Independence (1775-83) had the effect of reducing it from 59,707 in 1774 to 52,347 in 1782. The subsequent United States censuses show steady gains, as follows:—1790, 68,825; 1800, 69,122; 1810, 77,031; 1820, 83,059; 1830, 97,210; 1840, 108,830; 1850, 147,545; 1860, 174,620; 1870, 217,353; 1880, 276,531 (143,501 males, 133,030 females); while a State census in 1885 gave 304,419, an increase of 27,888 over that of 1880, and the census of 1890 showed a total of 345,506. A large percentage of the population is of foreign birth, principally from Great Britain

or Ireland, but lately the immigration shows a marked increase of French and Italians. About 100,000 of population are Roman Catholics; of the remainder, the Baptists (who have been in Rhode Island from its earliest settlement) are most numerous, while the communicants of the Protestant Episcopal church, with the Congregationalists and Methodists, have also a large representation.

No portion of the State can be described as exceptionally fertile; and only 3 per cent. of the population are engaged in agriculture. The favorable situation of Newport and Providence, at the two extremities of Narragansett Bay, led to the development in the last century of a flourishing trade. This was long ago greatly reduced, and the tonnage of these ports is now chiefly that of a coasting trade. With the final check given to foreign commerce in the war of 1812-14, manufactures gained at once that prominence in the local industries of the State which they have ever since held. From Samuel Slater's efforts at Providence and Pawtucket Falls, in 1790-93, may in fact be dated the real development of the cotton manufacturing industry in America, Slater, who had served an apprenticeship in England with a partner of Arkwright, having then been able from memory to set up in Rhode Island the whole set of recently improved spinning machinery. In 1791 only 5,858 yards of cotton cloth were made in Providence and vicinity, but in 1810 in Rhode Island 735,319 were made. Two years later, in 1812, there were fifty-three cotton mills within a radius of thirty miles of Providence.

During the past eighty years the development of manufacturing industry in Rhode Island, especially in the line of textile fabrics, has been constant. The latest available official reports show that the State contains 2,393 manufacturing establishments, with an invested capital of \$59,616,229, and employing 63,349 persons. The wages earned during the year amounted to \$23,253,099; the value of material used was \$48,271,448, and the total value of the products was \$95,452,085. Almost one-fourth of the total production was represented by cotton manufacturers and one-fifth by woolen manufactures; the figures being 21,771,504 and \$18,983,634 respectively. The agricultural products were valued at \$7,204,642, fisheries at \$1,613,046, making a grand total of \$104,269,773.

Rhode Island is a wealthy and prosperous State. Its taxable valuation for 1891 is given as follows: Real estate, \$291,907,716; personal property, \$104,886,836; a total of \$396,794,552. On January 1, 1891, the State debt was \$1,283,000; the sinking fund (par value) was \$951,703; leaving a net debt of \$331,296; and showing a reduction of debt during the year of \$91,279. The receipts of the State Treasury during the year, including a balance from the previous year, were \$1,255,131; the expenditures \$1,169,602, leaving a balance in the treasury January 1, 1891, of \$85,528.

Rhode Island is the most-thickly populated of all the States composing the American Union. Although it contains but three cities of importance it has thirty-three towns, and in fact is thoroughly built up throughout, forming practically a series of manufacturing towns. Its water-power is magnificent and is utilized in hundreds of places. Narragansett Bay with its tributaries extends throughout the heart of the State, thus affording a ready means of communication, while the railroad facilities are not surpassed even in New England. Although manufactures occupy so large a proportion of the population, agriculture is far from being neglected, and indeed the State is practically a market garden. Stock and dairy products, fruits and

seeds, are produced in great luxuriance and find a ready market.

It was not until 1828 that the present public school system was established; but, owing largely to the exceptional organizing ability of the first commissioner of public schools, Henry Barnard, a most efficient system was securely built up. Educational institutions, other than public, include Brown University, the Friends' School, and various others at Providence. Brown University was founded in 1764, under the name of Rhode Island College, and was the seventh college established in America.

The Redwood Library, at Newport, still in existence, incorporated in 1747, was the fourth public library founded in New England. The Providence Library was founded only a few years later, and is still perpetuated in the Providence Athenæum, an admirably conducted shareholders' library of 43,656 volumes. The Brown University Library, founded 1772, has more than 62,000 volumes, including several special collections of great rarity and value. There are, moreover, thirty-two "public libraries" in the State (free to all readers), with a total of about 100,000 volumes. The largest of these, 31,650 volumes, is the Providence Public Library.

The planting of the three scattered and independent settlements (Providence, 1636; Portsmouth, 1638; Newport, 1639) by Roger Williams and others whose views of church polity and doctrine had been found unpalatable to the Massachusetts Puritans, was not in the outset a movement for the establishment of a colony. The need of mutual protection, however, led to their combination; and the first general union of these three towns (together with a fourth, Warwick), was secured in 1647, under the charter of March 14, 1643-44. The union effected by this instrument was of the very loosest description, but under the pressure of causes which threatened the very existence of the colony a new and much more comprehensive charter was obtained in 1663. This extraordinarily liberal instrument constituted the fundamental law of Rhode Island for the next 180 years, through a succession of remarkable vicissitudes. The charters of Massachusetts and other American colonies were withdrawn in 1686, but the efforts of the royal agent were frustrated in Connecticut and Rhode Island; and in this colony the government was simply committed temporarily to the separate towns which had constituted the colony, the charter government being peacefully resumed three years later, in 1689. Rhode Island was hardly free, during the next seventy years, from some form of conflict with the mother country over the question of charter rights; and in the steps which served to precipitate the War of Independence (1775-83), as well as in the war itself, it was among the foremost. In the military operations of this war Nathaniel Greene, a Rhode Island officer, ranks easily second to Washington in generalship. Reluctant as Rhode Island was to acknowledge other authority than that of its own colonial charter, even after the close of the war, it did not accede to the constitution of the United States until June, 1790, more than a twelvemonth after the new government had gone into operation under Washington as president. Nor did it even then follow the example of the other States in framing a State constitution for the government of its local affairs, but retained its colonial charter of 1663 until almost the middle of the present century. In 1841 and 1842 the dissatisfaction with this mode of government culminated in a series of revolutionary movements; and a convention called by the citizens of the State adopted what was known as the "people's constitution," under whose provisions it was claimed that Thomas Wilson Dorr was chosen governor. Later in

the year 1842 a convention called by the regularly constituted authorities adopted the present constitution, under whose provisions the State government was organized in 1843. The governor (chosen annually) has no veto power. The legislative body, known as the General Assembly, comprises a senate and a house of representatives, each one of the thirty-six cities and towns choosing a single senator. The General Assembly begins its annual sessions in May at Newport, adjourning, after a few days, for a much more extended session at Providence beginning in the following January. The judicial body consists of one supreme court, with subordinate courts for the respective counties, the justices being chosen by vote of the General Assembly. The State is represented in the national Congress by two senators and two representatives. In the quadrennial election of president, Rhode Island has four votes in the "electoral college."

Since 1885 a number of amendments have been made to the State constitution, the more important of which is the extension of suffrage to soldiers and sailors of foreign birth who served in the army or navy from Rhode Island during the Civil War; also an amendment practically limiting the right of suffrage in the election of a city council, or in an election for the imposition of any tax or the expenditure of any money, to those who during the preceding year have paid tax on property assessed at \$134 in value. Amendments extending the right of suffrage to women, and prohibiting the manufacture and sale of intoxicating liquors to be used as a beverage were defeated. In the Civil War of 1861-65 Rhode Island took an active part, furnishing for the defense of the Union 24,042 men.

RHODES, an island in the Ægean Sea, belonging to the Turkish empire, lying off the southwest coast of Asia Minor, between 35° 52' and 36° 28' N. latitude and 27° 40' and 28° 15' E. longitude, about ten miles south of Cape Alepo. Its length is about forty-five miles from northeast to southwest, its greatest breadth twenty-two miles, and its area nearly 424 square miles. The island is diversified in its surface, and is traversed from north to south by an elevated mountain range, the highest point of which, named in ancient times Atabyris or Atabyrium, and still called Atairo, rises to an elevation of 4,560 feet. It commands a view of the elevated coast of Asia Minor toward the north, and of the Archipelago, studded with its numerous islands, on the northwest; while on the southwest is seen Mount Ida in Crete, often veiled in clouds, and on the south and southeast the vast expanse of waters which wash the African shore. The rest of the island is occupied in great part by ranges of moderately elevated hills, on which are found extensive woods of ancient pines, planted by the hand of nature.

The air is pure and salubrious, and it is said that there is hardly a day throughout the year in which the sun is not visible. The winds are liable to little variation.

Rhodes, in addition to its fine climate, is blessed with a fertile soil, and produces a variety of the finest fruits and vegetables. Numerous streams and rivulets, which take their rise in the central range, water the surrounding plains and valleys of the island. The valleys afford rich pastures, and the plains produce every species of grain; the wheat is of an excellent quality; and, but for the extortions of its barbarian rulers, the island might be the seat of agriculture as well as commerce, and might export large quantities of corn.

The commerce of the island has been of late years increasing at a rapid rate. Many British manufactures are imported by indirect routes, through Smyrna, Constantinople, Beyrout, and other places. Cotton

stuffs, calicoes, and gray linen are among the goods most in demand. The expansion of the trade has been very much owing to the establishment of steam navigation direct to the island, which is now visited regularly by French and Austrian steamers, as well as by some from England to Smyrna. The only town of any importance in the island is the capital, Rhodes, which stands at the northeast extremity.

Rhodes has at present two harbors. The least of these lies toward the east, and its entrance is obstructed by a barrier of rocks, so as to admit the entrance of but one ship at a time. The other harbor is larger, and also in a bad condition; here frigates of thirty guns may anchor, and are sheltered from the west winds, though they are exposed to the north and northeast winds. The two harbors are separated by a mole which runs obliquely into the sea. At the eastern entrance is the fort of St. Elmo, with a lighthouse; but the light is very feeble, and visible only a few miles.

The numerous poetical legends current among the Greeks with respect to Rhodes bear testimony to the importance which it attained in very early times.

Notwithstanding the evidences of early prosperity and power, we meet with very scanty notices of the Rhodian cities in the first period of Greek history. After the Persian War they appear to have passed into the condition of tributaries to Athens, and were compelled as such to join in the Athenian expedition to Sicily, but in 412 B.C. they deserted the Athenian cause and joined that of the Peloponnesians.

When Conon and his fleet restored the Athenian power by his victory off Cnidus (394 B.C.), Rhodes again embraced the victorious cause; but her fidelity during the subsequent contests was not very great. Sparta afterward received the allegiance of the island; and in the Social War (357-5) it joined the alliance against Athens, and, with the assistance of the Carian monarch Mausolus, succeeded in achieving independence. But, finding the power of that king dangerous to their liberties, the Rhodians once more sued for the Athenian protection, which they obtained through the eloquence of Demosthenes. Rhodes received a Macedonian garrison; but it was expelled after the death of Alexander, and a resolute resistance was begun to the Macedonian power. This formed one of the most illustrious periods in the history of the island. For arts as well as arms the island was renowned; the Rhodian laws, especially on maritime affairs, were reckoned the best in antiquity, and many of them adopted into the Roman code. Æschines, who had contended in eloquence with the greatest of orators, opened a school of rhetoric here. Protogenes embellished the city with his paintings, and Chares of Lindus with the celebrated colossal statue. The Colossus, erroneously supposed to have occupied a position striding over the entrance to the harbor, stood for fifty-six years, till an earthquake prostrated it in 224 B.C. Its enormous fragments continued to excite wonder in the time of Pliny, and were not removed till 656 A.D., when Rhodes was conquered by the Saracens, who sold the remains for old metal to a dealer who employed 900 camels to carry them away. More than 3,000 statues are said to have adorned the city, which was said by Strabo to surpass all others in beauty and ornamental character. After acknowledging allegiance to the Roman Empire, the Persians, etc., the island was granted by the emperor Emmanuel to the Knights of St. John, who soon after resisted a siege by the sultan Othman. They strengthened the natural advantages of the place by skillful fortifications, and by discipline and equipments made themselves nearly a match for the superior numbers of the Turks. The last and most famous siege of Rhodes took place in 1522,

when, after a desperate resistance for four months to the overwhelming numbers of the Ottomans, the knights, being left unassisted by all the European powers, capitulated on honorable terms, and evacuated the island. On the first day of 1523 Villiers de Lisle Adam, the grand master, embarked the last of the small band carrying away all the property of the order, and leaving the ruins of their city to the enemy. Rhodes has since been in the possession of the Turks, and is now the residence of the pasha of the Archipelago.

The population of the island is estimated at about 27,000, of whom 6,000 are Turks, 3,000 Jews, and the remainder Greeks. Of these nearly 20,000 are contained in the city and its suburbs; the rest of the island is very thinly peopled, though numerous small villages are scattered over its whole extent.

RHODIUM. See PLATINUM.

RHODODENDRON. Classical writers, such as Dioscorides and Pliny, seem, from what can be ascertained, to have called the oleander (*Nerium Oleander*) by this name, but in modern usage it is applied to a large genus of shrubs and trees belonging to the order heaths (*Ericaceæ*). The rhododendrons, then, are trees or shrubs, never herbs, with simple, evergreen or deciduous leaves, and flowers in terminal clusters surrounded in the bud by bud-scales but not as a rule by true leaves. The flowers are remarkable for the frequent absence or reduced condition of the calyx. The funnel or bell-shaped corolla, on the other hand, with its five or more lobes, is usually conspicuous, and in some species so much so as to render these plants greatly prized in gardens. The free stamens are usually ten, with slender filaments and anthers opening by pores at the top. The ovary is five or many celled, ripening into a long woody pod which splits from top to bottom by a number of valves, which break away from the central placenta and liberate a large number of small bran-like seeds provided with a membranous wing-like appendage at each end. The species are for the most part natives of the mountainous regions of the northern hemisphere, extending as far south as the Malay Archipelago and New Guinea, but not hitherto found in South America or Australia. None are natives in Britain. The varieties grown in gardens are mostly derived from the Pontic species (*R. ponticum*) and the Virginian *R. catawbiense*. These are mostly hardy in England.

What are termed greenhouse rhododendrons are derivatives from certain Malayan and Javanese species, and are consequently much more tender. They are characterized by the possession of a cylindrical (not funnel-shaped) flower-tube and other marks of distinction. Azaleas now referred to *Rhododendron* are derived from Chinese and Japanese species chiefly. What are called in gardens Ghent azaleas are hardy varieties with deciduous gummy foliage and tufts of fragrant, brilliantly-colored flowers. These are derivatives from *A. calendulacea*, *A. viscosa*, and other northeast American species. The foliage of rhododendrons contains much tannin, and has been used medicinally. Whether the honey mentioned by Xenophon as poisonous was really derived from plants of this genus as alleged is still an open question.

RHONE (Fr. *Rhône*), the largest European river flowing directly into the Mediterranean, rises in the Swiss canton of Valais, passes through the Lake of Geneva, strikes across the line of the Jura, and turning southward through France falls into the Gulf of Lyons. It has a length of 447 miles according to Strelbitzky (505 according to other authorities), and its principal affluent, the Saône, has a length of 268 miles above the confluence, which is 200 miles inland. The

drainage area of the whole river-system is 38,000 square miles, and the mean discharge at the river mouth is 60,000 cubic feet per second, the maximum being 428,840 cubic feet and the minimum 19,426. Since 1871 the motive power of the river has been utilized for the industries of Bellegarde; a large tunnel twenty feet high and more than half a kilometer long brings the water from the south side of the "perte" to turbine wheels placed in the bed of the Valserine, and wire ropes transmit the power to the Bellegarde workshops on the plateau 400 feet above.

**RHÔNE**, a department of southeastern France, deriving its name from the river on which Lyons, its chief town, is situated, was formed in 1793 from the eastern portion of the department Rhône-et-Loire, comprising parts of Lyonnais and Beaujolais. It is bounded on the north by Saône-et-Loire, on the east by Ain and by Isère, on the south and west by Loire, and lies between  $45^{\circ} 27'$  and  $46^{\circ} 18'$  N. latitude and  $4^{\circ} 15'$  and  $4^{\circ} 53'$  E. longitude. It contains the Beaujolais Mountains, the highest peak of which is 3,320 feet; the Tarare group; the Lyonnais Mountains (nearly 3,000 feet); and Mont Pilât, the highest peak of which belongs to the department of Loire. The lowest point of the department, where it is left by the Rhone, is 460 feet above the level of the sea. The meteorological conditions vary greatly with the elevation and exposure. Snow sometimes lies in the mountains from November to April, while at Lyons and in the valleys the mean temperature in winter is  $36^{\circ}$  Fahr., and in summer  $70^{\circ}$ , the annual mean being  $53^{\circ}$ . The average rainfall is somewhat higher than is general over France, owing to the amount of the precipitation on the hilly region.

Of a total area of 689,545 acres, 286,000 are arable, 120,000 are pasture meadow land, 79,000 under vines, 79,000 wood, and 66,000 moorland. The soil of the department is for the most part stony and only moderately fertile. Fruit trees, such as peaches, apricots, walnuts, and chestnuts, grow well, but the wood in general is little more than copse and brushwood. The wealth of the department is mainly derived from its industries. The population is principally engaged in the manufacture of chemicals, of machinery and of silk. **LYONS** (*q.v.*) is the center for the silk manufacture and Tarare for that of muslins, velvets, plush, calicoes, and prints, there being twenty-six factories with 33,000 spindles, 540 power-looms, 4,800 hand-looms; 2,000 workmen are also employed in the manufacture of counterpanes. The chief workshops for repairing the locomotives of the Paris, Lyons, and Mediterranean are in this department. There are also foundries of copper, bronze, and bell-metal, as also gold, silver, and steel wire works. The manufacture of gold and silver plate and jewelry has an annual turnover of 1,600,000, that of edible pastes amounts to \$2,400,000, and that of paper to \$270,000. The manufacture of wall papers is second only to that of Paris. In addition there are fifteen chemical works, eight glass works employing 1,000 workmen, nine candle works, twelve soap works and 700 mills. Coal and anthracite are found, as well as argentiferous lead, manganese, and copper pyrites; there are also large stone quarries. The cold mineral spring of Charbonnière, containing bicarbonates, iron and sulphur, is nineteen miles west of Lyons. The means of communication include 76 miles of navigable river, 5 of canal (the canal of Givors), 141 miles of government road, 3,685 miles of other roads, and 165 miles of railway connecting Lyons with Paris, with Roanne by Tarare, with Montbrison, St. Étienne, Nîmes, Marseilles, Grenoble, Chambéry, Geneva, Bourg, and Trévoux, Beaujeu with Belleville (on the Lyons and Mâcon line), and Thizy with Cours (two manufacturing towns

in the neighborhood of Tarare on the line from Lyons to Roanne). The population, which owing to the development of industries has doubled since 1801, was 741,470 in 1881, and estimated at 825,000 in 1890. There are two arrondissements, Lyons and Villefranche, twenty-nine cantons and 264 communes. Rhône belongs to the diocese of Lyons, is under the jurisdiction of the superior court of Lyons, and is divided between the corps d'armée of Clermont and of Grenoble. The chief towns are **LYONS** (*q.v.*); Tarare (13,352); Villeurbanne (11,176); Caluire-et-Cuire (9,740), and Oulins (7,536), suburbs of Lyons; Givors (11,470), a stirring town on the Rhone at the junction of the canal by which coal is brought from St. Étienne to the Rhone, with glass works, blast furnaces, foundries, brick and tile works, and potteries; Amplepuis (7,118); and Cours (6,929).

**RHUBARB**. This name is applied both to a drug and to a vegetable.

Rhubarb is used in medicine as a mild purgative and cholagogue, promoting digestion and improving the appetite when given in small doses, probably by stimulating the intestinal secretions. It has a subsequent astringent effect due to the rheotannic acid it contains, but this can be counteracted by giving it with alkaline preparations. It is especially valuable in the treatment of duodenal catarrh or catarrh of the biliary ducts with jaundice; and in certain skin diseases it has proved to be a valuable medicine, the results obtained being probably due to the chrysophan contained in it.

The rhubarb used as a vegetable consists of the leaf stalks of several hybrids between the species *R. raphaniticum*, *R. undulatum*, *R. palmatum*. The petioles of *R. officinale* have also been proved to be edible; but that plant is grown more frequently on account of its ornamental foliage. See **HORTICULTURE**.

**RHYL**, a watering-place of North Wales, in the county of Flint, is situated near the mouth of the Chwyd, thirty miles northwest of Chester and ten northwest of Denbigh, a railway line to which here joins that from Chester to Holyhead. Its chief advantages as a watering-place are the pure air and extensive firm sands. The town possesses a town hall, extensive winter gardens, racquet courts, lawn-tennis grounds, and other attractions. The east and west parades face the sea, and the pier, constructed of iron, is 700 feet in length. There is daily communication by steamer with Liverpool, Llandudno, Bangor, etc. The population of the urban sanitary district (area 600 acres) in 1871 was 4,500, in 1881 it was 6,029, and in 1889 about 7,000.

**RHYMER, THOMAS THE**. See **THOMAS OF ERCELDOUNE**.

**RHYMNEY**, an urban sanitary district of Monmouthshire, on the borders of Glamorganshire, England, is situated in the valley of the Rumney river, twenty miles west of Abergavenny, and twenty-two north of Cardiff. It owes its importance to the neighboring coal mines and to its iron and steel works, which employ nearly the whole population. The works of the Rhymney Iron Company, including blast furnaces and rolling mills, are among the largest of the kind in England. The town consists chiefly of plain houses inhabited by workpeople, the principal building being the church, a handsome structure in the Doric style erected in 1842. The population of the urban sanitary district (area 2,890 acres) in 1871 was 8,138, in 1881 it was 8,663, and in 1889 about 8,900.

**RIAZAN**. See **RYAZAN**.

**RIBAULT**, or **RIBAUT, JEAN**, a French navigator rendered famous by his connection with the early settlement of FLORIDA (*q.v.*), was born at Dieppe, probably

about 1520. Appointed by Coligny to the command of a colonizing expedition, Ribault sailed on February 18, 1562, with two vessels, and on May 1st, landed at St. John's river, or, as he called it, Rivière de Mai. In 1563 he appears to have been in England and to have issued *The whole and true discoverie of Terra Florida*. In 1565 Ribault was again sent out to the new settlement. While he was still there the Spaniards under Menendez de Avila, attacked the French ships at the mouth of the river. Ribault set out to retaliate on the Spanish fleet. Induced to surrender by false assurances of safeguard, Ribault and his men were put to the sword in October, 1565.

**RIBBON-FISHES** (*Trachypteridæ*), a family of marine fishes readily recognized by their long, compressed tape-like body, short head, narrow mouth, and feeble dentition. A high dorsal fin occupies the whole length of the back; an anal is absent, and the caudal, if present, deviates in its direction from the longitudinal axis of the body. The pectoral fins are small, the ventrals composed of several rays or of one long ray only. The largest of ribbon-fishes are the species of *Regalecus* (see OAR-FISH), of which specimens some twenty feet long by twelve inches in depth of body and two inches in thickness have been found. Like all deep sea fishes they occur in all seas.

**RIBBONS.** By this name are designated narrow webs, properly of silk, not exceeding nine inches in width, used primarily for binding and tying in connection with dress, but also now applied for innumerable useful, ornamental, and symbolical purposes. Along with that of tapes, fringes, and other smallwares, the manufacture of ribbons forms a special department of the textile industries. It is obvious that the weaving of very narrow fabrics, piece by piece, on separate looms would be a tedious and expensive process; yet for ages such was the only method of making ribbons. In 1745 the celebrated John Kay, the inventor of the fly-shuttle, obtained, conjointly with Joseph Stell, a patent for improvements in the ribbon loom; and since that period it has benefited by the inventions applied to weaving machinery generally.

Ribbon weaving is known to have been established near St. Étienne (dep. Loire) so early as the eleventh century, and that town to the present day continues to be the headquarters of the industry. In the time of Louis XIV. the ribbon trade there gave employment to about 6,000 persons; now about 17,000 looms are in operation in the district, 1,500 of which are power-looms in factories. Crefeld is the center of the German ribbon industry, the manufacture of black velvet ribbon being there a specialty. In Vienna about 2,000 looms are employed. Next to St. Étienne and Basel, Coventry is the most important seat of ribbon making, and to some extent the industry is also prosecuted at Norwich and Leicester. The average annual value of the ribbon trade of western Europe and America is \$80,000,000. A large proportion of the ribbons now made are mixed fabrics of silk and cotton.

**RIBERA, JUSEPE**, or, in Italian, GIUSEPPE, commonly called LO SPAGNOLETTO, or the Little Spaniard, a leading painter of the Neapolitan or partly of the Spanish school, was born near Valencia in Spain, at Xativa, now named S. Felipe, on January 12, 1588. He died peaceably and wealthy in Naples in 1656. His own signature on his pictures is constantly "Jusepe de Ribera, Español."

**RIBES.** See CURRANT and GOOSEBERRY.

**RICARDO, DAVID**, a celebrated political economist, was born at London, April 19, 1772. His first publication (1809) was *The High Price of Bullion a Proof of the Depreciation of Bank Notes*. This tract was an

expansion of a series of articles which the author had contributed to the *Morning Chronicle*.

In 1811 he made the acquaintance of James Mill, whose introduction to him arose out of the publication of Mill's tract entitled *Commerce Defended*. And in 1815, when the Corn Laws were under discussion, he published his *Essay on the Influence of a Low Price of Corn on the Profits of Stock*. This was directed against a recent tract by Malthus entitled *Grounds of an Opinion on the Policy of Restraining the free Importation of Foreign Corn*. The reasonings of the essay are based on the theory of rent which has often been called by the name of Ricardo; but the author distinctly states that it was not due to him.

In the *Proposals for an Economical and Secure Currency* (1816) he first disposes of the chimera of a currency without a specific standard, and pronounces in favor of a single metal, with a preference for silver, as the standard. He then puts forward a scheme which had been already briefly indicated in the appendix to the fourth edition (1811) of his *High Price of Bullion*. This was that the bank should be obliged to deliver on demand, not coin, but uncoined bullion or gold standard bars, in exchange for its notes, whenever the notes presented together for payment reached a moderate fixed amount. In a later tract (*Plan for a National Bank*) Ricardo proposes that one pound notes should be confirmed to the country districts. The general plan has been objected to on the ground that it would not provide a sufficient metallic reserve to meet sudden emergencies arising from the necessity of foreign payments.

Ricardo's chief work, *Principles of Political Economy and Taxation*, appeared in 1817. In 1820 he contributed to the supplement of the *Encyclopædia Britannica* an *Essay on the Funding System*, and in 1822 he published a tract *On Protection to Agriculture*, which is an able application to controversy of the general principles laid down in his systematic work.

Ricardo died on September 11, 1823, at his seat (Gatcomb Park) in Gloucestershire.

In forming a general judgment respecting Ricardo, we must have in view not so much the minor writings, to which this article has been in great part devoted, as the *Principles*, in which his economic system is expounded as a whole. By a study of this work we are led to the conclusion that he was an economist only, not at all a social philosopher in the wider sense, like Adam Smith or John Mill. He had great acuteness, but little breadth. For any large treatment of moral and political questions he seems to have been alike by nature and preparation unfitted; and there is no evidence of his having any but the most ordinary and narrow views of the great social problems. His whole conception of human society is material and mechanical, the selfish principle being regarded, after the manner of the Benthamites, as omnipotent, not merely in practical economy, but, as appears from his speech on the ballot and his tract on reform, in the whole extent of the social field.

**RICCATI, JAMES, COUNT**, a celebrated Italian mathematician, was born at Venice, May 8, 1676, and died at Treviso, April 15, 1754. He studied at the university of Padua, where he graduated in 1696. Riccati's name is best known and will be preserved by mathematicians in connection with his celebrated problem called Riccati's equation, published in the *Acta Eruditorum*, September, 1724.

**RICCI, MATTEO**, is eminent as practically the founder of Christian missions in modern China. He was born of a noble family at Macerata in the March of Ancona, on October 7, 1552, two months before Francis Xavier, burning with the desire to carry his message

into China, died at its gates. After some education at a Jesuit college in his native town, Ricci, at the age of sixteen, was sent by his father to study law at Rome. But the youth had already contemplated entering the Jesuit Company, and this purpose he accomplished about 1571. In 1577 Ricci and several other Italian students of noble birth offered themselves for the East Indian missions; and Ricci, without visiting his family to take leave, proceeded to Portugal. They arrived at Goa, in September, 1578. After four years spent in India, Ricci was summoned to the task of opening China to evangelization.

Several attempts had been made by Xavier, and since his death, to introduce the church into China. In 1571 a house of the Jesuits had been set up at Macao (where the Portuguese were established in 1557), but their attention was then occupied with Japan, and it was not till the arrival at Macao of Alessandro Valignani on a visitation in 1582 that work in China was really taken up. For this object he had obtained the services first of M. Ruggieri and then of Ricci. After various disappointments they found access to Chau-king-fu on the Si-kiang or West River of Canton, where the viceroy of the two provinces of Kwang-tung and Kwang-si then had their residences, and by favor of this personage they were enabled to establish themselves, and there spent several years. In 1601 he obtained a settlement with an allowance for subsistence in Peking, from which time Ricci's estimation among the Chinese was constantly increasing, as was at the same time the amount of his labors. He died May 14, 1610.

Ricci's character, his acquirements, and the use he made of them, were certainly worthy of all honor. We do not know what amount of success in conversion had rewarded his labors during his life, but some eminent and creditable converts there were, and his work was the foundation of the considerable spread which the Roman Catholic Church has since attained in China. Probably no European name of past centuries is so well known in China as that of *Li-ma-teu*, the form in which the name of the missionary (*Ri-cci Mat-teo*) was adapted to Chinese usage, and by which he appears in Chinese records. The works which he composed in Chinese are numerous. One of the first which attracted attention and reputation among Chinese readers was a Treatise upon Friendship, in the form of a dialogue containing short and pithy paragraphs; this is stated in the *De Expeditione* to have been suggested during Ricci's stay at Nan-chang by a conversation with the prince of Kien-ngan, who asked questions regarding the laws of friendship in the West. In the early part of his residence at Peking, Ricci brought out the *T'ien-chu shih-i*, or "Veritable doctrine of the Lord of Heaven," which deals with the divine character and attributes under eight heads. In 1604 Ricci completed the *Erh-shih-wu yen*, a series of short articles of moral bearing, but exhibiting little of the essential doctrines of Christianity. *Chi-jên shih pien* is another of his productions, completed in 1608, and consisting of a record of ten conversations held with Chinese of high rank.

Ricci's pointed attacks on Buddhism, and the wide circulation of his books, called forth the opposition of the Buddhist clergy. One of the ablest who took their part was Chu-liang, a priest of Hang-chau, who had abandoned the literary status for the Buddhist cloister, wrote three articles against the doctrine of the missionaries. Another work of Ricci's which attracted attention was the *Hsi-kuo fa*, or "Art of memory as practised in the West." Ricci was himself a great expert in *memoria technica*, and astonished the Chinese by his performances in this line. He also wrote, or edited,

various Chinese works on geography, the celestial and terrestrial spheres, geometry, and arithmetic.

RICCIARELLI, DANIELE, Italian artist, generally called, from the place of his birth, DANIELE DA VOLTERRA, was born in 1509, studied painting under Razzi and Peruzzi. He died in 1566. The principal extant works of Ricciarelli are at Rome. These are a *St. John the Baptist* in the picture gallery of the Capitol, a *Savior Bearing the Cross* in the Palazzo Rospigliosi, and a *Descent from the Cross*, his masterpiece, in the church of Trinità de Monti. There is also an *Elijah* at Volterra.

RICCOBONI, MADAME, whose maiden name was Marie Jeanne Laboras de Mézières, and who married and was deserted by an actor and author of little merit, was born at Paris in 1714. She herself was an actress, but did not succeed on the stage. She then took to novel writing and deserves a considerable place in the history of sentimental novel. Her first work was the remarkable *Histoire du Marquis de Cressy* (1758). This was followed by *Milady Catesby*, *Fanny Butler*, *Ernestine* (sometimes thought her masterpiece), three series of *Lettres* in the names of *Adelaide de Dammartin* (often quoted as *Madame de Sancerre*), *Elizabeth Sophie de Vallière*, *Milord Rivers*, and others. She died in 1792 in great indigence. Besides the works named she translated Fielding's *Amelia*, and tried a continuation of Marivaux's unfinished *Marianne*.

RICE. According to Roxburgh the cultivated rice with all its numerous varieties has originated from a wild plant called in India Newaree or Nivara (*Oryza sativa*). The rice plant is an annual grass with long linear glabrous leaves, each provided with a long, sharply-pointed ligule. The spikelets are borne on a compound or branched spike, erect at first but afterward bent downwards. Each spikelet contains a solitary flower with two other small glumes and two inner, larger and folded lengthwise, the outer one of the two rather larger and sometimes provided with an awn. Within these are six stamens, a hairy ovary surmounted by two feathery styles which ripens into the fruit (grain), and which is invested by the husk formed by the persistent glumes. The cultivated varieties are extremely numerous, some kinds being adapted for marshy land, others for growth on the hill-sides. It was very early cultivated in India, in some parts of which country, as in tropical Australia, it is, as we have seen, indigenous. There is proof of its culture in the Euphrates valley and in Syria 400 years before Christ. Crawford on philological grounds considers that rice was introduced into Persia from southern India. Rice was first cultivated in Italy near Pisa in 1468.

Rice constitutes one of the most important articles of food in all tropical and subtropical countries, and is one of the most prolific of all crops. The rice yields best on low lands subject to occasional inundations, and thus enriched by alluvial deposits. An abundant rainfall during the growing season is also a desideratum. Rice is sown broadcast, and in some districts is transplanted after a fortnight or three weeks. No special rotation is followed; indeed the soil best suited for rice is ill adapted for any other crop. In some cases little manure is employed, but in others abundance of manure is used. No special tillage is required, but weeding and irrigation are requisite. Payen gives only 7 per cent. of gluten in rice as compared with 22 per cent. in the finest wheat, 14 in oats, and 12 in maize. The percentage of potash in the ash is as 18 to 23 in wheat. The fatty matter is also less in proportion than in other cereals. Rice, therefore, is chiefly a farinaceous food, and requires to be combined with fatty and nitrogenous substances, such as milk or meat gravy, to satisfy the requirements of the system.

Rice was introduced into the United States at Charleston, S. C., during 1694. It was planted first in the vegetable gardens of the city and yielding abundantly grew in importance until now it is the leading agricultural product of that State. Its cultivation there, as also in the other States of Georgia, Louisiana, and elsewhere in the South where it was subsequently introduced, has been scientifically conducted of late years, which, with the favoring conditions of the soil, and the care exercised in harvesting the crop, has secured for the American commodity a reputation for superiority unequalled by that of any other country. The crops fluctuate annually from various causes, the deficiency being made up by importation which, for three months ending June 30, 1889, amounted in round numbers to 12,000 tons. Nearly the whole of this comes from British Burmah and Bengal. A large proportion of the rice brought to Europe is used for starch making, and some is taken by distillers of alcohol. Rice is also the source of a drinking spirit in India, and the national beverage of Japan—saké—is prepared entirely from the fermented grain.

RICE PAPER. The substance which has received this name in Europe, through the mistaken notion that it is made from rice, consists of the pith of a small tree *Aralia papyrifera* cut into thin slices. The tree grows in the swampy forests of Formosa and apparently nowhere else, and large quantities of the stems are conveyed to Chinchew, where the snow-white delicate pith is carefully sliced by spiral cuts into uniform sheets of a fine ivory-like texture. It is dyed various colors, and extensively used for the preparation of artificial flowers, while the white sheets are employed by native artists for water-color drawings.

RICH, CLAUDIUS JAMES, Eastern traveler and scholar, was born near Dijon, March 28, 1787. While at Shiraz, Persia, he was struck down by cholera October 5, 1821. His early death was a vast loss to Oriental investigation. The work he did accomplish was of great value for Eastern archæology and history.

RICHARD I., king of England, called even before his death "the Lion" or "Cœur de Lion," was the third son of Henry II. and Eleanor of Aquitaine. He was born, probably at Oxford, on September 8, 1157. In 1173 he joined the league against Henry II., but when the rebellion was suppressed in 1174 he was pardoned by his father. The death of his brother Henry in 1184 made Richard heir to the throne. From this time he was the center of the disturbances which troubled the last five years of Henry II.'s reign.

Richard's reign falls into two equal divisions—the one comprising his crusade and captivity, the other his wars against Philip in France. On his father's death he was at once acknowledged as duke of Normandy and count of Anjou. On September 3, 1189, he was crowned with great pomp at Westminster. This is the first English coronation of which we have a full account, and the formalities then adopted have been followed with little alteration ever since. Richard at once set to work to collect funds for the crusade. He raised large sums by various means, formed an alliance with Philip of France, and after obtaining the surrender of Acre on the coast of Syria arrived about Christmas, 1191, within sight of the Holy City, but, owing to the reluctance or desertion of his French allies, he found it impossible to besiege it, and therefore withdrew to the coast. Bad news from England now made him anxious to go home, but he resolved on one more attempt to save Jerusalem. He set out on June 4th, arrived again within sight of the city, and again retired without venturing to attack. Jaffa, which had been taken by Saladin, was retaken on August 1st. This was Rich-

ard's last exploit in the East. On September 1st he made a three years' truce with Saladin, on the basis of the *status quo*; and on October 9th he sailed for home, leaving behind him a name long remembered by the Saracens, but, beyond the capture of Acre, having accomplished none of the objects with which he set out.

Fearing to go through France, Richard sailed up the Adriatic, and made his way on foot, as a pilgrim and almost alone, to Erdburg near Vienna. Here he was discovered (December 21, 1192) by Leopold, duke of Austria, of whom, while at Ascalon, he had made a bitter enemy. After being confined for some time, he was surrendered in March, 1193, to the emperor Henry VI., who imprisoned him first at Trifels and afterward at Worms, whence he was at length liberated, and on the following March 13, 1194, he set foot again in England. He rapidly made himself master of the castles which held out for John, and on April 17, 1194, he was crowned a second time. He died on April 6, 1199, and was buried at Fontevraud.

RICHARD II., king of England, the only son of Edward the Black Prince and Joan of Kent, was born at Bordeaux, April 13, 1366. He succeeded to the throne on the death of his grandfather Edward III., on June 21, 1377. He was crowned on July 16. The weakness and unpopularity of the government produced a ferment among the lower classes, which, aggravated by the heavy taxation of 1379 and 1380, culminated in the Peasants' Revolt of June, 1381. This revolt gave Richard, then a lad of fifteen, his first opportunity of distinguishing himself. On June 14th he met the rebels at Mile End, and, by promising the abolition of villenage, induced the Essex contingent to return home. Next day he met the Kentish men at Smithfield. In the parley which followed, their leader, Wat Tyler, was killed. The mob were about to avenge his death when the young king, riding forward alone, calmed their irritation and induced them to follow him to Islington. Here a body of troops came to the king's aid, but Richard prevented a conflict, and persuaded the rioters to disperse. His presence of mind, extraordinary in one so young, not only saved his own life but averted a general disaster. In January, 1382, he married Anne of Bohemia, daughter of the emperor Charles IV. In 1385 the king led an expedition to Scotland. His refusal to allow the army to penetrate beyond Edinburgh is said to have caused another quarrel with the duke of Lancaster. Between 1385 and 1389 the monarchy was practically superseded by a committee on government, but in May, 1389, Richard threw off the yoke. On the ground that he was now of full age, he suddenly informed his council that he intended to rule alone. Gloucester made no resistance; the nation acquiesced; and Richard was at last really king. For eight years he ruled continuously.

In June, 1394, the queen died. In October of the same year Richard went to Ireland. He remained in Ireland till May, 1395. Next year he concluded a twenty-five years' truce with France, and engaged to marry Isabella, the French king's daughter. In July, 1397, he suddenly seized Warwick, Arundel, and Gloucester. The parliament, which met in September, declared the "appellants" guilty of high treason. Arundel was executed, Warwick imprisoned, Gloucester died, probably by violence, in prison. In February, 1399, John of Gaunt died, and Richard seized the Lancaster estates, thus reducing Hereford to desperation. The latter at once began to prepare to recover his inheritance, and Richard, apparently ignorant of the danger, went over to Ireland, thus leaving the kingdom open to his rival. Henry landed in Yorkshire early in July, and rapidly collected an overpower-

ing force. Richard returned to find Henry in possession of power and himself deserted by the nation. He surrendered to Henry at Flint (August 19th) and was conveyed to London. On September 29th he executed a deed by which he resigned the crown. Next day the deed was read in parliament. Formal sentence of deposition was pronounced, and Henry claimed and received the crown. A month afterward the late king was sentenced to perpetual imprisonment, and was removed to Pontefract. The conspiracy against Henry IV., which was discovered in January, 1400, sealed Richard's fate. The manner of his death is unknown, but there can be little doubt that he died by violence. He is said to have been buried at Langley, February 14, 1400.

RICHARD III., king of England, third son of Richard, duke of York, and Cicely Nevil, was born at Fotheringay on October 2, 1452. Having been sent out of England for safety on the death of his father in 1460, he was recalled next year by his brother Edward IV., who created him duke of Gloucester and appointed him lord high admiral. In 1474 he married Anne, daughter of the earl of Warwick and widow of Prince Edward. In 1482 he led an army into Scotland to aid the duke of Albany against James III., occupied Edinburgh and captured Berwick. On the death of Edward IV. (April 9, 1483) Richard at once made himself master of the situation by seizing Prince Edward, his nephew. Having assumed the title of Protector, he rapidly developed his plans for securing the crown. Under the pretext of a plot against his life, he seized and beheaded Hastings, Grey, and others (June 13th), forced the queen mother to give up her younger son Richard, and, on June 26, 1483, assumed the crown. The children of Edward IV. were set aside on the plea that their father was illegitimate. On July 6 Richard was crowned king. Shortly afterward it was publicly reported that the sons of Edward IV. were dead; their actual fate is to the present day unknown. In October, 1483, the rebellion of the duke of Buckingham was put down; the duke himself was executed on November 2d. A parliament which met in January, 1484, acknowledged Richard as king, in return for which he assented to an Act abolishing benevolences. His short reign was mainly occupied in preparing to resist the invasion of Henry of Richmond. Unable to prevent Henry's landing (August 7, 1485), Richard met his rival in battle at Bosworth (August 22d), and at the same time lost his crown and his life.

RICHARD, earl of Cornwall and king of the Romans, second son of John, king of England, and Isabella, was born at Winchester, January 5, 1209. In 1225 he undertook the government of Gascony. In 1240 he went on a crusade, returning in 1241, after concluding a treaty with the sultan of Egypt. In 1244 and 1246 we find him heading the parliamentary opposition against Henry III. When Henry went to France in 1253, Richard, together with the queen, acted as regent. He had already (1252) declined the pope's offer of the kingdom of Sicily, but in January, 1257, he was elected emperor by a majority of the electors, and soon afterward was crowned at Aix-la-Chapelle. In 1269 he went to Germany again for a short time, and returned to England to die at Kirkham in 1272.

RICHARD, duke of Normandy. See NORMANDY.

RICHARD OF BURY. See AUNGERVYLE, RICHARD.

RICHARD OF CIRENCESTER, historical writer, born 1335, was a member of the Benedictine abbey at Westminster, and his name ("Circestre") first appears on the chamberlain's list of the monks of that foundation drawn up in 1355. In the year 1391 he obtained a license

from the abbot to go to Rome, his design being to visit *limina Apostolorum*, and in this license the abbot gives his testimony to Richard's perfect and sincere observance of religion for upward of thirty years. In 1400 Richard was in the infirmary of the abbey, where his death took place in the following year. His only known extant work is *Speculum Historiale de Gestis Regum Angliæ, 447-1066*.

Of the *Speculum* the main value may be said to be of a negative character, in that it affords the most conclusive proof of the spuriousness of another work attributed to Richard and long accepted by the learned world as his. This was the *De Situ Britannia*, an elaborate forgery relating to the antiquities of Roman Britain which first appeared at Copenhagen in the year 1758.

This forgery was accepted as genuine by a well-known antiquary of the last century, Dr. William Stukeley, and under the sanction of his authority continued for a long time to be regarded in the same light by numerous scholars and antiquaries. Among their number were Gibbon, John Whitaker, Richard Gough, and Lingard. On the other hand, critics of a later date, such as J. J. Conybeare, Doctor Guest, Wex, Raine, and Woodward, from time to time gave expression, on various grounds, to a contrary conclusion. All doubt on the subject may, however, be held to have been effectually set at rest by the masterly and exhaustive exposure of the whole fraud drawn up by Professor Mayor. He has not only demonstrated, from the external and internal evidence alike, the spuriousness of the whole treatise, but in a collation (extending to nearly a hundred pages) of numerous passages with corresponding passages in classical mediæval authorities, has also traced out the various sources from whence Bertram derived the terminology and the facts which he reproduced in the *De Situ*.

RICHARD OF ST. VICTOR, a Scot by birth, was subprior of his convent in 1159 and prior in 1162, and was a friend of St. Bernard, to whom some of his books are dedicated. Of his works, which embrace exegesis, moral and dogmatic subjects, and mystical contemplation, the first edition appeared at Paris in 1528, the best at Rouen in 1650. He died in 1173.

RICHARDSON, SIR JOHN, naturalist, was born at Dumfries on November 5, 1787, and died near Grasmere on June 5, 1865. He became a surgeon in the navy in 1807, and is known by his share in the arctic explorations of Parry and Franklin, 1819-22 and 1825-26 (see POLAR REGIONS), and in the Franklin search expedition of 1848-49, but especially by his *Fauna Boreali-Americana*. He also wrote *Arctic Searching Expedition* (1851), and other works on the zoölogy of the arctic regions. He was knighted in 1846.

RICHARDSON, SAMUEL, born 1689, as the inventor or the accidental discoverer of a new literary form, the modern novel of domestic life and manners, is entitled to a more prominent place in history than his powers, whether of thought or style, would justify. He was the author of *Clarissa Harlowe* (1749) and *Sir Charles Grandison* (1753).

The epistolary form in which his stories were cast, and which remains as a memorial of their first suggestion, was abandoned by Richardson's first great follower and satirist, Fielding; but it was Richardson that led the way into the new field of literature. He lived long enough to see many imitators. Within twelve years of the publication of *Pamela*, the *Monthly Review* began to complain of the labor of reading the multitude of novels submitted to its judgment, and the masterpieces of Fielding, Smollett, and Sterne were produced before his death in 1761. His correspondence was published in six volumes in 1804.



**RICHELIEU, ARMAND DU PLESSIS, CARDINAL DE**, the greatest French statesman of the seventeenth century, was born in 1585. As the chief events of his life have been recorded in connection with the sketch of his political career in the article **FRANCE**, it only remains briefly to mention here some matters of secondary importance. In the early days of his courtiership, when he retired for a time to Avignon, Richelieu wrote two religious works which attained to considerable popularity—*Principaux points de la foy deffendus contre l'escrit adressé au roy par les quatre ministres de Charenton* (1617), and *La méthode la plus facile et assurée de convertir ceux qui sont séparés de l'Église* (Paris, 1651). After he became master of France, his desire for distinction as a man of letters and especially as a dramatic author led him to resort to various devices that were as undignified and ludicrous as they were high-handed and arbitrary. Even this high treason against art may perhaps be forgiven in consideration of the practical services the cardinal rendered the cause of literature. *Les Thuilleries*, *La Grande Pastorale*, *Mirame*, and the other plays, over whose fate he trembled as over the result of an embassy or a campaign, have long been forgotten; but a permanent interest attaches to his *Mémoires* and correspondence, though owing to his way of working with substitutes and assistants it has been a difficult task to settle how much of what passes under his name is authentic. He died in 1642.

**RICHELIEU, LOUIS FRANÇOIS ARMAND DU PLESSIS, DUC DE**, marshal of France and grand-nephew of Cardinal Richelieu, was born in Paris, March 13, 1696, and died in the same city August 8, 1788. Besides his reputation as the most scandalous Lovelace of a scandalous age, he attained, in spite of a deplorably defective education, distinction as a diplomatist and general. As ambassador to Vienna (1725–1729) he settled in 1727 the preliminaries of peace; in 1745 he helped to gain the victory of Fontenoy; three years afterward he made a brilliant defense of Genoa; in 1756 he expelled the English from Minorca by the capture of San Felipe fortress; and in 1757–1758 he closed his military career by those pillaging campaigns in Hanover which procured him the sobriquet of *Petit Père de la Maraude*. In his early days he was thrice imprisoned in the Bastille—in 1711 at the instance of his stepfather, in 1716 in consequence of a duel, and in 1719 for his share in Alberoni's conspiracy against the Regent. He was thrice married: first against his will, at the age of fourteen, to Mademoiselle de Noailles; secondly, in 1734, by the intrigues (according to the witty Frenchman's own account) of Voltaire, to Mademoiselle de Guise; and thirdly, when he was eighty-four years old to an Irish lady.

**RICHELIEU, ARMAND EMMANUEL DU PLESSIS, DUC DE**, was born September 25, 1766, and died May 17, 1822. He was grandson of the marshal and is remembered mainly as the enlightened and heroic governor of Odessa (1803–1813) who guided the city through the terrible years of the plague, and as the minister of foreign affairs under Louis XVIII., to whom it fell to sign the treaty of 1815. A pension of 50,000 francs, voted to him by the two chambers, he bestowed on the public charities of Bordeaux.

**RICHERUS**, a chronicler of the tenth century, son of Rodulf, a trusty councilor and captain of Louis IV., studied at the Rheims under Gerbert, afterward Pope Sylvester II. His intimacy with this famous man gave him many opportunities of knowing the history of his time, and when Gerbert became archbishop of Rheims he charged Richerus with the task of writing a history of the Gauls. This history in four books begins with

Charles the Fat and Eudes, and goes down to the year 995. From 969 onward Richerus had no earlier history before him, and his work is the chief source for the period when the Capets superseded the Carolingians. It was first edited in Pertz's *Monumenta Germaniæ*, vol. iii., and there have since been several separate editions.

**RICHMOND**, a town of Surrey, England, is on the south bank of the Thames, here crossed by a stone bridge of five arches, eight and one half miles west of Hyde Park Corner by road, and nine and three-quarters from the Waterloo station of the Southwestern Railway. The town was anciently called *Syenes* and afterward *Schene* and *Sheen*, until the name was in 1500 changed to Richmond by command of Henry VII. The southeast of the town, at the entrance to Richmond Park, is Richmond Hill, from which is the famous view of the Thames with the surrounding country to the west. The town itself is without special interest, and consists chiefly of one long and irregular street running north and south. The town has a Wesleyan theological college founded in 1834, a free public library, and public baths. The population of urban sanitary district (area 1,210 acres) in 1871 was 15,113, in 1881 it was 19,066, and in 1890 was estimated at 22,500.

**RICHMOND**, a borough in the North Riding of Yorkshire, England, is finely situated on the Swale, at the terminus of the Richmond branch of the North-Eastern Railway, forty-four miles northwest of York and fifteen southwest of Darlington. The interest of the town centers in the castle, said to have been founded by Alan Rufus, son of Hoel, count of Bretagne, who is also said to have rebuilt the town on his obtaining the estates of the Saxon Earl Edwin, embracing two hundred manors of Richmond, and extending over nearly a third of the North Riding. The principal trade is in agricultural produce, but there are a paper mill and an iron and brass foundry. The town received its first charter from Elizabeth. Under the Municipal Corporation Act it is governed by a mayor, four aldermen, and twelve councilors. The population of the Municipal borough (area 2,520 acres) in 1871 was 4,443, in 1889 it was about 5,000.

**RICHMOND**, a city of the United States, the county seat of Wayne county, Indiana, is situated in a fine agricultural region on the east branch of the White Water river (a sub-tributary of the Ohio), sixty-eight miles east of Indianapolis. It is an important railway center, being the junction of the Cincinnati, Hamilton and Dayton, Grand Rapids and Indiana, Pittsburgh, Cincinnati and St. Louis, and Chicago, St. Louis and Pittsburgh Railroads, all of which occupy the same depot. It is, with its surroundings, one of the most delightful and attractive cities in the State—the city park, 135 acres in extent, being a special feature of the improvements made there during recent years. The city contains thirteen churches, a complete and well arranged system of schools, three national banks with a capital of \$500,000 and \$250,000 surplus, a public library with 15,000 volumes, four papers, and a large number of stores and offices, together with a court-house and county buildings of the best character and description. There are six hotels, one theater, one opera house, and public halls with a seating capacity of nearly 5,000. Richmond is also the location of Earlham College, founded in 1859 by the Quaker society and open to both sexes. The manufactures embrace machinery, agricultural implements, sash, doors and blinds, flour, gas and electric lights, etc., etc. The city is well laid out; wide streets, handsomely shaded and maintained, fine residences, commercial and industrial establishments substantial and architecturally desirable are to be seen

everywhere, giving the city a metropolitan appearance. The city was incorporated in 1845. The population was 9,445 in 1870, 12,741 in 1880, and 16,608 in 1890.

RICHMOND, the capital of the State of Virginia, lies on the north bank of the James river, in Henrico county, of which it is also the capital. Its position at the head of tide-water and the rapids in the river just above the city make it the head of navigation, its distance from the sea by water being about 175 miles. Vessels drawing seventeen feet of water can come up to the docks. These docks were constructed to give a means of communication between the old James river and Kanawha canal and the James river, and afford anchorage and piers for nearly two miles of shipping. There are about three miles of moorage below the docks, in the river proper, thus giving the city five miles of frontage on water navigable for large vessels.

The city is built on seven hills, and before the elaborate engineering works of late years had been consummated the ravines which separated the hills formed very pronounced lines of demarkation, and were crossed by long wooden bridges, which gave the only means of access between the different sections. Of late years, however, the bridges have disappeared and grading and filling have together made a city whose streets will compare favorably with those of any other in the country. The inclination of the surface has made the matter of drainage easy, and there is no city in the world whose sewage system is more perfect, or in which refuse matter is more easily and thoroughly cleared away. A slight fall of rain is sufficient to thoroughly cleanse the streets, the water never standing on the surface, but rushing in torrents along the gutters to the sewers, to be carried away by the rapid current of the James river. The river is crossed by two foot and wagon bridges—one of the bridges being the historic Mayo's [toll] bridge, which has been swept away several times by floods in the river, each successive time being raised higher; the other is the "free" bridge, built by the two cities of Richmond and Manchester, which occupy opposite banks of the river. The Richmond and Danville, and the Richmond and Petersburg Railroads, and the Tredegar Iron Works have also bridges for railway transportation across the river connecting the historic (Union prison) Belle Isle with both shores.

The city is replete with buildings and points of interest to the patriot and antiquarian. The old Statehouse occupies a beautiful site on the summit of an eminence in the midst of the "Capitol Square," a magnificent park of thirteen or more acres. This old building, one of the first State Capitols erected in the Union, was built in 1796, and was modeled after the Maison Carée at Nismes, France, the model being furnished by Thomas Jefferson. It faces north and south, the southern end being occupied by a portico with a massive columnar façade. It is entered on the east and west sides by flights of stairs leading to a rotunda, the center of which is occupied by Houdon's celebrated statue of Washington, while around the walls are niches containing busts of various celebrities, the most notable being one of LaFayette, erected by order of the State Legislature to the memory of that friend of America. In the story above is a collection of portraits of the celebrated men the State has produced, and some of the noted actors in the drama of the war of the secession. Among them may be mentioned the elder and younger Tylers, Governor Floyd, John Randolph, Gen. R. E. Lee, General Hood, "Stonewall" Jackson, and others. The Statehouse contains, besides the various offices of the government, the senate and house of representative chambers, and the State library. The library will well repay a long visit, as it contains, in addition to a valu-

able collection of books, an interesting museum, whose relics are intimately associated with the history of the country from earliest times down to the present. North of the Capitol building is the colossal Foley statue of Gen. T. J. (Stonewall) Jackson, in bronze, erected in 1875 by English admirers. To the west stands Crawford's heroic equestrian statue of Washington, mounted on a pedestal of Virginia granite and marble, and surrounded by colossal figures of eminent Virginians, among them being Andrew Lewis, Patrick Henry, Thomas Jefferson, George Mason, John Marshall, and Thomas Nelson. At the base of the main pedestal are minor pedestals occupied by allegorical figures representing the various battles of importance during the revolutionary war. To the southwest stands a marble statue of the "Mill-boy of the Slashes," Henry Clay. This statue, which occupies a canopy, was much mutilated directly after the civil war by relic hunters, but has since been restored. It is said to be a fine likeness of the statesman. To the northeast of the Statehouse stands the governor's mansion, an old house of massive aspect, yet dear to every Virginian on account of its historic association. There are many other notable buildings in and around the city. Old St. John's Episcopal church, on 25th and Broad streets, was the scene of the session of the House of Burgesses during and before the revolutionary war, and here Patrick Henry made some of his stirring addresses, but did not, as has been often repeated, deliver the famous "give me liberty or give me death" speech here. That speech was made at Williamsburg. On Main street between 19th and 20th, still stands the old ante-revolutionary "stone-house" of the Ege family. Here Washington's headquarters were for a time during the last days of the revolution. On 12th and Leigh streets stands the old Breckinridge mansion (commonly called the "Davis mansion,") used as the Whitehouse of the confederacy; on Marshall street is the old Marshall residence, for a long time the home of the great chief justice. The old city hall, now torn down, was the scene of many historical events—among them being the trial of Aaron Burr. The old building stood on the corner of 11th and Broad streets. St. Paul's church is noted as the "official" church of the Confederacy. The Virginia medical college was founded in 1838 by Dr. Thomas Johnston, and has since been one of the foremost medical colleges in the United States. Its peculiar Egyptian architecture makes it a notable building. The old African Baptist church, now replaced by a new structure, is rich also in historic associations. It was in this church that Horace Greeley and John Minor Botts addressed themselves to the task of quieting the frenzied negroes, who were about to indulge in a riot immediately after the war. During the slavery regime the church had a membership of several thousand slaves, necessitating the ministrations of several pastors, the latter being presided over by Doctor Ryland, a white preacher, his subordinates being mostly colored. The old State armory on the canal bank between the river and the docks played an important part in the rebellion. Near by are the famous Tredegar Iron Works, the ordnance factory of the south during the war. These are still in operation and are among the largest in the south. The State penitentiary is located at the foot of Gamble's Hill, covering several acres of ground, and is interesting from its historical associations. It is managed on the silent system, some of the convicts being farmed out to contractors, who have their work done within the walls.

Before the war Richmond was the *entrepot* for the South. Since the war she has made rapid strides toward regaining that position. Here ships from all over the world may be seen, and her commerce is

daily augmenting. The principal manufactures of the city are tobacco and cotton, together with flour, leather, etc. There are over seventy tobacco factories here, and the tobacco made is said to be the finest in the world. Considerable shipments of the raw staple are made, and reprizing establishments are numerous. Cigarettes and smoking tobacco and cigars are included in the list of products as well as chewing tobacco. The Haxall and Gallego flour mills are two among the largest in the world. Hollywood cemetery, to the west of the city is one of the most beautiful cemeteries in the world, having a natural picturesqueness of situation over the falls of the James unsurpassed. A long list of eminent men is included on the rolls of the dead who lie here. Among them may be mentioned President Monroe, Gen. J. E. B. Stuart, Gen. H. A. Wise, Gens. A. P. Hill, G. E. Pickett and others. Several thousand confederate soldiers are buried here. In Oakwood Cemetery at the opposite end of the city lie 15,000 of these defenders of the "lost cause." In both these cemeteries are monuments to the soldiers who fell in defense of the Confederacy.

In the immediate vicinity of the city are numerous granite quarries, while the clay abounding thereabouts is said to produce the finest bricks in the world.

In the James river, between Hollywood cemetery and the Chesierfield shore, lies Belle Isle (rightly named), a beautiful islet on which during the war several thousand Federal prisoners were quartered. The other military prisons were the noted "Libby" prison (now removed to Chicago), which stood on 20th and Dock streets, and "Castle Thunder," which stood on 18th and Cary streets. The latter was burned, but has since been rebuilt. The Richmond Baptist college is one of the foremost educational institutions in the South, having, in fact, adopted a modified university course. Its students are increasing yearly, and its graduates take a rank second to none. Other higher educational institutions are the female seminary, the high school, and several academies. The public school system is generously supported, Richmond having been the first among the Southern cities to adopt free public instruction after the war. The precinct schools are large and commodious, are sixteen in number, each being subdivided into (on an average) twelve schools or rooms. The whites and blacks are separately taught, there being no mixed schools. The average salary of the teachers is \$45 per month. The city owns its gas-works and water-works, and supplies its subscribers with these necessaries at so much per year, both institutions being sources of considerable revenue to the government. There are numerous lines of railways either entering the city or making close connection with it. There are several lines of street railway, one of them an electric motor system. The city is one of the most beautiful in natural situation in the world, and every year sees added attractions of art. Recently (1890) a statue to General Lee was erected on the "Allan lot," near the "New Reservoir" boulevard, thus increasing the noble collection of statuary concentrated in that city.

The city has numerous banks, a cotton and corn exchange, a flour exchange, and a tobacco exchange. There are three theaters—one of them, the old "Marshall," having before the war a stock company, which included in its members Joe Jefferson, Edwin Adams, D'Orsay Ogden, and John Wilkes Booth.

The population, which was only 5,737 in the beginning of the century, has increased as follows:—9,785 in 1810; 12,067 in 1820; 16,060 in 1830; 20,153 in 1840; 27,570 in 1850; 37,910 in 1860; 51,038 in 1870; 63,600 in 1880; and 81,388 in 1890. In 1857 the real

estate of Richmond was assessed at \$18,259,816, and the personal property at \$10,287,278. By 1885 the corresponding figures were \$34,502,903, and \$15,000,000. By 1890 the figures were \$42,604,762, and \$17,379,486.

The first settlement on part of the site of Richmond is said to date from 1609; and Fort Charles was erected as a defense against the Indians in 1644-45. But the real origin of the town, which was incorporated in 1745, was Byrd's warehouse, erected by Col. William Byrd in the close of the seventeenth century. It was still a small village when, in 1779, it was made the capital of the State of Virginia. From May, 1861, till April, 1865, when it was occupied by the Federal army, Richmond was the seat of government of the Confederate States. On the capture of Petersburg by General Grant the Confederate leaders thought it impossible to hold the city, in spite of the strength of its fortifications; and Ewell, who commanded the rear-guard of the retreating army, set the great tobacco factories and flour mills and the arsenal on fire; the conflagration lasted till the evening of the following day. In September, 1870, as had happened several times before, part of the city was laid under water by the floods of the James river, and Mayo's bridge was swept away. Opposite the city lies Manchester, really a suburb of Richmond, though enjoying a separate corporate existence. This town is almost wholly devoted to manufactures, the motive power for which is furnished by the unlimited water power of the falls of the James. It is united to Richmond by several bridges. Its chief manufactures are cotton and flour.

RICHMOND, LEGH, writer of tracts, was born January, 1772, at Liverpool, where his father was a physician. He was educated at Trinity College, Cambridge, where he was graduated B.A. in 1794 and M.A. in 1797. In 1798 he was appointed to the joint curacies of Brading and Yaverland in the Isle of Wight. He took a prominent interest in the British and Foreign Bible Society, the Church Missionary Society, and various other institutions of a similar kind. In 1805 he became chaplain to the Lock Hospital, London, and in the same year was presented to the rectory of Turvey, Bedfordshire, where he remained till his death, May, 1827. The best known of the tracts of Legh Richmond is the *Dairyman's Daughter*, of which as many as 4,000,000 in nineteen languages were circulated before 1849. A collected edition of his tracts was first published in 1814 under the title of *Annals of the Poor*.

RICHTER, ERNST FRIEDRICH EDUARD, writer on musical theory and composition, was born at Grosschönau in Saxony, on October 24, 1808. He first studied music at Zittau, and afterward at Leipsic, where he attained so high a reputation that in 1843 he was appointed professor of harmony and counterpoint at the conservatorium of music, then newly founded by Mendelssohn. On the death of Hauptmann, January 3, 1868, he was elected cantor of the Thomasschule, which office he retained until his death, April 9, 1879. He is best known by three theoretical works—*Lehrbuch der Harmonie*, *Lehre vom Contrapunct*, and *Lehre von der Fuge*—originally written for the use of his pupils.

RICHTER, JOHANN PAUL FRIEDRICH, usually called JEAN PAUL, the greatest German humorist, was born at Wunsiedel, in Bavaria, on March 21, 1763. Having attended the gymnasium at Hof for two years, Richter went in 1780 to the university of Leipsic.

Richter began his career as a man of letters by writing the *Grönländische Processe* and *Auswahl aus des Teufels Papieren*, the former of which was issued in 1783-84, the latter in 1789. These works were not re-

ceived with much favor, and in later life Richter himself had little sympathy with their satirical tone. His next book, *Die Unsichtbare Loge*, a romance, published in 1793, had all the qualities which were soon to make him famous, and its power was immediately recognized by some of the best critics of the day. Encouraged by the reception of *Die Unsichtbare Loge*, he sent forth in rapid succession a series of writings which secured for Richter a great place in German literature, and during the rest of his life every work he produced was welcomed by a wide circle of admirers. In 1801 he married Caroline Mayer, a bright, accomplished, and amiable lady whom he met in Berlin in 1800. They lived first at Meiningen, then at Coburg; and finally, in 1804, they settled at Baireuth. Here Richter spent a quiet, simple, and happy life, constantly occupied with his work as a writer. In his last years he began *Wahrheit aus Jean Paul's Leben*, to which additions from his papers and other sources were made after his death by C. Otto and E. Förster. He died of dropsy on November 14, 1825.

Schiller said of Richter that he would have been worthy of admiration "if he had made as good use of his riches as other men made of their poverty." And it is true that in the form of his writings he never did full justice to his great powers. In working out his conceptions he found it impossible to restrain the expression of any powerful feeling by which he might happen to be moved. His style, too, lacks directness, precision, and grace. The splendor of Richter's genius, however, makes it easy for the class of readers to whom he appeals to forgive even these grave defects. His imagination was of extraordinary fertility, and no German prose writer has presented more fascinating pictures of childhood and youth, of friendship and love; nor has any one shown more finely how sordid circumstances may evoke the noblest qualities of loyal and generous minds.

RICIMER, created "comes" of the empire under Valentinian III., was the son of a chief of the Suevi, who had married a daughter of Wallia king of the Visigoths. He was brought up at Valentinian's court, and served with distinction under Aëtius. In 456 a decisive naval victory over the Vandals off Corsica, followed soon afterward by the defeat of their land forces near Agrigentum, earned for him the title of "Deliverer of Italy" and brought him within sight of the goal of his ambition. Having vanquished and deposed the emperor Avitus in October of that year, he for some time exercised every function of sovereignty over Italy under the title of "patrician," which he received from Leo in February, 457. When Anthemius, invested with the purple by Leo, arrived at Rome in 467, Ricimer was politic enough to acquiesce; subsequently a quarrel with his father-in-law occasioned his withdrawal to Milan, whence he marched at the head of an army upon Rome, which he besieged and sacked, Anthemius being among the slain (July 11, 472). Olybrius was next made emperor at the instance of the Roman "king-maker," who died of a malignant fever on August 18, 472.

RICKETS, a disease of childhood characterized chiefly by a softened condition of the bones and by other evidences of perverted nutrition. The symptoms which precede the outward manifestation of the disease are marked disorders of the digestive and alimentary functions. The child's appetite is diminished, and there is frequent vomiting, together with diarrhea or irregularity of the bowels, the evacuations being clay-colored and unhealthy. Along with this there is a falling away in flesh. The urine contains a large amount of calcareous salts. The bones also from their softened condition tend to become distorted and misshapen, both by

the action of the muscles and by the superincumbent weight of the body. Those of the limbs are bent outward and forward, and the child becomes "bow-legged" or "in-kneed" often to an extreme degree. The trunk of the body likewise shows various alterations and deformities. The pelvis undergoes distortion, which may reduce its capacity to a degree that in the female may afterward lead to serious difficulties in parturition. The head of the rickety child is large-looking in its upper part, the individual bones of the cranium sometimes remaining long ununited, while the face is small and ill-developed, and the teeth appear late and fall out or decay early. The constitutional conditions of ill-health continue, and the nutrition and development of the child are greatly retarded.

The disease may terminate in recovery, with more or less of deformity and dwarfing, the bones although altered in shape becoming firmly ossified, and this is the common result in the majority of instances. On the other hand, during the progress of the disease, various intercurrent ailments are apt to arise which may cause death, such as the infectious fevers, bronchitis and other pulmonary affections, chronic hydrocephalus, convulsions, laryngismus stridulus, etc.

The treatment of rickets is necessarily more hygienic than medicinal, and includes such preventive measures as may be exercised by strict attention to personal health and nutrition on the part of mothers, especially where there appears to be any tendency to a rickety development in any members of the family. The management of a child exhibiting any tendency to the rickets is of great importance, but can only be alluded to in general terms. The digestive disorders characteristic of the setting in of the disease render necessary the greatest care and watchfulness as to diet. The medicinal remedies most to be relied on are those which improve the digestive functions and minister to nutrition, and include such agents as the preparations of iron, quinine, and especially cod-liver oil.

When the disease is showing evidence of advancing, it is desirable to restrain the child from walking, as far as possible. But this precaution may be to some extent rendered unnecessary by the use of splints and other apparatus as supports for the limbs and body, enabling the child to move about without the risk of bending and deformity of the bones which otherwise would probably be the result.

RICKMAN, THOMAS, architect and writer on the styles of the Middle Ages, was born in 1776 at Maidenhead, Berkshire, England, where his father practiced as a surgeon, and was brought up as a member of the Society of Friends. He built an immense number of churches, chapels, and other buildings, and was an important factor in the revival of taste for mediævalism, perhaps in that respect only second to Pugin. His book entitled *An Attempt to Discriminate the Styles of Architecture in England* is a work which deserves great credit for its painstaking research; a great many editions of it were published, and it was eventually much improved and enlarged. Rickman died in 1841.

RIDDLES are probably the oldest extant form of humor. They spring from man's earliest perception that there are such things as analogies in nature. Man observes an example of analogy, puts his observations in the form of a question, and there is the riddle ready made. The riddle, to be brief, is an interrogatory form of the fable, and like the fable originates among rude people, and is perpetuated in the folklore of peasantry.

RIDLEY, NICHOLAS, bishop of London, and a martyr to the Reformation, was descended from a family long seated in Northumberland. The second son

of Nicholas Ridley of Unthank near Willimoteswick in that county, he was born in the beginning of the sixteenth century. From the grammar school of Newcastle-upon-Tyne he was sent to Pembroke College, Cambridge, about 1518, was in 1530 chosen under-treasurer of the university; and in 1534 he was senior proctor, when along with the vice-chancellor and the other proctor, Richard Wilkes, he signed the decree of the university against the jurisdiction of the pope in England. In 1540, having been made doctor of divinity, he was appointed king's chaplain; and in the same year he was elected master of his college in Cambridge. Soon after, he was appointed a canon of Canterbury. In 1545 he renounced the doctrine of transubstantiation, and was made a canon of Westminster. In 1552, returning from Cambridge, he paid a visit to the Princess (afterward Queen) Mary, at Hunsdon, Hertfordshire. On account of her unqualified condemnation of the Reformed doctrines, he from this time concurred in the proposals to exclude her from the throne, and he signed the will of Edward VI. settling the crown on Lady Jane Grey. On the death of the king, he, in a sermon at St. Paul's Cross, July 16, 1553, affirmed that Mary was illegitimate, and predicted that her accession would be disastrous to the religious interests of England. After the proclamation of Mary he set out for Framlingham to confess his offenses against her, but was met with a warrant for his arrest and was committed to the Tower. In March, 1554, he was sent down, along with Cranmer and Latimer, to Oxford, to be tried before a committee of convocation. He was convicted of heresy, was sentenced to death, and on October 16, 1555, he, in company with Latimer, was burnt at the stake at Oxford.

RIEMANN, GEORG FRIEDRICH BERNHARD, mathematician, was born on September 17, 1826, at Breselenz, near Dannenberg in Hanover. In 1846, in his twentieth year, Riemann entered himself as a student of philology and theology in the university of Göttingen. It soon became evident that his mathematical studies, undertaken at first probably as a relaxation, were destined to be the chief business of his life; and he obtained his father's permission to devote himself entirely to a scientific career. By this time he had exhausted the resources of Göttingen in the shape of mathematical lectures; and he proceeded in the beginning of 1847 to Berlin. In 1850 he returned to Göttingen and began to prepare his doctor's dissertation, busying himself meanwhile with "Naturphilosophie" and experimental physics, and in November, 1851, he obtained his doctorate. After his return to Göttingen (November, 1857) he was made extraordinary professor, and in 1860 he visited Paris, and met with a warm reception there. In November, 1865, he returned again to Göttingen, but in June, 1866, he returned once more to Italy, where he died July 20, 1866.

RIENZI, COLA DI (1313-1354). See ROME.

RIESENER, JEAN HENRI, the celebrated cabinet-maker of Louis XIV., was born at Gladbeck, near Cologne, 1725. He died January 6, 1806.

RIESENGBIRGE (Bohemian *Krkonoše*), or Giant Mountains, a lofty and rugged group on the common boundary of Silesia and Bohemia, between the upper courses of the Elbe and the Oder. They form the highest portion of the Sudetic system, which separates southeast Prussia from the Austrian empire, and finds its natural continuation toward the northwest in the Erzgebirge, the Thuringian Forest, and the Harz Mountains. Adjoining the Isergebirge and the Lausitzergebirge on the west, and the Eulengebirge and the Adlergebirge on the east and southeast, the Riesengebirge proper run southeast and northwest between the sources of the Zacken and

the Bober, for a distance of twenty-three miles, with a breadth of fourteen miles. They cover an area of about 425 square miles, three-fourths of which is in Austrian and the remainder in Prussian territory.

RIETI, a city of Italy, in the province of Perugia, eighteen and a half miles southeast of Terni, which is sixty-nine miles by rail from Rome. It occupies a fine position 1,396 feet above the sea on the right bank of the Velino (a torrent sub-tributary to the Tiber), which at this point issues from the limestone plateau; the old town occupies the declivity and the new town spreads out on the level. Rieti has no small amount of mediæval picturesqueness, and displays a good deal of modern activity in wine-growing, cattle-breeding, and sugar-boiling. The fertility of the neighborhood is celebrated both by Virgil and by Cicero. A Roman bridge over the Velino, Thorwaldsen's monument to Isabella Alfani, and a statue to St. Barbara by Berdini, both in the cathedral, and the Palazzo Vincentini by Vignola deserve to be mentioned. The population was 7,875 in 1871, and 9,618 (with suburbs, 13,679; in the commune, 16,822) in 1881, and estimated at 10,000 in 1890.

RIETSCHHEL, ERNST FRIEDRICH AUGUST, one of the most distinguished of modern German sculptors. Born at Pulsnitz in Saxony in 1804, at an early age he became an art student at Dresden, and subsequently a pupil of Rauch in Berlin. He there gained an art studentship and studied in Rome in 1827-28. After returning to Saxony he soon brought himself into notice by a colossal statue of Frederick Augustus, king of Saxony, was elected a member of the academy of Dresden, and thenceforth became one of the chief sculptors of his country. In 1832 he was elected to the Dresden professorship of sculpture, and had many foreign orders of merit conferred on him by the governments of different countries. His death occurred at Dresden in 1861.

RIFLE. See GUNMAKING.

RIFLEMAN-BIRD, or RIFLE-BIRD, names given by the English in Australia to a very beautiful inhabitant of that country. The cock bird is clothed in velvety-black, generally glossed with rich purple, but having each feather of the abdomen broadly tipped with a chevron of green bronze, while the crown of the head is covered with scale-like feathers of glittering green, and on the throat gleams a triangular patch of brilliant bluish emerald, a color that reappears on the whole upper surface of the middle pair of tail-quills. The hen is grayish-brown above, the crown striated with dull white; the chin, throat, and a streak behind the eye are pale ochreous, and the lower parts deep buff, each feather bearing a black chevron. It inhabits the northern part of New South Wales and southern part of Queensland as far as Wide Bay, beyond which its place is taken by a kindred species, the *P. victoriae* of Gould, which was found by John Macgillivray on the shores and islets of Rockingham Bay. Further to the north, in York Peninsula, occurs what is considered a third species, *P. alberti*, very closely allied to and by some authorities thought to be identical with the *P. magnifica* (Viellot) of New Guinea—the "Promerops" of many writers. From that country a fifth species, *P. wilsoni*, has also been described by Mr. Ogden. Little is known of the habits of any of them, but the Rifleman-bird proper is said to get its food by thrusting its somewhat long bill under the loose bark on the boles or boughs of trees, along the latter of which it runs swiftly, or by searching for it on the ground beneath. During the pairing-season the males mount to the higher branches and there display and trim their brilliant plumage in the morning sun, or fly from tree to tree uttering a note

which is syllabled "yass" greatly prolonged, but at the same time making, apparently with their wings, an extraordinary noise like that caused by the shaking of a piece of stiff silk stuff. Verreaux informed Mr. Elliot that he believed they breed in the holes of trees and lay white eggs; but on that score nothing is really known.

RIGA (Esth. *Ria-Lin*), a seaport of Russia, in 56° 57' N. latitude and 24° 6' E. longitude, 375 miles southwest of St. Petersburg, is in population the fifth city of the empire, while in foreign trade it ranks next to St. Petersburg and Odessa. The town is situated at the southern extremity of the gulf, eight miles above the mouth of the Düna (Dwina), which brings Riga into water communication with an extensive region, as also with the basins of the Dnieper and Volga.

Riga consists of four parts—the old town and the St. Petersburg and the Moscow suburbs standing on the right bank of the Düna, and the Mitau suburb on the left bank, connected by a floating bridge which is removed in winter, and by a viaduct, 820 feet long, resting on light piers of solid stone, and leaving a passage for ships. The old town still preserves its Hanseatic features—and is so limited that its population increases very slowly. The so-called suburbs, on the other hand, with their broad and quiet boulevards on the site of the former fortifications, are steadily growing and undergoing new improvements.

The population was 167,728 in 1881, is now (1890) estimated at about 185,000. About one-half of the population is German, the remainder being Russian and Lettish in nearly equal proportions, with some 2,000 Esthonians, and nearly 5,000 foreigners. The life of the city has a German character throughout, but the Russians (many of whom were serfs until 1861), and still more the Letts and Esthonians, also display a steadily progressive intellectual life. Both are seeking to counteract the German influence by increasing the number of their educational institutions, the Letts also by the stage and the press. The larger commerce is wholly in German and (to a less extent) English hands. Owing to its communication by water and rail with the forests of White Russia and Volhynia, Riga is a great mart for timber, which in value stands third among the exports. Flax and linsced occupy the first place, Riga being the chief Russian port for the extensive flax-producing region of northwest Russia. Owing to the great railway which crosses the country from Riga to Smolensk, afterward dividing into two branches, to Orenburg and Tsaritsyn on the lower Volga respectively, Riga is also the great storehouse and place of export for hemp coming by rail from west central Russia, and for corn, Riga merchants sending their buyers as far east as Tamboff. Oats, in particular, are extensively exported to England from the central provinces. Tallow, leather, tobacco, rugs, feathers, and other minor items add considerable to the total value of the exports. The competition of the port of Libau is counterbalanced by the steady development of the Russian railway system. The imports, consisting chiefly of salt, fish, wine, and cotton, with metals, machinery, coal, oils, fruits, tobacco, and other minor articles, are also rapidly increasing. Riga is in railway communication with Libau (*via* Mitau), and with St. Petersburg (*via* Düna), Warsaw, and central Russia; the traffic is very active.

The manufactures of the town and neighborhood are yearly developing; the chief items are woolen cloth, cottons, machinery, metal wares, cigars, cork, glass, and paper.

The educational institutions include, besides the polytechnic, a Greek seminary, four gymnasiums, some ten private schools for secondary education of boys and

girls, and a comparatively large number of primary schools. The municipal library contains very interesting materials relating to the history of the Baltic provinces. The book trade is rapidly extending.

RIGAUD, HYACINTHE, French painter, born at Perpignan July 20, 1659, was the descendant of a line of painters. Having early lost his father, he was sent by his mother to Montpellier, where he studied under Pezet and was helped by Ranc, then to Lyons, and in 1681 to Paris. Having attained a professional position of unsurpassed eminence, Rigaud died at the age of eighty-four on December 27, 1743, having never recovered from the shock of losing his wife in the year previous.

RIGGING. See illustration in article on SEAMANSHIP.

RIGHT, PETITION OF. See PETITION.

RIGHTS, BILL OF. On February 13, 1688-89, the Declaration of Right was delivered by the Lords and Commons to the prince and princess of Orange. In October, 1689, the rights claimed by the declaration were enacted with some alterations by the Bill of Rights, 1 Will. and M., § 2, c. 2, next to Magna Charta the greatest landmark in the constitutional history of England and the nearest approach to the written constitutions of other countries.

The Declaration of Right and the Bill of Rights introduced no new principle into the English constitution. In the United States, the main provisions of the bill of Rights, so far as they are applicable, have been adopted both in the constitution of the United States and in the State constitutions.

RIMINI. The city of Rimini is bounded on three sides by water. It faces the Adriatic to the north, has the torrent Aprusa, now called Ausa, on the east, and has the river Marecchia, the Arimnum of the ancients and later known as the Ariminum, on the west. It stands in a fertile plain, which on the southern side soon swells into pleasant slopes backed by the jagged peaks of the Umbrian Apennines. The foremost foothill of the range is the steep crag of Mons Titanus crowned by the towers of San Marino. This oldest and smallest of republics commands a prospect of almost unrivaled beauty over hill and plain—to Ravenna on one side, Pesaro on the other, and mountains of Montefeltro, Rimini and its rivers, and across the Adriatic to the Dalmatian coast. During the Middle Ages the history of Rimini has no importance. In 1216 Rimini, being worsted by Cesena, adopted the desperate plan of granting citizenship to two members of the Malatesta family—Giovanni and Malatesta—for the sake of their aid and that of their vassals in the defense of the State, and the conduct of the war. Then followed a long period of confusion in which, by means of conspiracies and crimes of every kind, the Malatesta succeeded in becoming tyrants of Rimini. The Malatesta family ruled for 250 years, but in 1528 Pope Clement VII. became master of the town.

From that time the Malatesta became citizens of Venice; their names were inscribed in the Golden Book, and they were admitted to the grand council. With the death, in 1716, of Christina Malatesta, the wife of Niccolo Boldu, the Rimini branch of the family became extinct. The descendants of Giovanni, brother of Malatesta da Verrucchio, who married one of the Sogliano, were known as the Sogliano-Malatesta. The representatives of this branch settled in Rome. The history of Rimini practically ends with its independence. It fell into obscurity under the rule of the popes, and was not again mentioned in history until, in 1831 and 1845, it took a prominent part in the revolutionary movements against papal despotism, and in favor of Italian independence. Although Rimini, like many

other cities of Romagna, is now harassed by republican and socialistic sets, it is a thriving town, and enjoys increasing prosperity. It had, in 1881, a population of 37,248 souls, and, in 1889, 40,000, being the center of a district containing 88,110 inhabitants, and is part of the province of Forlì, which, divided into three districts of Cesena, Forlì, and Rimini, has a total population of 252,883 souls. Many small manufactures are carried on at Rimini, but agriculture is its principal resource, and its produce in corn and wine is considerably in excess of the local consumption. Rimini also boasts a good public library of 28,000 volumes, inclusive of 850 MSS.; and it has a record office containing several thousand ancient MSS.

RINDERPEST. See MURRAIN.

RING (Gr. *δακτύλιος* Lat. *annulus*). At an early period, when the art of writing was known to but very few, it was commonly the custom for men to wear rings on which some distinguishing sign or badge was engraved (*ἐπίσημον*), so that by using it as a seal the owner could give a proof of authenticity to letters or other documents.

The earliest existing rings are naturally those found in tombs of ancient Egypt.

In ancient Babylonia and Assyria finger rings do not appear to have been used. In those countries the signet took a different form, namely, that of a cylinder cut in crystal or other hard stone, and perforated from end to end, but the Etruscans used very largely the gold swivel ring mounted with a scarab, a form of signet probably introduced from Egypt. A third and more numerous class of Etruscan signet rings have scarabs, cut usually in sard or carnelian, which are a link between the art of Egypt and that of Greece, the design cut on the flat side being Hellenic in style, while the back is shaped like the ordinary Egyptian scarabæus beetle.

Among the Greeks signet rings were very largely worn, and were usually set with engraved gems while the Romans appear to have imitated the simplicity of Lacedæmonia. Throughout the republic none but iron rings were worn by the bulk of the citizens.

Different laws as to the wearing of rings existed during the empire: Tiberius made a large property qualification necessary for the wearing of gold rings; Severus conceded the right to all Roman soldiers; and later still all free citizens possessed the *jus annuli aurei*, silver rings being worn by freedmen and iron by slaves. Under Justinian even these restrictions passed away.

Throughout the Middle Ages the signet ring was a thing of great importance in religious, legal, commercial, and private matters. Among the varieties of rings is the Ring of the Fisherman, worn by the pope, also the Episcopal ring, conferred upon the newly-made bishop, together with his crozier, a special form for this being inserted in the Pontifical. Then there are the Posy rings, so called from the rhymes engraved upon them, Memorial rings, Merchant's rings, engraved with a badge or trade-mark, Papal rings, of which many now exist dating from the fifteenth and seventeenth centuries, given by the popes to new-made cardinals; Poison rings, with a hollow bezel, used in classical times. In the bezel a hollow point, made to work with a spring, was concealed; it communicated with a receptacle for poison in a cavity behind in such a way that the murderer could give the fatal scratch while shaking hands with his enemy.

Another very large and elaborate form of ring is that used during the Jewish marriage service. Fine examples of the sixteenth and seventeenth centuries exist. In the place of the bezel is a model, minutely worked in gold or base metal, of a building with high gabled

roofs, and frequently movable weathercocks on the apex. This is a conventional representation of the temple at Jerusalem. Perhaps the most magnificent rings from the beauty of the workmanship of the hoop are those of which Benvenuto Cellini produced the finest examples. They are of gold, richly chased and modeled with caryatides or grotesque figures, and are decorated with colored enamels in a very skillful and elaborate way. Very fine jewels are sometimes set in these magnificent pieces of sixteenth-century jewelry.

RINGWORM. A common disease of the scalp due to the presence of a fungus.

RIOBAMBA, or ROYABAMBA, a town in the South-American republic of Ecuador, situated on the road from Guayaquil to Quito in "a sand valley or plain of the great central highland of the Andes—Chimborazo, Carguairazo, Tunguragua, and Altar all being visible from its plaza." The town has occupied its present site only since the close of the eighteenth century; in 1797 the old town, which lay about twelve miles to the west at Cajabamba, was completely destroyed by a vast landslip (still recognizable) from Mount Cicalfa in one of the most terrific convulsions recorded even in that region of volcanic activity. Though said to have 16,000 inhabitants, and to manufacture woolen gloves, sacking, and coverlets, the town is poorly built and comparatively lifeless.

RIO DE JANEIRO (in full form SÃO SEBASTIÃO DO RIO DE JANEIRO, and colloquially shortened to RIO), the capital of Brazil, and one of the principal seaports of South America, is situated on the western side of one of the finest natural harbors in the world in 25° 54' 23" S. latitude and 43° 8' 34" W. longitude (the position of the observatory). Along with its environs it is separated from the province of Rio de Janeiro (whose chief town is Nitherohi) and constitutes an independent municipality (*município neutro*), with an area of about 540 square miles, divided into nineteen (formerly sixteen) parishes or *freguezias*. Most of the streets are narrow and mean-looking; even the fashionable Rua do Ouvidor, which is lined on both sides with handsome shops, is a mere alley. The Rua Direita, or, as it is now called officially, Rua Primeiro de Março, is the principal business street, and is wide and pleasant. The churches and monastic buildings of Rio de Janeiro number upward of fifty, mostly built in the "Jesuit" style, but striking from their size and the barbaric magnificence of their decorations, as well as on account of their well-chosen sites. Besides the famous hospital of Dom Pedro II., there are several smaller institutions of the same class in the city; and a large and handsome lunatic asylum, founded in 1841 with funds obtained by selling titles of nobility at a fixed tariff, occupies a good position in the Botafogo suburb. The military hospital is also an extensive establishment. Among the literary and scientific institutions of the city, the College Dom Pedro II. (which is well organized), national museum, institute of history, geography, and ethnology (1838), polytechnic institute, national educational museum, polytechnic school, military, naval, and normal schools, lyceum of arts, musical conservatory, geographical society, and astronomical and meteorological observatory deserve special mention. The great national library owes its foundation to the bequest of João VI., and now numbers upward of 120,000 volumes open to the public daily (see LIBRARIES). One of the pleasant features of the city is the abundant supply of excellent water distributed to numerous stately fountains in the streets and public squares. The bay of Rio de Janeiro has been the subject of poetic panegyric ever since it was discovered; and the traveler who comes to it after a voyage round the world seems as susceptible to its

charm as if it were his first tropical experience. The actual entrance, between Fort St. Juan and Fort Santa Cruz, is 1,700 yards wide. Within there are fifty square miles of anchorage, or even more for vessels of light draught, the bay having a width varying from two to seven miles and stretching inland from the sea for sixteen miles. Its coast line, neglecting minor indentations, measures sixty miles.

How completely (in spite of the fact that Santos and Rio Grande have become more independent) Rio de Janeiro is the commercial as well as the political capital of Brazil is evident from the fact that the exports from Rio are on the average fully equal in value to those from the rest of Brazil. To the large total, coffee has long contributed 40-50 per cent., and in 1880-81 (an exceptional year) the ratio rose to 86 per cent. Though the coffee plant was not introduced till 1770, Brazil is the greatest coffee-producing country in the world, and Rio de Janeiro is consequently the largest coffee-exporting city. The other exports of moment are brandy (in decreasing quantities), sugar, hides, diamonds, tapioca (mainly to France), tobacco and cigars, medicinal herbs, gold dust, and jacaranda, rosewood, and other timbers. The imports comprise cotton goods, machinery, pitch pine, and petroleum. Among the comparatively few local industries are the weaving of colored buckskins (by a German firm) and other woolen and half woolen stuffs, the extensive manufacture of artificial mineral waters and liquors, brewing, carriage-building, and hat-making. Rio de Janeiro is the terminus of the Dom Pedro II. Railway, and thus of nearly the whole railway system of the country; and it communicates regularly by steamer with Niterohi on the other side of the bay, which is the terminus of another line. In 1889 there were 5,781 miles of railway open. The population of the municipality of Rio de Janeiro was in 1850 stated at 266,466, of which 205,906 were in the town proper; but this, like most of the earlier figures, appears to be an exaggeration, as the census in 1872 gave only 274,972, of which about 190,000 were in the town and suburbs, the slaves numbering 48,939 and the foreigners (mainly Germans, French, and Italians) 84,279. The population in 1889 was about 350,000. The Italian element has been rapidly increasing. The bulk of the population is Portuguese with a mixture of Negro blood. The native Indian races are scarcely represented.

The bay of Rio de Janeiro, the Niterohi or "Hidden Water" of the natives, was first observed on January 1st (hence the name) by Alphonso de Souza, who supposed, as the Rio indicates, that he had discovered the mouth of a large river. How Villegagnon in 1558 took possession of the island which now bears his name but was then called after his patron Coligny, and how his colony was destroyed by the Portuguese, has been told in the article BRAZIL. The city of Rio de Janeiro did not become the capital of the viceroyalty till 1763, when José I. chose it in preference to Bahia because it was a better center for defensive operations against the Spaniards. In 1711 it had been captured by Duguay-Trouin, who exacted 70,000 cruzados as ransom. It became the residence of the Portuguese royal family in 1808; in the same year its port was declared free to foreign trade; and in the course of a short time it was made by Dom João VI. the seat of so many important institutions that Portugal became jealous at finding the relation between mother country and colony practically reversed. When João VI. returned to Portugal and Pedro was declared emperor of Brazil in 1822, Rio de Janeiro naturally remained the capital of the new state. On November 29, 1889, when the Republic of Brazil was founded, Rio de

Janeiro was the headquarters of those who promoted the change, and has since been designated as the capital.

RIO GRANDE (that is, "Great River" in both Spanish and Portuguese), a descriptive epithet which in a vast number of cases has become a proper name. (1) RIO GRANDE (or RIO BRAVO) DEL NORTE, which rises in the Rocky Mountains between the La Plata and San Juan ranges in the southwest of Colorado, has a total course of about 1,800 miles, and forms for 1,100 miles the boundary between the United States and Mexico, but owing to the shallowness of its ordinary current is navigable for steamers only to Kingsbury's Rapids, 450 miles from the sea. (2) RIO GRANDE DO NORTE, or Potengi, or Potingi, which gives its Portuguese name to a northern province of Brazil, rises in the Serra dos Cairiris-Novos, passes Natal, the capital of the province, and falls into the sea to the south of São Roque. (3) RIO GRANDE DO SUL, the outlet of the Lagõa dos Patos, wrongly supposed by the early explorers to be the mouth of a great river, gives its name to a city and province of Brazil (see below). (4) RIO GRANDE, a river of Western Africa, enters the sea opposite the Bissagos Archipelago (see SENEGAMBIA).

RIO GRANDE DO SUL, or in full SÃO PEDRO DO RIO GRANDE DO SUL, a city of Brazil, in the province of the same name, near the mouth of the estuary of Rio Grande. Including the suburbs it is a place of from 30,000 to 35,000 inhabitants, with a considerable trade and various manufactures. The bar at the mouth of the "Rio" does not admit vessels of full ten-foot draught; but dredging operations undertaken by the government in 1882 are considerably increasing the depth. In 1881-84 a railway was constructed from Rio Grande do Sul to Bage 125 miles inland. The average annual value of the imports in the six official years ending June 30, 1882, was about \$2,945,215, reckoning the milreis at 50c. In 1881, 651 vessels (133,779 tons) crossed the bar inward, and 555 (133,276) outward. Among the foreign vessels the British are most numerous. The imports are very various, to supply the colonies of Germans, Italians, etc., settled throughout the province; the exports on the other hand are mainly hides, skins, bones, hair, tallow, etc.

Rio Grande do Sul was a long time the chief town of the captaincy of El Rei (which included both the present province of Rio Grande do Sul and that of Santa Catharina). It was first founded as an encampment of Portuguese troops in 1737 on the south side of the Rio Grande. The settlement was removed to its present site by Gomes Freire d'Andrade in 1745. The Spaniards occupied this part of the country from 1763 to 1776. In 1807 the two districts of São Pedro and Santa Catharina were united and erected into a province with São José de Porto Alegre for its chief town; and, though Rio Grande was declared a city in 1809, Porto Alegre retained its position even after the separation into two comarcas in 1812. The name of the province has been rendered familiar in Europe through the remarkable success which has attended the establishment of German and Italian agricultural colonies. In 1872 there were 36,458 foreigners in the province to 330,564 freeborn Brazilians and 67,791 slaves; and by 1882 it was estimated that the German population alone amounted to 102,000, while the Italians, who began to immigrate in 1875, were rapidly approaching 50,000. The first German settlement was that of São Leopoldo on the Rio do Sino, founded by Dom Pedro I. in 1825. By 1830 the inhabitants numbered 5,000, and in 1854 the town was made a municipality. Others of the same nationality are Novo Mundo (1850), Nova Petropolis (1858), Santa Maria da Soledade, Marato, São Benedito, São Salvador, Montenegro, Feliz, Teutonia (1858),



Estrella (1856), Santa Cruz (1849), Mont Alverne, Germania, São Lorenzo (1858), Santa Clara, São Silvano, Domingos, etc. The principal Italian colonies are Caxias, Conde d'Eu, Donna Isabel, and Silveira Martins, which in 1884 had respectively 13,680, 6,287, 9,595, and 6,000 inhabitants. The success of these colonies is one of the most important elements in the development of the Brazilian empire.

RIOM, a town of France, with 9,590 inhabitants, at the head of an arrondissement in the department of Puy-de-Dôme, eight miles north of Clermont-Ferrand on the railway to Paris, occupies an eminence on the left bank of the Ambène (a left-hand tributary of the Allier) rising above the fertile plain of Limagne. It is surrounded with boulevards and has wide streets, but the houses, being built of black lava, have a rather somber appearance. A feature in the town is the fountains, of which some are of the Renaissance period. Riom trades in the products of Limagne—grain, wine, hemp, preserved fruits, and especially a conserve of apricots—and has a tobacco manufactory.

RIONERO IN VOLTURE, a city of Italy, in the province of Potenza, four miles from Atella, is pleasantly situated at the foot of Monte Volture, has the repute of being the best built and best kept of the towns of the Basilicata, and has long been distinguished by the industrious character of its inhabitants (11,383 in 1881). In 1851 it suffered severely from the earthquake.

RIOT is "an unlawful assembly which has actually begun to execute the purpose for which it assembled by a breach of the peace and to the terror of the public." An unlawful assembly is an assembly of three or more persons with intent to commit a crime by force or carry out a common purpose, lawful or unlawful, in such a way as to give reasonable grounds for fearing a breach of the peace. A rout is an unlawful assembly which has made a motion toward the execution of its common purpose. If the unlawful assembly should begin to demolish a particular inclosure, that would be a riot; if it should proceed to pull down all inclosures, that would be treason. It was considered, as early as the fourteenth century, that the common law gave an insufficient remedy against riot. Subsequently Parliament took special cognizance of the crime, giving jurisdiction to justices to restrain, arrest and imprison rioters; also conferring similar powers on the sheriff and *posse comitatus*, and constituting certain statutory offenses similar to riot at common law. Any prosecution for an offense against the act must be commenced within twelve months after the offense.

It is the duty of a magistrate at the time of a riot to assemble subjects of the realm, whether civil or military, for the purpose of quelling a riot. In this duty he is aided by the common law, under which all subjects of the realm are bound to assist on reasonable warning, and by various enactments enabling the authorities to call out the auxiliary and reserve forces for the suppression of riot, and to close public houses where a riot is apprehended. A matter of interest is the extent of the protection afforded by the Riot Act to soldiers acting under the commands of their officers. The soldier is at the same time a citizen, and the mere fact of his being a soldier, is not sufficient to exonerate him from all responsibility. No case in which the question has called for decision seems to have arisen. The civil remedy given to those whose property has suffered by riot is of an exceptional character. The action is brought against the hundred in which the riot took place. The hundred is supposed to guarantee the orderly conduct of its inhabitants, and is liable to damages for its failure to preserve order. It has been held that damage to a house will not entitle the owner

to compensation from the hundred unless the intention of the rioters was to totally destroy the house.

The Riot Act does not extend to Ireland.

In Scotland a riot may be either rioting and mobbing or rioting and breach of the peace. The first is much the same as the riot of English law. "Mobbing consists in the assembling of a number of people and their combining against order and peace to the alarm of the lieges" (Macdonald, *Criminal Law*, 180). The second offense occurs where concourse or a common purpose are wanting. The liability of the country or burgh for destruction of property by riot is provided for by the Riot Act and by several Acts of Parliament of the reign of George III.

In the United States the law is based upon that of England. In some States there is a statutory proclamation for the dispersion of rioters in words almost identical with those of the British Riot Act. The city, town, or county, according to circumstances, is liable for the damage caused by rioters. In some cases a remedy over against the rioters is given by legislation.

RIPARIAN LAWS. By the law of England the property in the bed and water of a tidal river as high as the tide ebbs and flows at a medium spring tide is presumed to be in the crown or a grantee of the crown, generally the lord of a manor, and the bed and water of a non-tidal river are presumed to belong to the person through whose land it flows, or, if it divide two properties, to the riparian proprietors, the rights of each extending to mid-stream (*ad medium filum aquæ*). In order to give riparian rights, the river must flow in a defined channel, or at least above ground. The diminution of underground water collected by percolation does not give a cause of action to the owner of the land in which it collects, though he is entitled to have it unpolluted unless a right of pollution be gained against him by prescription. As a general rule a riparian proprietor, whether on a tidal or non-tidal river, has full rights of user of his property.

The principal rights enjoyed by riparian owners as such are the right of increase of property by means of alluvion and the right of use of the water.

Alluvion is the gradual and imperceptible increase of land by deposit; a sudden and violent changing of the course of a stream by a flood does not change the property.

The limitations to which the right of the riparian proprietor is subject may be divided into those existing by common right, those imposed for public purposes, and those established against him by crown grant or by custom or prescription. Under the first head comes the public right of navigation, of anchorage and fishery from boats (in tidal waters), and of taking shell-fish (and probably other fish except royal fish) on the shore of tidal waters as far as any right of several fishery does not intervene. Under the second head would fall the right of eminent domain by which the state takes riparian rights for public purposes, compensating the proprietor, the restrictions upon the fishery rights of the proprietor, as by acts forbidding the taking of fish in close time, and the restrictions on the ground of public health, as by the Rivers Pollution Act, 1876. The jurisdiction of the state over rivers in England may be exercised by officers of the crown, as by commissioners of sewers or by the Board of Trade under the Crown Lands Act, 1866. A bridge is erected and supported by the county authorities, and the riparian proprietor must bear any inconvenience resulting from it. An example of an adverse right by crown grant is a FERRY (*q.v.*) or a port. The crown, moreover, as the guardian of the realm, has jurisdiction to restrain the removal of the foreshore, the natural barrier of the sea, by its owner in case of apprehended danger to the coast. The

rights established against a riparian proprietor by private persons must, as a rule, be based on prescription or custom, only on prescription where they are in the nature of profits *à prendre* (see PRESCRIPTION). Among such rights are the right to bathe, to land, to discharge cargo, to tow, to dry nets, to beach boats, to take sand, shingle, or water, to have a sea-wall maintained, to pollute the water (subject to the Rivers Pollution Act). In some cases the validity of local riparian customs has been recognized by the legislature.

A freshwater lake appears to be governed by the same law as a non-tidal river. The preponderance of authority is in favor of the right of the riparian proprietors as against the crown. The law of Scotland is in general accordance with that of England. In the United States the common law of England was originally adopted, the State succeeding to the right of the crown. In Pennsylvania, North Carolina, South Carolina, Iowa, Mississippi, and Alabama, it has been determined that the common law does not prevail, and that the ownership of the bed or soil of all rivers navigable for any useful purpose of trade or agriculture, whether tidal or fresh water, is in the State (Bouvier, *Law Dict.* s.v. "River"). The supreme court of the United States in 1857 declared constitutional an Act of Congress of 1845, extending the admiralty jurisdiction of the United States to all public navigable rivers and lakes where commerce is carried on between different States or with foreign nations. The right of eminent domain has been exercised to a much greater extent than in England in the acquisition of sites for mills under the powers of State legislation in encouragement of trade. The law as to subterranean water seems to be still unsettled. Some State decisions have recognized a public right to moor vessels and place cargo on the shore.

RIPH (פ'רי or ר'יא'), *i.e.* RABBENU YISHAK B. YA'AKOB HAKKOHEN AL-PHASI OR AL-FEZI, after the death of his teachers the greatest rabbi of Africa, and subsequently of the Peninsula, in the eleventh and twelfth centuries, was born in 1013 at Kal'at-Ibn-Hammad near Fez, and died at Lucena in 1103.

RIPLEY, a well-built market town of Derbyshire, England, situated near the river Derwent and the Cromford Canal, and on a branch line of the Midland Railway ten miles north of Derby and ten south of Chesterfield. In the neighborhood there are extensive collieries, and coke is largely manufactured. Besides the large concern of the Butterley Iron Company, which includes foundries, blast furnaces, and boiler works, the town possesses silk and cotton mills. The charter for the market was granted by Henry III. The population of the urban sanitary district (area 1,211 acres) in 1871 was 5,639; in 1881 it was 6,087, and about 7,000 in 1890.

RIPLEY GEORGE, critic and man of letters, was born at Greenfield, in western Massachusetts, on October 3, 1802. He was educated at local schools and at Harvard College, where he took his degree in 1823, and then studying theology was in 1826 ordained pastor of a Unitarian church in Boston. Here his success as a thoughtful preacher was marked; but in 1840 he resigned his charge, and he subsequently retired from the active ministry altogether.

In 1849 he joined the staff of *The Tribune*, founded eight years before by Horace Greeley in New York, and in a short time became its literary editor. This position, which, through his steadiness, scholarly conservatism, and freedom from caprice as a critic, soon became one of great influence, he held until his death on July 4, 1880.

During the greater part of the time of his connection with *The Tribune*, Ripley was also the adviser of a leading publishing house, an occasional contributor to

the magazines, and a coöperator in several literary undertakings. The chief of these, and the most lasting work that bears his name, was the *American Cyclopædia*.

RIPON, a cathedral city and borough in the West Riding of Yorkshire, England, is situated at the confluence of the Ure with the Laver and the Skell, and on the Great Northern Railway, twenty-two miles northwest of York and eleven north of Harrogate. From an early period till the sixteenth century Ripon was celebrated for its manufactures of woolen cloth. After this industry declined the town became so well known for its spurs that "as true steel as Ripon rowels" became a current phrase; and both Ben Jonson and Davenant refer to Ripon spurs in their verses. This manufacture, with those of buttons and various kinds of hardware, continued to prosper till the beginning of the present century, when the rise of the mechanical industries in the large towns caused it to decline. The population of the borough (area 1,580 acres) in 1871 was 6,806, in 1881 it was 7,390, and in 1890 it was estimated at 7,000.

RIPPERDA, JOHN WILLIAM, BARON, a political adventurer, was born of noble parents in the province of Groningen in the Netherlands, in 1680, and was educated in the college of the Jesuits at Cologne. He died at Tetuan toward the end of 1737.

RIPUARIAN LAW. See SALIC LAW.

RIST, JOHANN, German hymn-writer, was born at Ottensen in Holstein on March 8, 1607, and educated at Hamburg, Bremen, Leyden, Utrecht, Leipsic. In 1635 he became a preacher at Wedel on the Elbe, and there he died on August 31, 1667 (see HYMNS).

RITSCHL, FRIEDRICH WILHELM, an eminent German scholar, was born in 1806 in Thuringia. The great event of Ritschl's life was a sojourn of nearly a year in Italy (1836-37), spent in libraries and museums, and more particularly in the laborious examination of the Ambrosian palimpsest of Plautus at Milan. From this journey Ritschl's whole temperament and intellect received a new and richer coloring, and the remainder of his life was largely occupied in working out the material then gathered and the ideas then conceived. He accepted a call to Leipsic, where he died in harness in 1876.

Ritschl's character was strongly marked. To the world in general Ritschl was best known as a student of Plautus. When he began his studies, the text of that author was like some ancient picture, defaced alike by time and by much repainting. He cleared away the accretions of ages, and by efforts of that real genius which goes hand in hand with labor, brought to light many of the true features of the original.

In spite of the incompleteness, on many sides, of his work, Ritschl must be assigned a place in the history of learning among a very select few. His studies are presented principally in his *Opuscula* collected partly before and partly since his death. The *Trinummus* (twice edited) was the only specimen of his contemplated edition of Plautus which he completed. The edition has been continued by some of his pupils—Goetz, Loewe, and others—and is still in progress.

RITSON, JOSEPH, was the most militant and ill-tempered, and at the same time one of the most learned and accurate, of the antiquaries of the eighteenth century. Born at Stockton-on-Tees, of a Westmoreland yeoman family, in 1752, he was bred to the law, and settled in London as a conveyancer at the age of twenty-two. His first notable publication was in 1782, an attack on Warton's *History of English Poetry*. In the following year Johnson and Stevens were assailed for their text of Shakespeare. Bishop Percy was next

subjected to a furious onslaught in the preface to a collection of *Ancient Songs* (printed 1787, dated 1790, published 1792). His collection of the Robin Hood ballads is perhaps his greatest single achievement. Spelling was one of his eccentricities, his own name being an example: Ritson is a short pronunciation for Richardson. He died in 1803.

RITTENHOUSE, DAVID, astronomer, was born at Germantown, Penn., April 8, 1732. First a watchmaker, he afterward became treasurer of Pennsylvania and (from 1792) master of the United States mint; he was largely occupied in settling the boundaries of several of the States. As an astronomer, Rittenhouse's principal merit is that he introduced the use of spider lines in the focus of a transit instrument. He died on June 26, 1796.

RITTER, CARL, the greatest geographer of modern times, was born at Quedlinburg on August 7, 1779, and died in Berlin, September 29, 1859.

The service rendered to geography by Ritter was mainly threefold. Geography was, to use his own expression, a kind of physiology and comparative anatomy of the earth: rivers, mountains, glaciers, etc., were so many distinct kinds of organs, each with its own appropriate functions; and, as his physical frame is the basis of the man, determinative to a large extent of his life, so the structure of each country is a leading element in the historic progress of the nation. Such portions of his universal geography as he completed remain each the standard thesaurus for its territory. This is especially the case with the sections devoted to Palestine and to Central Asia.

RIVAROL, ANTOINE DE, was born at Bagnols in Languedoc on June 26, 1753, and died at Berlin on April 13, 1801. He was well educated, and is said to have been admitted by the bishop of Uzès to a theological seminary, then to have held a tutorship at Lyons under the name of Longchamps. He went to Paris and when the Revolution developed the importance of the press, Rivarol at once took up arms on the royalist side. The *Journal Politique* of Sabatier de Castres and the *Acts des Apôtres* of Peltier were the chief papers in which he wrote. Rivarol has had no rival in France except Piron, and none in England except Sidney Smith, in sharp isolated conversational sayings.

The works of Rivarol were published in five volumes by his friend Chênédollé (who has reported much remarkable conversation of his in his last days) and Fayolle (Paris, 1805); but their perusal as a whole can only be recommended to the student of literature.

RIVE DE GIER, a town of France, in the department of Loire, situated thirteen miles to the east-northeast of St. Étienne, on the Lyons Railway at the head of the canal of Givors on the Gier. The town, which is constantly enveloped in a dense cloud of smoke, and presents a dirty and unattractive appearance, is principally dependent on the coal industry, there being fifty pits in the basin of the Gier, with an annual output of over 19,000,000 bushels. There are twenty-two coke and lamp black furnaces, and five glass works, the products of which—colored glass and so-called Nuremberg mirrors—are celebrated, on account of the fineness and purity of the sand found on the banks of the Rhone and the Saône. Mining machinery, railway plant, and coarse ironmongery are also manufactured, and there are iron and steel works. A large number of persons are also employed in winding and spinning silk and in tape-weaving. The population in 1881 was 15,760, and about 17,000 in 1890.

RIVER. See GEOLOGY.

RIVER ENGINEERING. The improvement of rivers may be considered under two aspects, for rivers

form the natural channels for conveying the surplus rainfall from the districts through which they pass to the sea, and they can also be utilized for the purposes of inland navigation. If a river, owing to the small section of its channel, or the slight inclination of its bed, is incapable of discharging the whole volume of water which drains into it in rainy seasons, the lands along its banks become flooded. If, on the other hand, a river is impeded by rapids, by shoals, or by a bar at its mouth, it is prevented from serving as a natural highway for the traffic of the district through which it flows. Accordingly the mitigation of floods and the regulation of rivers are the problems which have to be grappled with in the engineering of rivers. The first aims at remedying an existing evil, and the second deals with the development of the resources and trade of a country by the improvement of its water communications.

The entire prevention of floods would entail a larger expenditure than the results would justify. In most cases, the prevention of summer floods and the mitigation of winter floods would suffice; for, while summer floods are always very injurious, winter floods prove sometimes beneficial in depositing the mud which they bring down, provided they do not remain very long upon the land. There are three methods by which floods may be prevented or mitigated, namely—(1) improvement of channel; (2) embankment of channel; (3) pumping.

The discharging capacity of a river may be increased by enlarging the section of its channel; by the formation of straight cuts, which reduce its length, and consequently increase its fall; by dredging away shoals, and thus rendering the fall of its bed more uniform; and by removing obstacles to its flow at weirs.

When it is essential that the lands bordering a river should be absolutely protected from inundation, the enlargement of a river bed to an adequate extent for discharging the greatest floods would be too costly, especially when the fall is small: and it becomes necessary to resort to the expedient of increasing the channel, above the surface of the ground, by forming embankments along each side. By making the banks with material excavated from the channel, the earthwork serves the double purpose of enlarging the river bed and forming a bank. A flood channel of considerable dimensions can be readily obtained by placing the embankments some distance back from the margin of the river, thus greatly enlarging the section when the waters rise above the level of the land, while leaving the natural river bed unaltered for the ordinary flow. The Fens of Lincolnshire, a large portion of Holland, the valley of the Po, and large tracts of low-lying land bordering the Mississippi are protected by embankments.

When lands are very flat and low, lying sometimes actually below the general drainage-level of the district and the water-level of the streams, it is impossible for rivers to perform their ordinary function of draining the land by gravitation. It is necessary in such cases to create an artificial fall by pumping the drainage waters up so as to be discharged into the adjacent streams. This method has the advantage of insuring the effectual drainage of the lands, provided adequate pumping power is supplied; but it forms an additional tax on the land, as steam has to be applied to do what is under ordinary conditions effected by nature, and the land has also to be surrounded by banks.

Rivers may be broadly divided into two classes in respect of the lower portion of their course, for the tide is propagated up some rivers to a considerable distance from their mouth, commingling with the fresh water and producing an ebb and flow far into the interior; while rivers flowing into tideless seas descend with an

unimpeded current to their outlet. The effect of the tidal ebb and flow is most readily perceived in contrasting the mouths of tidal and tideless rivers. The mouths of the Mississippi, the Nile, the Danube, and the Rhone present very marked differences to the outlets of the St. Lawrence, the Seine, the Thames, and the Severn. Tideless rivers divide into a number of mouths, whereas tidal rivers are confined to a single outlet; and the effect of tidal influence on this difference is still further confirmed by the instance of the Maas, which, with a very slight tidal range, exhibits a tendency to deteriorate into the dispersion of mouths of a tideless river. The value of tidal flow in maintaining a river is fully manifested by comparing the navigable condition of the Thames or of the muddy Humber with the delta of the Nile or the Rhone, though the latter rivers possess a much larger fresh-water discharge.

The general improvements of the upper portions of both tidal and tideless rivers may be carried out on similar principles, though on approaching their mouths they need a totally different treatment. To give a river a uniform depth, its channel and flow require regulation. Hard shoals may be permanently removed by dredging; but silty shoals, even when dredged away, will re-form unless the channel is contracted. A bar is a ridge or shoal extending across the navigable channel, over which there is less depth than either above or below it. The lowering of such a bar forms one of the main objects of river improvement, as upon the depth that can be obtained over the bar depend the class of vessels that can enter the river, and, in tidal rivers, the period of time during which the entrance can be navigated. A bar may result from the action of the sea, which tends to form a continuous beach across any inlet, and would obliterate the mouths of rivers if the channels were not maintained by the ebb and flow of the tide and the fresh-water discharge; or it may be formed by the conflict of the sea and river water, which checks the current at the mouth and causes the river to deposit the sediment which it held in suspension. The bars at the mouths of the Mersey, the Liffey, and the Adour are due to the first cause; while the bars at the mouths of tideless rivers, such as the Mississippi, the Danube, and the Rhone, are mainly due to the second.

There are three obstructions to which tidal rivers are subject, namely, a bar, a shifting channel, and inadequacy of depth; and there are three general methods which may be resorted to for their improvement, namely, jetties (see JETTIES), training walls, and dredging, in addition to the regulation of their upper portion by longitudinal jetties, or banks, as previously mentioned.

The wandering shallow channel of a river through a wide sandy estuary may be improved by training the channel, in a suitable direction, by means of longitudinal mounds of rubble stone, commonly termed training walls. The proper width between the training walls depends upon the fall, the tidal range, and the fresh-water discharge, and should gradually increase down stream so as to admit as much tidal water as possible with a steady flow. As the scour of the fresh-water discharge is greater with a contracted channel, the tendency is to place the training walls too close together, which, though improving the depth in the channel between the walls, reduces the volume of tidal water that can get up the channel and thus compromises the maintenance of the outlet beyond the walls.

The most careful consideration should be given to all the conditions of an estuary before training works are commenced, for when once begun they must be eventually carried out to deep water; and, if ports exist along the shores of the estuary, they are liable to be injured

by the accretion resulting from the works unless the trained channel can be led close along them.

The improvements effected within recent years in the ordinary dredging machinery, and the introduction of the sand-pump dredger, have facilitated and cheapened dredging operations to such an extent that some of the most remarkable river improvements have been effected by dredging. Dredging merely consists in removing material from the river bed, and thus enlarging and deepening it; and the extent to which this method of improvement may be carried simply depends upon the economical consideration as to how far the improvement of the traffic on the river by an increase of depth will afford an adequate return for the outlay. Dredging, however, furnishes a cheap method of excavation owing to the small cost of carriage by water. Dredging being a purely artificial means of improvement, generally necessitates regular maintenance; whereas the improvement from scour effected by jetties and training walls is permanent, being realized by natural means.

The improvements on the Tyne and on the Clyde have mainly resulted from very extensive dredging operations, but they have been aided by training walls on the Clyde, and by the Tynemouth piers on the Tyne, which protect the entrance channel from drift and the dredgers from waves, and concentrate the scour over the bar. The three methods of improvement described above have been resorted to on the Tees: for training walls have been formed through the wide estuary below Middlesborough for fixing the channel; converging jetties are being constructed for sheltering the channel from wave-born sand, and for directing the scour over the bar; and dredging is being employed for deepening the trained and sheltered channel. On the Maas, also, and at Charleston, dredging is being used for attaining a depth for navigation which the jetties alone were unable to produce.

Tideless rivers on entering the sea have their velocity checked, and consequently deposit the silt which they previously carried in suspension. In process of time this accumulated deposit forms a tract of low-lying land protruding into the sea, through which the river flows in several shallow channels to the sea owing to the impediments offered to its flow by the sediment which it deposits. The form which these diverging channels assume has led to the term delta being applied to the mouths of tideless rivers and the tract of land which they create. These deltas are always advancing, and consequently reducing the very small fall of the channels through them by prolonging their course. The rate of advance varies with the amount of sediment brought down, the depth of the sea in front, and the extent to which the delta spreads out. The Rhone delta has at present a yearly average progression of 140 feet; the Kilia mouths of the Danube delta have been estimated to advance 200 feet annually; while the Mississippi delta, extending 220 miles into the Gulf of Mexico, is supposed to have taken 4,400 years in forming, which would be equivalent to an average annual advance of 264 feet, the present advance being about 207 feet in a year.

The only method of improving the outlet of a tideless river is to concentrate the current flowing through one of the channels, and to prolong the banks of the regulated channel into deep water by means of parallel jetties.

The only other way of remedying the impediments to navigation at the mouths of tideless rivers is by avoiding the delta channels altogether, and constructing a canal connecting the deep river above the delta with the sea at some suitable place beyond the influence of the river alluvium. This expedient has been resorted

to for the trade of the Rhone; for, though the discharge of the river was concentrated into a single outlet by forming embankments on each side, between 1852 and 1857, which shut off the other three outlets and extend into the sea at its mouth, the increased discharge brought down the whole sediment of the river, and a bar formed again farther out. Accordingly the St. Louis Canal was formed, between 1863 and 1873, going from the head of the delta into the Bay of Foz beyond the limits of the delta. A similar plan was proposed for the Mississippi, but was abandoned in favor of the jetty system. The success of the jetty system depends upon the existence of a littoral current to carry away the sediment in the stream conveyed by aid of the jetties into deep water, or upon the gradual prolongation of the jetties to keep pace with the progression of the delta. The outlets of the Danube and the Mississippi have both been improved by training one of their minor delta channels into deep water; and hitherto the depth over the bars has been maintained. In the case of the Danube, the southerly current sweeping across the outlet carries away a portion of the issuing sediment. The Mississippi jetties direct the discharge into such deep water, and with so much velocity, that it may be premature to decide to what extent the maintenance of the depth may be due to a westerly current in the gulf; but hitherto from one cause or the other, or probably from both combined, the bar has not formed again in front of the jetties.

The method of lowering a bar at the mouths of rivers by means of jetties has been applied to both tidal and tideless rivers; but the systems employed for each type of river are based on different principles which must not be confounded together. A tideless river is maintained solely by its discharge, and therefore the more its channel is contracted the greater is the depth.

The greatest difficulty in training tidal rivers is so to adjust the width of channel that the free admission of the flood tide may be secured while affording adequate scouring power for the current. If the influx of the tide is checked by a sufficient reduction of width to insure improvement in depth by scour, the capacity of the estuary is eventually reduced, and a portion of the scouring power is lost, as in the case of the Seine. It is better, therefore, to regulate the width so as to insure a free admission of the tide, and to provide for any deficiency in scour and depth by dredging. Deepening by dredging can be easily and economically effected to any desired extent, as shown by the Tyne and Clyde improvements; whereas tidal capacity in an estuary, when once lost, can never be regained.

**RIVERSIDE**, located in San Bernardino county, Cal., on the Santa Anna river, was founded early in the seventies by a colony of New Englanders who removed west for the purpose of engaging in the cultivation of fruit. The surrounding country is peculiarly adapted to this pursuit, being supplied with irrigating canals, etc., and the industry and enterprise of the inhabitants have developed a region of unsurpassed fertility, where oranges, lemons, figs, and other tropical fruits of exceptional quality are produced in abundance. The city is situated seven miles from Dalton station on the Southern Pacific road, by which it is afforded easy access to depots of distribution and supply, and is otherwise provided with transportation accommodation adequate to the necessities of the service. It contains four banks, a number of churches, schools, academies, and stores, besides manufactures of furniture, pottery, etc., also fruit-canning and raisin-preserving works. The population in 1890 was 6,000.

**RIVIERA OF GENOA.** See **ITALY.** It is customary to speak of the Eastern and Western Riviera (Riviera di Levante and Riviera di Ponente), which meet at Genoa.

**RIXDORF**, a large village to the southeast of Berlin, and practically an outlying suburb of that city, with which it is connected by tramway, is chiefly interesting as a foundation of Moravian Brethren from Bohemia, who settled here in 1737, under the protection of King Frederick William I. German Rixdorf, which is now united with Bohemian Rixdorf, was a much more ancient place, and appears as Richardsdorf in 1630 and as Riegenstorp in 1435. The inhabitants of the united community (who numbered 18,729 in 1880, and about 10,500 in 1890, though only 3,421 in 1852) are engaged chiefly in weaving, in the manufacture of india-rubber goods, and in the various industries of the neighboring capital.

**RIZZIO, DAVID**, a servant of Mary, queen of Scots, was, according to Buchanan, a native of Turin, and came to Scotland in 1561 in the train of the Piedmontese ambassador. He entered the queen's service as a musician in 1564, and was also employed by her as private foreign secretary. He was murdered in 1566, as has been related in the article **MARY.**

**RJEV.** See **RZHEFF.**

**ROACH** (*Leuciscus rutilus*), a fish of the family of Carps (*Cyprinidae*) and of the genus *Leuciscus*, which comprises also the Rudd, Chub, and Dace. It is one of the most common freshwater fishes of Europe north of the Alps, and extends northward as far as Lapland. Roach spawn from April to May, and frequently produce hybrids with other allied fishes, such as the rudd and the bream. They never attain to a large size, a roach of one and a half pounds being considered an unusually large fish. As a food-fish this species is not held in esteem; but by the pleasure it affords to a large class of humble anglers it rivals any of the freshwater fishes which give more pretentious sport.

**ROADS AND STREETS.** The earliest roads about which anything definite is known are those of ancient Rome, one of the oldest of which and the most celebrated for the grandeur of its works—the Appian Way—was commenced in 312 B.C. Roman roads are remarkable for preserving a straight course from point to point regardless of obstacles which might have been easily avoided. They appear to have been often laid out in a line with some prominent landmark, and their general straightness is perhaps due to convenience in setting them out. In solidity of construction they have never been excelled, and many of them still remain, often forming the foundation of a more modern road, and in some instances constituting the road surface now used. There are no traces of Roman influence in the later roads in England, but in France the Roman method appears to have been followed to some extent when new roads were constructed about the beginning of the eighteenth century. A foundation of stones on the flat was laid, and over that two layers of considerable thickness, of larger and smaller stones, bordered by large stones on edge, which appeared on the surface of the road.

The almost incredibly bad state of the roads in England toward the latter part of the seventeenth century appears from the accounts cited by Macaulay. The turnpike roads were generally managed by ignorant and incompetent men until Telford and Macadam brought scientific principles and regular system to their construction and repair. The name of Telford is associated with a pitched foundation, which he did not always use, but which closely resembled that which had been long in use in France, and the name of Macadam often characterizes roads on which all his precepts are disregarded. Both insisted on thorough drainage and on the use of carefully prepared materials, and adopted a uniform cross section of moderate curvature instead

of the exaggerated roundness given before; but while Telford paid particular attention to a foundation for broken stone, Macadam disregarded it, contending that the subsoil, however bad, would carry any weight if made dry by drainage and kept dry by an impervious covering. Macadam was engaged more with the repair of old roads than with the construction of new ones, and, though it is not possible to agree with all his doctrines, the improvement which he effected in road management and maintenance was great and lasting.

A road should be as short as possible between two points to be connected, but straightness must often be sacrificed to avoid difficulties and expense and to secure good gradients. The latter should be as easy as practicable, having regard to the country to be traversed, and it is desirable that there should be a ruling gradient than which none should be steeper. On a level macadamized road in ordinary repair the force which the horse has to put forth to draw a load may be taken as one thirtieth of the load. But in going uphill the horse has also to lift the load, and the additional force to be put forth on this account is very nearly equal to the load drawn divided by the rate of gradient. Thus on a gradient of one in thirty the force spent in lifting is one-thirtieth of the load, and in ascending a horse has to exert twice the force required to draw the load on a level. In descending, on the other hand, on such a gradient, the vehicle, when once started, would just move of itself without pressing on the horse. A horse can without difficulty exert twice his usual force for a time, and can therefore ascend gradients of one in thirty on a macadamized surface without sensible diminution of speed, and can trot freely down them. These considerations have led to one in thirty being generally considered as the ruling gradient to be aimed at on first-class roads, though one in forty has been advocated.

The thickness to be given to a road made altogether of broken stone will depend on the traffic it is intended for. On a good well-drained soil a thickness of six inches will make an excellent road for ordinary traffic, and Macadam's opinion that ten inches of well-consolidated material was sufficient to carry the heaviest traffic on any substratum if properly drained has proved to be generally correct. In a new road the loss of thickness during consolidation must be allowed for, and the materials should be laid about one-half thicker than the coating is intended to be.

Whenever it is possible a new road should be finished with a roller. The materials are consolidated with less waste, and wear and tear of vehicles and horses is saved.

A pitched foundation like that used by Telford is always desirable for a road that is subject to heavy traffic. It consists of flat stones carefully set on edge in courses across the road with the broadest edges downward. The upper edges should not exceed four inches in breadth, to hold the broken stone well. All inequalities must be knocked off, and small stones and chips must be firmly pinned into the interstices with a hammer, so as to form a regular convex surface, with every stone firmly fixed in place. The thickness of the pitching is generally six or seven inches; it should not be less than four, and it may generally be thicker without any sensible increase of cost. At least four inches of broken stone are required over the pitched foundation, and, when consolidated, six are always sufficient. Burned clay, gravel, or even sand may be usefully employed as a foundation on a clay bottom, to cut off the road material from the clay.

The qualities required in a good road stone are hardness, toughness, and ability to resist the action of the

weather, and these are not always found together in the same stone. Limestones possess another quality, that of furnishing a mortar-like detritus which binds the stone together, and enables it to wear better than a harder material that does not bind. For heavy traffic the best materials are traps, basalts, greenstones, and syenite; quartzose grits and cherty sandstones are always excellent materials. For moderate traffic the harder limestones are sufficiently durable and make the smoothest and pleasantest roads.

Stone for a new road should be evenly broken to a size that will pass every way through a ring two and one-half inches in diameter. For repairs, especially when the material is tough, a gauge of two and one-fourth or two inches may be used with advantage, as the stone covers a larger surface, consolidates sooner, and makes a smoother surface. Stone is best broken by hand, but stone-breaking machines have been introduced which supersede hand-breaking to some extent, especially where large quantities of hard stone are to be broken.

Early pitched roadways consisted of pebbles or rounded bowlders, bedded in the natural surface or in sand or gravel. The next step in advance was to employ roughly-squared blocks; but the wide and irregular joints admitted the water to the subsoil, and the mud worked up and the stones sank irregularly under the traffic. Telford recommended a bed of about six inches of clean river ballast, rendered compact by being traveled upon for some time before the paving was laid, but he subsequently considered that nothing short of twelve inches of broken stone, put on in layers four inches thick and completely consolidated by carriages passing over them, would answer the purpose. He recommended paving stones of considerable depth and of from four and one-half to six or seven and one-half inches in breadth for the greatest thoroughfares, and he pointed out the importance of working the stones flat on the face and square on all sides, so as to joint close and preserve the bed or base as nearly as possible of the same size as the face, and of carefully placing together in the same course stones of equal breadth. Many pavements thus laid with stones of considerable breadth still remain, but experience proved that it was a mistake to suppose that broad stones having a larger base would support better the weight and shocks of heavy traffic; on the contrary, a wide stone has a tendency to rock on its bed, and also to wear round on the top and become slippery. To obtain an even surface and a better foothold for the horses the stones were reduced in width. The reduction of breadth to about three inches was generally followed, but it is only of late years that a concrete foundation has been employed to any great extent, the frequent breaking up to which streets are subject having prevented it.

The best materials for pavement sets are the hard igneous and metamorphic rocks, though millstone grit and hard sedimentary rock of the same nature are used when the traffic is comparatively light. Excessively hard stone which wears smooth and slippery is objectionable in spite of its durability.

Joints simply filled in with gravel are of course pervious to water, and a grout of lime or cement does not make a permanently water-tight joint, as it becomes disintegrated under the vibration of the traffic. Grouted joints, however, make a good pavement when there is a foundation of concrete or broken stone or hard core. Where there is not a regular foundation imperviousness in the joints is of great importance.

*Wood Paving.*—Wood pavements were introduced in 1839. Hexagonal or circular blocks of fir or cedar six to eight inches across and four to six deep, were bedded in gravel laid on a foundation previously leveled and

beaten. The blocks were either beveled off at the edges or grooved across the face to afford foothold. Other wood pavements were tried about the same time, but they soon got out of order from unequal settlement of the blocks, and most of them lasted but a few years. The best of these was Carey's, which consisted of blocks six and one-half to seven and one-half inches wide, thirteen to fifteen long, and eight or nine deep, the sides and ends having projecting and reëntering angles locking the blocks together with the view of preventing unequal settlement. Experience led to a reduction in the width of the blocks to four inches and in the depth to five or six, and the salient and reëntering angles disappeared from the sides. With these modifications Carey's pavement remained in use until after the introduction of more modern systems in recent years. The "improved wood pavement" was first used in 1871. After the foundation was formed to the proper cross section a bed of sand four inches deep was laid, upon which came two layers of inch deal boards saturated with boiling tar, one layer across the other. The wooden blocks were three inches wide, five deep, and nine long; they were dipped in tar and laid on the boards with the ends close together, but transversely the courses were spaced by fillets of wood three-fourths of an inch wide nailed to the floor and to the blocks. The joints were filled up with clean pebbles rammed in and were run with a composition of pitch and tar, the surface being dressed with boiling tar and strewed with small sharp gravel and sand. In this pavement a somewhat elastic foundation was provided in the boards, which were also intended to prevent unequal settlement of the blocks; but the solidity of the pavement depended upon its water-tightness, for, when the surface water reached the sand, as it did sooner or later, settlement and dislocation of the blocks under the traffic arose. This form of pavement is still in use in our western cities, though being fast superseded by stone.

There is some difference of opinion as to the best material for a wood pavement. Pitch pine and the harder red and yellow deals are the most durable, but they are less elastic than the softer woods, and are apt to wear slippery. Soft white woods have been recommended for the sake of a more elastic surface; but on the whole either Memel or Swedish yellow deal is generally considered the best material. Whatever wood is used, it should be sound, close-grained, even in quality, free from knots and sap, and from the blue tinge which is a sign of incipient decay. After the blocks are cut, all those that are unsound, knotty, or badly shaped should be carefully rejected, as defective blocks soon cause holes in the surface and must be replaced, or the adjoining blocks will suffer undue wear and the surface become irregular. The breadth of the blocks never now exceeds four inches, and it is generally three, the length being determined by the breadth of the deal or batten from which they are cut. The depth is usually five or six inches; five inches are considered by many to be enough to give sufficient depth for as long as the pavement will retain a sufficiently good surface without renewing the wood, and blocks of that depth have been laid in many London streets. It is doubtful if any advantage is derived from creasoting or from dipping the blocks in creasote oil or coal tar. Dipping affords a cover for the use of defective or inferior wood, and thorough creasoting, though it preserves the wood from decay, has little or no influence on the wear, which in almost all cases determines the life of the blocks.

*Asphalt Paving.*—Asphalt was first used for street paving in Paris in 1854. It was introduced in London in 1869, when Threadneedle street was paved by the

Val de Travers Asphalt Company, and since then it has been extensively used for paving both streets and footways. Shortly afterward the system was introduced in Washington, D. C., where it yet remains to a limited extent. The material is a hard limestone impregnated with bitumen in the proportion of from 6 to 8 per cent. in the Seyssel rock, and from 10 to 12 in that from Val de Travers. Asphalts containing less than the former proportion have not sufficient coherence for street pavements, and those containing more than the latter proportion soften from heat in the summer. Asphalt is employed either as a mastic or compressed. The mastic is previously prepared in cakes and is melted for use in caldrons with a small quantity of bitumen, and for a street pavement is thoroughly mixed with sand or grit. It is spread in one thickness on a concrete foundation, covered with sand, and beaten to an even surface. This material has not proved so successful for street surfaces as compressed asphalt. To produce this the rock asphalt, previously reduced to a fine powder by mechanical means, is heated in revolving ovens to from 220° to 250°, spread while still hot, and compressed into a solid mass by hot disk-shaped rammers, and afterward smoothed with irons heated to a dull redness. The original rock is thus as if were reconstructed by taking advantage of the power of coherence of the molecules under pressure when hot. In heating the powder the moisture combined in the limestone must be driven off without reducing the proportion of the bitumen more than is unavoidable. The powder cools very slowly and may be conveyed long distances from the ovens; it may even be kept till the next day before use. When laid it should still retain a temperature of from 150° to 200°. It is spread evenly with a rake by skilled workmen for the whole width of the street to a thickness about two-fifths greater than the finished coating is intended to be. Ramming is commenced with light blows to insure equality of compression throughout and is continued with increased force until the whole is solidified. The ramming follows up the spreading, so that a joint is required only when the work is interrupted at the end of a day, or from some other cause. In a few hours after it has been laid an asphalt pavement may be used for traffic. When finished, its thickness may be from one and a half to two and a quarter inches, according to the traffic; a greater thickness than the latter cannot be evenly compressed with certainty.

ROANNE, a town of France, at the head of an arrondissement in the department of the Loire, lies on the left bank of the Loire in 46° 2' 26" N. latitude at a height of 922 feet above the sea. In 1886 Roanne had a population of 30,060.

ROANOKE, a Virginia town, the capital of Roanoke county, lies on the Atlantic, Mississippi and Ohio Railroad, and is of some importance as a tobacco market. The town has banks, telegraphs, schools, churches, etc., and a population (1890) of 16,159.

ROBBERY. See THEFT.

ROBBIA, DELLA, the name of a family of great distinction in the annals of Florentine art. Its members are enumerated in chronological order below.

I. LUCA DELLA ROBBIA, was the son of a Florentine named Simone di Marco della Robbia. He was born about 1400. No sculptured work of the great fifteenth century ever surpassed the singing-gallery which Luca made for the cathedral at Florence between 1431 and 1440, with its ten magnificent panels of singing angels and dancing boys, far exceeding in beauty those which Donatello in 1433 sculptured for the opposite gallery in the same choir. This magnificent work now lies scattered in various parts of the Bargello. The general effect of the whole can best be seen at the South Kensington

Museum, where a complete cast is fixed to the wall. The same museum possesses a study in *gesso duro* for one of the panels, which appears to be the original sketch by Luca's own hand. He died in 1482, after executing numerous other works of art, some of which yet remain to attest his skill. His principal works are those in enameled relief.

II. ANDREA DELLA ROBBIA, the nephew and pupil of Luca, also carried on the production of enameled reliefs. He was born in 1435. One of his finest works is a large retable at Volterra in the church of S. Girolamo, dated 1501; it represents the Last Judgment, and is remarkable for the fine modeling of the figures. He died in 1525.

III., IV. Five of Andrea's seven sons worked with their father, and after his death carried on the Robbia fabrique. Early in life two of them came under the influence of Savonarola, and took monastic orders at his Dominican convent; these were MARCO, who adopted the name of Fra Luca, and PAOLO, called Fra Ambrogio. One relief by the latter, a Nativity with four life-sized figures of rather poor work, is in the Cappella degli Spagnuoli in the Sienese convent of S. Spirito; a MS. in the convent archives records that it was made in 1504.

V. The chief existing work known to be by the second son LUCA is the very rich and beautiful tile pavement in the uppermost story of Raphael's loggie at the Vatican, finely designed and painted in harmonious majolica colors.

VI. GIOVANNI DELLA ROBBIA during a great part of his life worked as assistant to his father, Andrea, and in many cases the enameled sculpture of the two cannot be distinguished. Some of Giovanni's independent works are of great merit. He was born in 1469, and died in 1529.

VII. GIROLAMO DELLA ROBBIA, another of Andrea's sons, was an architect and a sculptor in marble and bronze as well as in enameled clay. He was born in 1488, and died in 1566.

ROBERT I., king of France, son and successor of Hugh Capet, was born at Orleans in 971 and died at Melun in 1031.

ROBERT, called THE BRUCE, king of Scotland, was the son of the seventh Robert de Bruce, lord of Annandale, and was born in 1274. The birthplace of the Bruce—perhaps Turnberry, his mother's castle, on the coast of Ayr—is not certainly known. His youth is said by an English chronicle to have been passed at the court of Edward I. On August 28, 1296, Robert de Bruce "le vieil" and Robert de Bruce "le jeune," earl of Carrick, swore fealty to Edward at Berwick; but (according to Hemingford), in breach of this oath, renewed at Carlisle on the Gospels and the sword of Thomas a Becket, the young earl joined Wallace, who had raised the standard of Scottish independence in the name of Baliol after that weak king had himself surrendered his kingdom to Edward. Urgent letters were sent ordering Bruce to support Warenne, Edward's general, in the summer of 1297; but, instead of complying, he, along with the bishop of Glasgow and the steward of Scotland, laid waste the lands of those who adhered to Edward. On July 7th Percy forced Bruce and his friends to make terms by the treaty called the Capitulation of Irvine. In the campaign of 1304, when Edward renewed his attempt on Scotland and reduced Stirling, Bruce supported the English king, who in one of his letters to him says, "If you complete that which you have begun we shall hold the war ended by your deed and all the land of Scotland gained." But, while apparently aiding Edward, Bruce had taken a step which bound him to the patriotic cause. On June 11th, a month before the fall of Stirling, he met Lamberton at

Cambuskenneth and entered into a secret bond by which they were to support each other against all adversaries and undertake nothing without consulting together. The death of his father in this year may have determined his course and led him to prefer the chance of the Scottish crown to his English estates and the friendship of Edward.

This determination closes the first chapter of his life; the second, from 1304 to 1314, is occupied by his contest for the kingdom, which was really won at Bannockburn, though disputed till the treaty of Northampton in 1328; the last, from 1314 to his death in 1329, was the period of the establishment of his government and dynasty by an administration as skillful as his generalship. The fall of Stirling was followed by the capture and execution of Wallace at London on August 24, 1305. Edward hoped still to conciliate the nobles and gain Scotland by a policy of clemency to all who did not dispute his authority. Challenged by the king with the bond between him and Lamberton (according to one account discovered by the treachery of John Comyn, with whom a similar engagement had been made or attempted), Bruce secretly quitted London, and on February 10, 1306 met by appointment, in the church of the Friars Minor at Dumfries, Comyn, whom he slew at the high altar for refusing to join in his plans.

The bond with Lamberton was now sealed by blood and the confederates lost no time in putting it into execution. Within little more than six weeks Bruce, collecting his adherents in the southwest, passed from Lochmaben to Glasgow and thence to Scone, where he was crowned by the bishop of St. Andrews on March 25th, the bishops of Glasgow and Moray, with the earls of Lennox, Athole, and Errol, being present. Two days later Isabella, Countess of Buchan, claimed the right of her family the Macduffs, earls of Fife, to place the Scottish king on his throne, and the ceremony was repeated with an addition flattering to the Celtic race. Though a king, Bruce had not yet a kingdom, and his efforts to obtain it were till the death of Edward I. disastrous failures. In June he was defeated at Methven by Pembroke, and on August 11th he was surprised in Strathfillan, where he had taken refuge, by Lord Lorn. The ladies of his family were sent to Kildrummy in January, and Bruce, almost without a follower, fled to Rathlin, an island off Antrim (Ireland). Edward, though suffering from his last illness, came to the north in the following spring. While wreaking his vengeance Edward himself was summoned by death at Burgh-on-the-Sands, on the Solway, on June 7, 1307.

Bruce, with the insight of military genius, seized his opportunity. Leaving Edward, now his only brother in blood and almost his equal in arms, in Galloway, he suddenly transferred his own operations to Aberdeenshire. In the end of 1307 and again in May, 1308, he overran Buchan, where, at Inverary on May 22d, he defeated its earl, one of his chief Scottish opponents. Then crossing to Argyll he surprised Lord Lorn in the Pass of Brander and took Dunstaffnage. In 1309 a truce, scarcely kept, was effected by the pope and Philip of France, and in 1310, in a general council at Dundee, the clergy of Scotland—all the bishops being present—recognized Bruce as king. The support given him by the national church in spite of his excommunication must have been of great importance in that age, and was probably due to the example of Lamberton. The next three years were signalized by the reduction one by one of the strong places the English still held—Linlithgow in the end of 1310, Dumbarton in October, 1311, Perth by Bruce himself in January, 1312. Encouraged



by these successes, he made a raid into the north of England, and on his return reduced Butel (in Galloway), Dumfries, and Dalswinton, and threatened Berwick. In March, 1313, Sir James Douglas surprised Roxburgh, and Randolph surprised Edinburgh. In May Bruce was again in England, and, though he failed to take Carlisle, he subdued the Isle of Man. Edward about the same time took Rutherglen and laid siege to Stirling, whose governor, Mowbray, agreed to capitulate if not relieved before June 24, 1314. By the close of 1313 Berwick and Stirling alone remained English. Edward II. felt that if Scotland was not to be lost a great effort must be made. With the whole available feudal levy of England, a contingent from Ireland, and recruits even out of jails—for murderers were pardoned on condition of joining the army—he advanced from Berwick to Falkirk, which he reached on June 22d. After a preliminary skirmish on Sunday the 23d, in which Bruce distinguished himself by a personal combat with Henry de Bohun, whom he felled by a single blow of his ax, the battle of Bannockburn was fought on Monday the 24th; and the complete rout of the English determined the independence of Scotland and confirmed the title of Bruce.

In the career of Bruce it was the turning-point. The enthusiasm of the nation he had saved forgot his late adherence to the popular cause, and at the parliament of Ayr on April 25, 1315, the succession was settled by a unanimous voice on him, and, failing males of his body, on his brother Edward and his heirs male, failing whom on his daughter Marjory and her heirs, if she married with his consent. Soon after she married Walter the Steward.

The last part of Bruce's life, from 1315 to 1329, began with an attempt which was the most striking testimony that could have been given to the effect of Bannockburn, and which, had it succeeded, might have altered the future of the British Isles. This was no less than the rising of the whole Celtic race, who had felt the galling yoke of Edward I. and envied the freedom the Scots had won. In March, 1318, first the town and then the castle of Berwick, the last stronghold of the English, capitulated, and Bruce wasted the English border as far as Ripon.

The chief author of Scottish independence barely survived his work. His last years had been spent chiefly at the castle of Cardross on the Clyde, which he acquired in 1326, and the conduct of war, as well as the negotiations for peace, had been left to the young leaders Randolph and Douglas, whose training was one of Bruce's services to his country. Ever active, he employed himself in the narrower sphere of repairing the castle and improving its domains and gardens, in shipbuilding on the Clyde, and in the exercise of the royal virtues of hospitality and charity. The religious feeling, which had not been absent even during the struggles of manhood, deepened in old age, and took the form the piety of the times prescribed. He made careful provisions for his funeral, his tomb, and masses for his soul. He procured from the pope a bull authorizing his confessor to absolve him even at the moment of death. He died from leprosy, contracted in the hardships of earlier life, on June 7, 1329, and was buried at Dunfermline beside his second wife, Elizabeth de Burgh, whom he had married about 1304, and who bore him late his only son, David, who succeeded him.

ROBERT, the name of two dukes of Normandy. See NORMANDY, for ROBERT I. (died 1035) and ROBERT II. (died 1134); see also ENGLAND.

ROBERT, HUBERT, born at Paris in 1753, deserves to be remembered not so much for his skill as a painter

as for the liveliness and point with which he treated the subjects he painted. Robert fell, struck by apoplexy, April 15, 1808. His brush was in his hand; he had painted till the last moment.

ROBERT, LOUIS LÉOPOLD, French painter, was born at Chaux de Fonds (Neufchâtel) in Switzerland on May 13, 1794. Robert committed suicide before his easel, March 20, 1835, on the tenth anniversary of the melancholy suicide of a brother to whom he had been much attached.

ROBERT OF GLOUCESTER, an English antiquary and historical writer, who lived in the second half of the thirteenth century, was a monk of the abbey at Gloucester, and is supposed by Hearn, the editor of his *Chronicle*, to have been sent to preside over the foundation at Oxford (afterward Worcester College), where the younger members of the abbey were partly educated. This, however, is mere conjecture. The evidence which establishes his claim to be the author of the *Chronicle* (by which he is best known) is also slight.

ROBERT GUISCARD, duke of Apulia and Calabria, was born at Hauteville near Coutances in Normandy about the year 1015. In 1081 he felt himself strong enough to carry his arms abroad against Alexius Comnenus, ostensibly on behalf of the deposed emperor Michael Ducas, the father-in-law of his daughter. The defeat of Alexius under the walls of Durazzo in October, 1081, was followed by the capture of that place in February, 1082, and by a victorious march toward Constantinople. But before Robert had reached the capital he was summoned back by Gregory VII., his suzerain, to rescue him from the emperor, Henry IV., by whom he was being besieged in Rome. After capturing and sacking the city in May, 1084, and conducting Gregory to a place of safety in Salerno, Guiscard resumed his operations against Alexius, defeating the united Greek and Venetian fleets, and raising the siege of Corfu in November, 1084. While still engaged in active warfare he died of pestilence at Cephalonia on July 17, 1085.

ROBERTS, DAVID, landscape painter, was born at Stockbridge, Edinburgh, on October 24, 1796. November 25, 1864, he was seized with an attack of apoplexy and expired the same evening.

ROBERTSON, FREDERICK WILLIAM, one of the most brilliant and influential preachers of modern times, was born in London on February 3, 1816, and died in 1853.

ROBERTSON, THOMAS WILLIAM, English dramatist, was born on January 9, 1829. As a dramatist he had a brief but very brilliant career. It is not too much to say that he was the most successful and distinguished writer of plays in his generation. A farcical comedy by him, *A Night's Adventure*, was produced at the Olympic under Farren's management as early as 1851. He edited a mining journal in 1860 and contributed to it a novel afterward dramatized with the title *Shadow Tree Shaft*. He wrote a farce entitled *A Cantab*, which was played at the Strand in 1861. Then, in 1864, came his first marked success, *David Garrick*, produced at the Haymarket with Sothorn in the principal character. It was not, however, till the production of *Society* at the Prince of Wales Theater in 1865, under the management of Miss Marie Wilton, afterward Mrs. Bancroft, that the originality and cleverness of the dramatist were fully recognized.

Robertson, although his health was already undermined, followed up *Society* in quick succession with the series of characteristic plays which made the reputation of himself, the company, and the theater. Unhappily he did not live long to enjoy his success, but died in London in February, 1871.

ROBERTSON, WILLIAM, an eminent Scottish historian, born at Borthwick, Midlothian, on September 19, 1721. He conceived the plan of his *History of Scotland* as early as the year 1753; in July, 1757, he had proceeded as far as the Gowrie conspiracy, and in November of the following year David Hume, then residing in London, was receiving the proof-sheets from Strahan and making friendly but searching criticisms on the work in letters to the author.

The success of the *History of Scotland* was immediate and splendid, and within a month a second edition was called for. Before the end of the author's life the book had reached its fourteenth edition; and in the opinion of some it remains Robertson's greatest work.

The rest of Robertson's life was uneventful to a degree, even surpassing the proverbial uneventfulness of the lives of scholars. Hume advised him to write a history of Greece or else "Lives" in the manner of Plutarch. Dr. John Blair urged him to write a complete history of England, while Horace Walpole suggested a history of learning. It must be recorded to Robertson's credit that he showed a preference from the first for the subject which he ultimately selected, *The History of the Reign of the Emperor Charles the Fifth*. He took uncommon pains with the work and devoted to it ten consecutive years of labor. It appeared in three volumes quarto in 1769. In 1777 he published his *History of America* and in 1791 his *Disquisition concerning the Knowledge which the Ancients had of India*, which concluded his historical labors and appeared only two years before his death, which occurred near Edinburgh on June 11, 1793. His fame had long been European, and he left no rival in the field of historical composition save Gibbon alone.

ROBERVAL, GILLES PERSONNE DE, French mathematician, was born at the village of Roberval near Beauvais in 1602, and died in 1678.

ROBESPIERRE, MAXIMILIEN MARIE ISIDORE, the most fanatical and most famous of the republican leaders of the French Revolution, was born at Arras on May 6, 1758. Completing his law studies with distinction, and having been admitted an avocat in 1781, Robespierre returned to his native city to seek for practice, and to struggle against poverty. His reputation had already preceded him, and the bishop of Arras, M. de Conzié, appointed him criminal judge in the diocese of Arras in March, 1782. This appointment, which he soon resigned, to avoid pronouncing a sentence of death, did not prevent his practicing at the bar, and he speedily became known as a careful and painstaking advocate.

Such had been the life of the future republican leader up to 1788, when he took part in the discussion as to the way in which the states-general should be elected, showing clearly and forcibly in his *Adresse à la Nation Artésienne* that, if the former mode of election by the members of the provincial estates was again adopted, the new states-general would not represent the people of France. In the assembly of the bailliage rivalry ran still higher, but Robespierre had already made his mark in politics; by the *Avis aux Habitants de Campagne* (Arras, 1789), which is almost certainly by him, he secured the support of the country electors, and, though but thirty years of age, poor, and without influence, he was elected fifth deputy of the tiers état of Artois to the states-general.

When the states-general met at Versailles on May 5, 1789, the young deputy of Artois already possessed the one faculty which was to lead him to supremacy; he was a fanatic. While the constituent assembly occupied itself in drawing up an unworkable constitution as the grand panacea, Robespierre turned from the assembly of provincial avocats and wealthy bourgeois to the

people of Paris. However, he spoke frequently in the constituent assembly, and often with great success, and was eventually recognized as second only to Pétion de Villeneuve—if second to him—as a leader of the small body of the extreme left—the thirty voices, as Mirabeau contemptuously called them.

When he instinctively felt that his doctrines would have no success in the assembly, he turned to the Jacobin Club, which had consisted originally of the Breton deputies only, but which, after the assembly moved to Paris, began to admit among its members various leaders of the Parisian bourgeoisie. The death of Mirabeau strengthened Robespierre's influence in the assembly; but in May, 1791, he proved his lack of statesmanlike insight and his jealous suspicion of his colleagues by proposing and carrying the motion that no deputies who sat in the constituent could sit in the succeeding assembly. The flight of the king on June 21st and his arrest at Varennes excited Robespierre's suspicions, and made him declare himself at the Jacobin Club to be "ni monarchiste ni republicain." But the vigorous conduct of Lafayette and the National Guard on the Champ de Mars on July 17, 1791, terrified him, for he believed that he was a predestined victim, until he was succored by Duplay, a cabinetmaker in the Rue St. Honoré, and an ardent admirer of his, in whose house he lived (with but two short intervals) till his death. At last came his day of triumph, when on September 30th, on the dissolution of the constituent assembly, the people of Paris crowned Pétion and himself as the two incorruptible patriots.

On the dissolution of the assembly he returned for a short visit to Arras, where he met with a triumphant reception. In November he returned to Paris, and on December 18th made a speech which marks a new epoch in his life. Brissot, the *âme politique* of the Girondin party which had been formed in the legislative assembly, urged vehemently that war should be declared against Austria, and the queen was equally urgent in the hope that a victorious army might restore the old absolutism of the Bourbons. Two men opposed the projects of the queen and the Girondins—Marat and Robespierre: Marat opposed them for statesmanlike reasons (see MARAT), and Robespierre on humanitarian grounds and because as a follower of Rousseau he disliked war. This opposition from those whom they had expected to aid them irritated the Girondins greatly, and from that moment began the struggle which ended in the *coups d'état* of May 31st and June 2, 1793.

On the meeting of the convention to which he had been elected first deputy for Paris, the Girondins immediately attacked Robespierre; but Robespierre had no difficulty in rebutting this attack (November 5th). All personal disputes, however, gave way by the month of December, 1792, before the great question of the king's trial, and here Robespierre took up a position which is at least easily understood. This great question settled by the king's execution, the struggle between Robespierre and the Girondins entered upon a more acute stage, and the want of statesmanship among the latter threw upon the side of the fanatical Robespierre, Danton and all those strong practical men who cared little for personal questions, and whose only desire was the victory of France in her great struggle with Europe. In the month of May, 1793, Camille Desmoulins, acting under the inspiration of Robespierre and Danton, published his *Histoire des Brissotins* and *Brissot dévoilé*; Isnard declared that Paris must be destroyed; Robespierre preached insurrection at the Jacobin Club; and on May 31st and June 2d the commune of Paris destroyed the Girondin party. For a moment it seemed as if France would avenge them; but patriotism

was stronger than federalism. The defense of Lyons only exasperated the men who were working for France, and the armies who were fighting for her, and on July 27, 1793, when the struggle was practically decided, the convention elected Robespierre to the committee of public safety.

This election marks an important epoch, not only in the life of Robespierre, but in the history of the Revolution. Danton and the men of action had throughout the last two years of the crisis, as Mirabeau had in the first two years, seen that the one great need of France, if she was to see the end of her troubles without the interference of foreign armies, was the existence of a strong executive government. The means for establishing the much-needed strong executive were found in the committee of public safety. The success of this committee in suppressing the Norman insurrection had confirmed the majority of the convention in the expediency of strengthening its powers, and the committee of general security which sat beside it was also strengthened and given the entire management of the internal police of the country. When Danton, who had been a member of the committee from April to July 10, 1793, left it, Robespierre was elected; and it was not until then that he became one of the actual rulers of France. Indeed the committee was not finally constituted until September 13th, when the last two of the "great" twelve who held office until July, 1794, were elected.

With the actual organization of the Terror Robespierre had little or nothing to do; its two great engines, the revolutionary tribunal and the absolute power in the provinces of the representatives on mission, were in existence before he joined the committee of public safety, and the laws of the maximum and of the suspects were by no means of his creation. The reason why he is almost universally regarded as its creator and the dominant spirit in the committee of public safety is not hard to discover. Men like Carnot and Billaud-Varenne were not conspicuous speakers in the convention, nor were they the idols of any section of the populace; but Robespierre had a fanatical following among the Jacobins, and was admittedly the most popular orator in the convention.

After this explanation it may be said at once that Robespierre was not the author of the overthrow of the Dantonists and the Hébertists, though he thoroughly agreed with the majority and had no desire to save them, the principles of both parties being obnoxious to him. Both parties must be crushed. Before the blows at the leaders of those two parties were struck, Robespierre retired for a month (from February 13 to March 13, 1794) from active business in the convention and the committee, apparently to consider his position; but he came to the conclusion that the cessation of the Reign of Terror would mean the loss of that supremacy by which he hoped to establish the ideal of Rousseau, for Danton, he knew, was essentially a practical statesman and laughed at his ideas. He must have considered too that the result of his siding with Danton would probably have been fatal to himself. The result of his deliberations was that he abandoned Danton and co-operated in the attacks of the committee on the two parties. On March 15th he reappeared in the convention; on the 19th Hébert and his friends were arrested; and on the 24th they were guillotined. On March 30th Danton, Camille Desmoulins, and their friends were arrested, and on April 5th they too were guillotined.

It was not until after the execution of Danton that Robespierre began to develop a policy distinct from that of his colleagues in the great committee, an opposition which ended in his downfall. He began by using his in-

fluence over the Jacobin Club to dominate the commune of Paris through his devoted adherents, two of whom, Fleuriot-Lescot and Payan, were elected respectively mayor and procureur of the commune. He also attempted to usurp the influence of the other members of the great committee over the armies by getting his young adherent, Saint-Just, sent on a mission to the frontier. In Paris Robespierre determined to increase the pressure of the Terror: no one should accuse him of moderatism; through the increased efficiency of the revolutionary tribunal Paris should tremble before him as the chief member of the great committee; and the convention should pass whatever measures he might dictate. To secure his aims, Couthon, his other ally in the committee, proposed and carried on June 10th the outrageous law of twenty-second Prairial, by which even the appearance of justice was taken from the tribunal, which, as no witnesses were allowed, became a simple court of condemnation. The result of this law was that between June 12th and July 28th, the day of Robespierre's death, no less than 1,285 victims perished on the guillotine at Paris.

At last, on the 26th of July, Robespierre appeared for the first time for more than four weeks in the convention and delivered a carefully studied harangue, which lasted for more than four hours, in which he declared that the Terror ought to be ended, that certain deputies who had acted unjustly and exceeded their powers ought to be punished, and that the committees of public safety and general security ought to be renewed. Great was the excitement in the convention; all wondered who were the deputies destined to be punished; all were surprised that the Terror should be imputed as a fault to the very committee of which Robespierre had been a member. The majority of the great committee determined to act promptly. The convention, moved by Robespierre's eloquence, at first passed his motions; but he was replied to by Cambon the financier, Billaud-Varenne, Amar, and Vadier, and the convention rescinded their decrees and referred Robespierre's question to their committees. On the following day, the 27th of July, or in the revolutionary calendar, the 9th Thermidor, Saint-Just commenced to speak on behalf of the motions of Robespierre, when violent interruptions showed the temper of the convention. Tallien, Billaud-Varenne, and Vadier again attacked Robespierre; cries of "Down with the tyrant!" were raised; and, when Robespierre hesitated in his speech in answer to these attacks, the words "C'est le sang de Danton qui t'étouffe" (It is the blood of Danton which chokes him) showed what was uppermost in the minds of the Mountain. The excitement increased, and at five in the afternoon Robespierre, Couthon, and Saint-Just, with two young deputies, Augustin Robespierre and Lebas, the only men in all the convention who supported them, were ordered to be arrested. Yet all hope for Robespierre was not gone; he was speedily rescued from his prison with the other deputies by the troops of the commune and brought to the Hôtel de Ville. There he was surrounded by his faithful adherents, led by Payan and Coffinhal, but the day was past when the commune could overawe the convention; for now the men of action were hostile to the commune, and its chief was not a master of *coups d'état*. On the release of Robespierre, the convention had again met, and declared the members of the commune and the released deputies *hors de la loi*. The national guards under the command of Barras had little difficulty in making their way to the Hôtel de Ville; Robespierre was shot in the lower jaw by a young gendarme named Merda while signing an appeal to one of the sections of Paris to take up arms for him, though the wound was

afterward believed to have been inflicted by himself; and all the released deputies were again arrested. After a night of agony Robespierre was the next day taken before the tribunal, where his identity as an outlaw was proved, and without further trial he was executed with Couthon and Saint-Just and nineteen others of his adherents on the Place de la Révolution on the 10th Thermidor (July 28) 1794.

**ROBIN HOOD.** The oldest mention of Robin Hood at present known occurs in the second edition—what is called the B text—of *Piers the Plowman*, the date of which is about 1377. He is next mentioned by Wyntown in his *Scottish Chronicle*, written about 1420; next by Bower in his additions to Fordun's *Scotichronicon* about 1450. Of his popularity in the latter half of the fifteenth and in the sixteenth centuries there are many signs. In the Elizabethan era and afterward mentions abound. Of the ballads themselves, *Robin Hood and the Monk* is possibly as old as the reign of Edward II.; *Robin Hood and the Potter* and *Robyn and Gandelyn* are certainly not later than the fifteenth century. These are the facts about him and his balladry. Of conjectures there is no end. He has been represented as the last of the Saxons—as a Saxon holding out against the Norman conquerors so late as the end of the twelfth century. Others maintain that he was a follower of Simon de Montfort. A third theory associates him with the earl of Lancaster of Edward II.'s time; Hunter believed that he could identify him with a certain Robin Hood mentioned in the Exchequer accounts of his reign. But, whether he lived or not, and whenever he lived, it is certain that many mythical elements are contained in his story. Both his name and his exploits remind us of the woodland spirit Robin Goodfellow and his merry pranks. He is fond of disguising himself, and devoted to fun and practical jokes. And the connection of the May games with him points to a fusion with some older memory—with some sun-god. In fact, the outlaw would seem to have become a center around which gathered and settled older traditions of men and of spirits and of gods.

**ROBIN REDBREAST.** See REDBREAST.

**ROBINS, BENJAMIN**, an English natural philosopher, was born at Bath in 1707, and died in 1751.

**ROBINSON, EDWARD**, author of the *Biblical Researches*, a son of the Rev. William Robinson, of Puritan ancestry, was born at Southington, Connecticut, on April 10, 1794. He was educated at Hamilton College, New York, where he graduated in 1816. In 1832 he published a revised edition of Taylor's translation of Calmet's *Dictionary of the Bible*, and in the ensuing year a popular *Dictionary of the Bible* and a translation of Buttman's *Greek Grammar*. In 1834 he published a revised edition of Newcome's *Greek Harmony of the Gospels*. In 1836 he issued a translation of Gesenius' *Hebrew Lexicon* and in the same year a *Greek and English Lexicon of the New Testament*. He published his *Biblical Researches* in 1841 in three volumes, simultaneously in Berlin and Boston. His services were recognized by a gold medal from the Royal Geographical Society of London in 1842, the degree of D.D. from the university of Halle in 1842, and the degree of LL.D. from Yale College in 1844. He died in New York city in 1863.

**ROBINSON, JOHN**, one of the founders of Independency in England, was born most probably near Scrooby, in Nottinghamshire, in 1575, and died in 1625.

**ROBINSON, JOHN THOMAS ROMNEY**, the inventor of the cup-anemometer, was born in Dublin on April 23, 1792, and died February 28, 1882.

**ROB ROY**, the popular designation of a famous Highland outlaw whose prowess is the theme of one of

Sir Walter Scott's novels, was by descent a Macgregor, being the younger son of Donald Macgregor of Glen-gyle, who had attained the rank of lieutenant-colonel in the army of James II., by his wife, a daughter of William Campbell of Glenfalloch. He was born about 1660. He received the name Roy from the red hair which clustered in thick curls over his brow, and latterly adopted Campbell as his surname on account of the acts proscribing the name of his clan. He inherited a small property on the Braes of Balquhiddy, and at first devoted himself to the rearing of cattle. Having formed a band of armed clansmen, he obtained, after the accession of William III., a commission from James II. to levy war on all who refused to acknowledge him as king, and in the autumn of 1691 made a descent on Stirlingshire to carry off the cattle of Lord Livingstone, when, being opposed by the villagers of Kippen, he also seized the cattle from all the byres of the village. Shortly afterward he married Mary, daughter of Macgregor of Comar. On the death of Gregor Macgregor, the chief of the clan, in 1693, he managed, though not the nearest heir, to get himself acknowledged chief, obtaining control of the lands stretching from the Braes of Balquhiddy to the shores of Loch Lomond, and situated between the possessions of Argyll and those of Montrose. To assist in carrying on his trade as cattle-dealer he borrowed money from the duke of Montrose, and, being on account of losses unable to repay it, he was in 1712 evicted from his property and declared an outlaw. Taking refuge in the more inaccessible Highlands, Rob Roy from this time forward supported himself chiefly by depredations committed in the most daring manner on the duke and his tenants, all attempts to capture him being unsuccessful. According to a notice in the *Caledonian Mercury* he died at Balquhiddy on December 28, 1734. He was buried in Balquhiddy churchyard.

**ROBUSTI, JACOPO**, commonly called IL TINTORETTO or TINTORET, one of the greatest painters of the Venetian or of any school, was born in Venice in 1518, though most accounts say in 1512. His father, Battista Robusti, was a dyer, or "tintore;" hence the son got the nickname of "Tintoretto," little dyer, or dyer's boy. In childhood Jacopo, a born painter, began daubing on the dyer's walls; his father, noticing his bent, took him round, still in boyhood, to the studio of Titian, to see how far he could be trained as an artist. We may suppose this to have been toward 1533, when Titian was already fifty-six years of age. Ridolfi is our authority for saying that Tintoret had only been ten days in the studio when Titan sent him home once and for all. The reason, according to the same writer, is that the great master observed some very spirited drawings, which he learned to be the production of Tintoret; and it is inferred that he became at once jealous of so promising a scholar. The two earliest mural paintings of Robusti—done, like others, for next to no pay—are said to have been *Belshazzar's Feast* and a *Cavalry Fight*, both long since perished. Such, indeed, may be said to have been the fate of all his frescoes, early or later. The first work of his which attracted some considerable notice was a portrait-group of himself and his brother—the latter playing a guitar—with a nocturnal effect; this also is lost. It was followed by some historical subject, which Titian was candid enough to praise. One of Tintoret's early pictures still extant is in the church of the Carmine in Venice, the *Presentation of Jesus in the Temple*; also in S. Benedetto are the *Annunciation* and *Christ with the Woman of Samaria*. For the Scuola della Trinità (the scuole or schools of Venice were more in the nature of hospitals or charitable foundations than of educational institutions), he

painted four subjects from Genesis. Two of these, now in the Venetian Academy, are *Adam and Eve* and the *Death of Abel*, both noble works of high mastery, which leave us in no doubt that Robusti was by this time a consummate painter—one of the few who have attained to the highest eminence by dire study of their own, unseconded by any training from some senior proficient.

Toward 1546 Robusti painted for the church of S. Maria dell'Orto three of his leading works—the *Worship of the Golden Calf*, the *Presentation of the Virgin in the Temple*, and the *Last Judgment*—now shamefully repainted; and he settled down in a house hard by the church.

The next conspicuous event in the professional life of Tintoret is his enormous labor and profuse self-development on the walls and ceilings of the Scuola di S. Rocco, a building which may now almost be regarded as a shrine reared by Robusti to his own genius. The painting of its interior was commenced in 1560.

It was probably in 1560, the same year when he began working in the Scuola di S. Rocco, that Tintoret commenced also his numerous paintings in the ducal palace; he then executed there a portrait of the doge, Girolamo Priuli. Other works which were destroyed in the great fire of 1577 succeeded—The *Excommunication of Frederick Barbarossa by Pope Alexander III.* and the *Victory of Lepanto*. After the fire Tintoret started afresh, Paul Veronese being his colleague; their works have for the most part been disastrously and disgracefully retouched of late years, and some of the finest monuments of pictorial power ever produced are thus degraded to comparative unimportance. We here reach the crowning production of Robusti's life, the last picture of any considerable importance which he executed, the vast *Paradise*, in size seventy-four feet by thirty, reputed to be the largest painting ever done upon canvas. It is a work so stupendous in scale, so colossal in the sweep of its power, so reckless of ordinary standards of conception or method, so pure an inspiration of a soul burning with passionate visual imagining, and a hand magical to work in shape and color, that it has defied the connoisseurship of three centuries, and has generally (though not with its first Venetian contemporaries) passed for an eccentric failure; while to a few eyes it seems to be so transcendent a monument of human faculty applied to the art pictorial as not to be viewed without awe nor thought of without amazement.

After the completion of the *Paradise* Robusti rested for awhile, and he never undertook any other work of importance, though there is no reason to suppose that his energies were exhausted, had his days been a little prolonged. He was seized with an attack in the stomach, complicated with fever, which prevented him from sleeping and almost from eating for a fortnight, and on May 31, 1594, he died.

ROC, or more correctly RUKH, a fabulous bird of enormous size which carries off elephants to feed its young. The legend of the roc, familiar to every one from the *Arabian Nights*, was widely spread in the East; and in later times the home of the monster was sought in the direction of Madagascar, whence the gigantic fronds of the *Raphia* palm, very like a quill in form, appear to have been brought under the name of roc's feathers.

ROCH, ST., according to the *Roman Breviary*, was a native of Montpellier, France. He was born with the mark of a red cross upon his person, and this was at once interpreted as signifying his future eminence. Coming to Italy during an epidemic of plague, he was very diligent in tending the sick in the public hospitals

at Aquapendente, Cesena, and Rome, and effected many miraculous cures by prayer and simple contact. After similar ministries at Piacenza he himself fell ill, and would have perished as he passed through the forest had not the dog of a certain nobleman daily supplied him with bread. On his return to Montpellier he was arrested as a spy and thrown into prison, where he died, having previously obtained from God this favor, that all plague-stricken persons invoking him should be healed. The date of his death was August 16, 1327, in the thirty-second year of his age.

ROCHDALE, a municipal and parliamentary borough of southeast Lancashire, England, is situated on the river Roch and on the Lancashire and Yorkshire railway, eleven miles north-northeast of Manchester, and twelve east of Bolton. The population of the borough (area, 4,172 acres) in 1871 was 63,485, and in 1891 it was 71,458.

ROCHEFORT, a town of France, the chef-lieu of an arrondissement of the department of Charente-Inférieure and of the fourth maritime prefecture, lies on the right bank of the Charente, nine miles from the Atlantic, and is built partly on the side of a rocky hill and partly on old marshland, which renders the position unhealthy. The town is laid out with great regularity in chess-board fashion. The fortifications are sufficient merely to prevent it being taken by surprise. The population of the town was 30,285 in 1886 (33,040 in the commune.)

ROCHEFOUCAULD. See LA ROCHEFOUCAULD.

ROCHELLE, LA, a town and seaport of France, the chef-lieu of the department of Charente-Inférieure, is situated on the Atlantic coast in 46° 9' N. latitude, 296 miles by rail southwest of Paris. Its fortifications, which were constructed by Vauban, have a circuit of three and one-half miles with seven gates. In population (21,591 in 1886; 22,464 in the commune) it ranks after Rochefort. At the Reformation La Rochelle early became one of the chief centers of Calvinism, and during the religious wars it armed privateers which preyed on Catholic vessels in the Channel and the high seas. In 1571 a synod of the Protestant churches of France was held within its walls under the presidency of Beza, for the purpose of drawing up a confession of faith. After the massacre of St. Bartholomew, La Rochelle held out for six and a half months against the Catholic army, which was ultimately obliged to raise the siege after losing more than 20,000 men. The peace of June 24, 1573, signed by the people of La Rochelle in the name of all the Protestant party, granted the Calvinists full liberty of worship in several places of safety. Under Henry IV. the town remained quiet, but under Louis XIII. it put itself again at the head of the Huguenot party. Its vessels blockaded the mouth of the Gironde and stopped the commerce of Bordeaux, and also seized the islands of Ré and Oléron and several vessels of the royal fleet. It was then that Richelieu resolved to subdue the town once for all. In spite of the assistance rendered by the English troops under Buckingham and in spite of the fierce energy of their mayor Guiton, the people of La Rochelle were obliged to capitulate after eight months' siege (October, 1628).

ROCHELLE SALT. See TARTARIC ACID.

ROCHESTER, an episcopal city and municipal and parliamentary borough of Mid-Kent, England, is situated on the Medway, on the Medway canal, and on the London, Chatham and Dover and the Southeastern railway lines, thirty-three miles east of London, contiguous to Chatham and Strood. The population of the borough (area 2,909 acres) in 1871 was 18,352, and in 1891 it was 26,170; this includes 7,000 persons in the town of Strood, situated on the opposite side of the Medway.

ROCHESTER, a New Hampshire town, in Strafford county, lies near the Cocheco river, on a branch of the Boston and Maine railroad, being also a station for several other lines. It has churches, banks, schools, telegraphs, etc., and extensive manufactures of woolen products and shoes. Population (1890), 7,113.

ROCHESTER, a Minnesota town, lies on the south fork of the Zumbro river, and is the capital of Olmstead county. It has churches, schools, banks, railroads, telegraphs, and a population (1890) of 5,321. There are several flouring mills here, and extensive manufactures of furniture, pumps and wagons.

ROCHESTER, a city of the United States, capital of Monroe county, N. Y., lies 229 miles to the west of Albany, in a rich agricultural region, upon a plateau on both banks of the Genesee river, 7 miles from its mouth at Lake Ontario and 263 feet above the lake level. There are three falls in the river of 96, 26, and 83 feet respectively within the city limits, the banks below the first fall varying in height from 100 to 210 feet. To this abundant water-power of the Genesee, supplemented by the transportation facilities afforded by the Erie canal and the various railway connections, Rochester mainly owes its progress and prosperity. The streets of the city are generally wide, and well paved and lighted (partly by electricity), and trees and flowering plants are abundant. Rochester is an important railway center. The New York Central railroad, with elevated tracks through the city, has two lines east to Syracuse, two west to Buffalo and Niagara Falls respectively, and one north to Charlotte, where connection is made with the Rome, Watertown and Ogdensburg line; a branch of the New York, Lake Erie and Western railway connects with the main line at Corning and with the Buffalo branch at Avon; the Rochester and Pittsburgh railway runs south to Salamanca, and the Genesee Valley railway to Olean, crossing the West Shore railway a short distance south of the city line; and there are also railway lines to Irondequoit Bay and Windsor beach, and about 30 miles of street railway, radiating from the center in all directions. The manufactures of Rochester are numerous and varied. Though no longer at the head of the flour industry, it still possesses twenty mills, capable of producing 2,900 barrels daily. The principal manufacture is that of ready-made clothing, the sales reaching \$9,000,000 annually. In its boot and shoe trade the city ranks fourth in the country (5,000 hands; annual sales, \$6,500,000). There are also sixteen breweries and ten malt-houses; some eighty or ninety cigar-makers and tobacconists have a total output of about 2,000,000 pounds of tobacco, 18,000,000 cigars, and 140,000,000 cigarettes; while furniture-making employs 1,000 hands. The lumber business is extensive; and of late years the city has been one of the principal centers for the distribution of the anthracite and bituminous coal of Pennsylvania. Its numerous nurseries are a peculiar feature of the place; and there is a great variety of other industries. The main supply of water is brought in iron conduits (147 miles of pipe) from Hemlock lake, twenty-nine miles to the south; an additional supply for subsidiary purposes is drawn from the Genesee river (eleven and one quarter miles of pipe). The total cost of the works has been \$3,744,749. The principal cemetery, Mount Hope, with an area of 200 acres, is exceedingly picturesque and well cared for. Rochester has two State institutions, the Western House of Refuge and the Western New York Institution for Deaf Mutes. The former, opened in 1849, is a substantial structure of brick, with accommodation for 600 inmates, built at a cost of \$373,000; it receives juvenile delinquents committed by magistrates; they are instructed in trades and labor upon the farm belonging to

the refuge. Among the eleemosynary institutions of the city are the Rochester city hospital, St. Mary's hospital, the Rochester, St. Patrick's, St. Mary's, St. Joseph's, and the Jewish orphan asylums, the home for the friendless, the industrial school, the church home, the home of industry, and the home for truant children. There are seventy-five churches, including the Roman Catholic cathedral, six Baptist, ten Methodist Episcopal, ten Protestant Episcopal, eleven Presbyterian, five Lutheran, and eleven Roman Catholic churches, and five Jewish synagogues. The public school system of Rochester includes a free academy (cost \$125,000) and thirty grammar-schools (with classes in the orphan asylums), in which 200 teachers are engaged and 10,000 pupils taught. There are also thirty private institutions, academies, seminaries, and parochial schools. The university of Rochester was established in 1850, under Baptist auspices; its faculty consists of a president and ten professors, and the annual attendance of students is about 160. It has two buildings—Anderson Hall and Sible Hall. The Rochester theological seminary (Baptist), founded in 1850 and housed in two commodious buildings—Trevor and Rockefeller Halls—has eight professors and about seventy students, besides a German department. Other public libraries in addition to those of the university and the theological seminary are the Central and Reynolds'. There are four English and two German daily newspapers, and twelve weekly and nine monthly publications. Among edifices not already mentioned are the city-hall, the United States Government building, the courthouse, the Warner astronomical observatory, the Rochester and East side savings banks, the Powers buildings, with their famous art gallery, and the Warner and Kimball factories. The population (89,366 in 1880) was 133,896 in 1890.

ROCHESTER, JOHN WILMOT, EARL OF, born in Oxfordshire in 1647, was one of the unworthies of the reign of the "merry monarch, scandalous and poor,"

"Who never said a foolish thing  
Nor ever did a wise one."

Rochester is the author of both these imperishable descriptions of Charles II., and by them and his poem "Upon Nothing," and his death-bed conversation with Bishop Burnet he is now chiefly known. He died on July 26, 1680, at the early age of thirty-three, and the common account is that his constitution was undermined and exhausted by profligate excesses.

ROCHE-SUR-YON, LA, a town of France, the chief town of department of La Vendée, lies 278 miles southwest of Paris by the railway to Sables d'Olonne, on an eminence 164 feet above the sea, on the right bank of the Yon, a little tributary of the Lay, itself an affluent of the Pertuis Breton. In 1889 the population of the town was 8,789; of the commune, 10,200.

ROCKET. See AMMUNITION and PYROTECHNY; for the use of rockets to rescue the shipwrecked, see LIFEBOAT.

ROCKFORD, a city of the United States, the county seat of Winnebago county, Ill., on both banks of the Rock river, which, rising in Wisconsin, falls into the Mississippi after a course of 350 miles. By rail it lies 92 miles northwest of Chicago and is a junction of the Chicago and North-Western, the Chicago, Milwaukee and St. Paul, and the Chicago, Burlington and Quincy Railroads. Abundant water-power was secured by a dam 800 feet long constructed across the river in 1844. The chief objects of industry of Rockford, one of the largest manufacturing centers in the Mississippi valley, are agricultural implements, furniture, watches, silver-plated ware, cutlery, tacks and nails, bolts, wire-cloth, netting, woolen and cotton goods, paper, flour, oat-

meal, glucose. Waterworks on the Holly system are capable of pumping 5,500,000 gallons through the mains in twenty-four hours. The city stands in a fine agricultural district, is handsomely built and well shaded, and has a public library, a public high school, and ten other public school buildings, a seminary for girls (1849), five banks, and twenty-one churches. The population was 6,976 in 1860, 11,048 in 1870, 13,129 in 1880, and 23,589 in 1890 (township, 14,525). Rockford was settled about 1836; in 1852 it received incorporation as a city.

ROCKHAMPTON, a town of Queensland, Australia, is situated some forty miles up the Fitzroy river, nearly on the Tropic of Capricorn. The streets are well formed and kept, bordered by trees, with ever-flowing water down the channels. Embosomed in hills it has a climate, in spite of the heat, of singular salubrity, the death-rate being only about half that of London. The population in 1884 was about 11,000.

ROCKINGHAM, CHARLES WATSON WENTWORTH, SECOND MARQUIS OF, twice prime minister of England, was the only son of Thomas Watson Wentworth. Charles Watson Wentworth was born in 1730 on the 19th of March (Albemarle), or the 13th of May (Collins), and was educated at Eton. He showed his spirit as a boy by riding across from Wentworth to Carlisle in 1745 with but one servant, to join the duke of Cumberland in his pursuit of the young Pretender. He was created earl of Malton in the peerage of Ireland on September 4, 1750, and succeeded his father as second marquis of Rockingham on December 14th in the same year. In 1751 he became lord-lieutenant of the north and west ridings of Yorkshire, and a lord of the bedchamber; and in 1760 was made a knight of the Garter. On July 12, 1765, Lord Rockingham formed his first administration with General Conway and the duke of Grafton as secretaries of state. In May, 1766, the duke of Grafton seceded from the government, and in August, 1766, he succeeded his former chief as lord of the treasury and prime minister. Then followed many years of fruitless opposition to the king's personal authority as exhibited through his ministers, but at last, on March 27, 1782, Lord Rockingham again became prime minister, with Fox and Shelburne as secretaries of state. This time he enjoyed office for but a few weeks, for he died on July 1, 1782.

ROCKINGHAM, a town of Vermont, in Windham county, lies on the Vermont Central R. R., a short distance from Bellows Falls. The town has a bank, an academy, other schools, several manufactories, and a machine shop. It has telegraph and ample church accommodation. Population, 1890, 5,000.

ROCK ISLAND, a city of the United States, the capital of Rock Island county, Ill., is situated opposite Davenport on the left bank of the Mississippi, about three miles above the mouth of the Rock river, and at the foot of the Upper Rapids, which extend for about sixteen miles. Distant by rail 181 miles west of Chicago, and 247 miles north of St. Louis, Rock Island is one of the great centers of railroad and river traffic. With Davenport (in Iowa) it is connected by a two-story road and railway bridge, constructed by the government in 1870. Among the public buildings are a large public library and St. Augustana College, founded by the Swedish Lutherans. Glass-works, a plow factory, a distillery, flour-mills, and a stove-factory are the principal industrial establishments. The city, however, is best known from the great national arsenal situated on the island from which it derives its name. This island is a ridge of limestone rock about three miles long, and with an area of 960 acres. As the site of Fort Armstrong it became known in the Black Hawk

War; the prison was used for the detention of Confederate prisoners during the Civil War; and since that date the government has constructed the present extensive works, intended to be the central United States armory. There are ten vast stone workshops, each with a stone house in the rear, as well as officers' quarters, offices, etc. The population of Rock Island city was 13,634 in 1890. The charter dates from 1849.

ROCKLAND, a city and seaport of Maine, and county town of Knox county, is situated sixty miles by rail east-northeast of Portland, on Owl's Head Bay, an inlet of Penobscot Bay. It was incorporated in 1854, has an area of 7,000 acres, and a sea frontage of about four and one-half miles, and numbered 8,174 inhabitants in 1890 (in 1870, 8,191). Lime-burning is the staple trade (1,000,000 barrels per annum). The adjacent islands—Dix Island, Hurricane Island, etc.—are known by their granite quarries. Water for the city is obtained from Lake Chickawaukie.

ROCKVILLE, a Connecticut town in Tolland county, is a place of some importance as a railroad and a manufacturing center. The power for manufactures is supplied by Snipsic Lake, which furnishes a fall of 280 feet here. The town contains churches, an opera house, schools, banks, newspapers, cotton and woolen mills, and silk, stockingnet and envelope factories; it has telegraph connections with all points. The population, 1890, is 6,500.

ROCKY MOUNTAINS. See UNITED STATES.

ROCROI, a town of France, the chef-lieu of an arrondissement in the department of Ardennes, lies fifteen miles in a straight line north-northwest of Mézières and within two miles of the Belgian frontier, at a height of 1,083 feet above the sea. As a fortified place it commands the Ardennes plateau between the valley of the Meuse and the headwaters of the Oise. The present fortifications were constructed by Vauban. In 1881 the population was 1,649 (commune 2,977).

RODBERTUS, KARL JOHANN, by some considered to be the founder of scientific socialism, was born at Greifswald on August 12, 1805. He died on December 8, 1875.

RODERICK. See SPAIN.

RODEZ, a town of France, chef-lieu of the department of Aveyron and the see of a bishop, 412 miles south of Paris by the railway which continues to Béziers, is built at a height of 2,077 feet on a promontory surrounded by the Aveyron, a sub-tributary of the Garonne by the Tarn. In population—14,560 inhabitants (15,333 in the commune) in 1886—it ranks next to the industrial town of Millau.

RODNEY, GEORGE BRYDGES RODNEY, BARON. English admiral, second son of Henry Rodney of Walton-on-Thames, was born there on February 19, 1718. After minor services of an active character in home waters, he obtained command of the *Eagle*, sixty guns, and in this ship took part in Hawke's victory off Ushant, October 14, 1747, over the French fleet under L'Etandière. During the Seven Years' War Rodney rendered important service. In 1757 he had a share in the expedition against Rochefort, commanding the *Dublin*, seventy-four. Next year, in the same ship, he served under Admiral Boscawen at the taking of Louisbourg (Cape Breton). On May 19, 1759, Rodney became a rear-admiral.

In 1764 Rodney was created a baronet by patent of January 21st, and the same year he married Henrietta, daughter of John Clies, of Lisbon. From 1765 to 1770 he was governor of Greenwich Hospital, and on the dissolution of parliament in 1768 he successfully contested Northampton at a ruinous cost. When appointed commander-in-chief of the Jamaica station in 1771 he

lost his Greenwich post, but a few months later received the office of rear-admiral of Great Britain. Till 1774 he held the Jamaica command, and during a period of quiet was active in improving the naval yards on his station.

Sir George was appointed once more commander-in-chief of the Leeward Islands October 1, 1779, but did not sail until December 29th. He captured a Spanish convoy bound to Cadiz on January 8, 1780, and eight days later defeated the Spanish admiral Don Juan de Langara off Cape St. Vincent, taking or destroying seven ships. On April 17th an action, which, owing to the carelessness of some of Rodney's captains, was indecisive, was fought off Martinique with the French admiral Guichen. Rodney, acting under orders, captured the valuable entrepôt of St. Eustatius, and by his strong measures for stopping illegal and contraband trade evoked an attempt at censure on the part of his political opponents. After a few months in England, recruiting his health and defending himself in parliament, Sir George returned to his command in February, 1782, and a running engagement with the French fleet on April 9th led up to his crowning victory off Dominica, when, on April 12th, with thirty-five sail of the line, he defeated Comte de Grasse, who had thirty-three sail. The French inferiority of numbers was more than counterbalanced by the greater size and superior sailing qualities of their ships, yet five were taken and one sunk, after eleven hours' fighting. This important battle saved Jamaica and ruined French naval prestige.

Rodney arrived home in August to receive unbounded honor from his country. He had already been created Baron Rodney of Rodney Stoke, Somerset, by patent of June 19, 1782, and the House of Commons had voted him a pension of £2,000 a year. From this time he led a quiet country life till his death, which occurred on May 24, 1792, in London, while on a visit to his son.

RODOSTO, a town of European Turkey, in the sandjak of Tekfur Daghi or Rodosto in the vilayet of Adrianople (Edirne), is situated on the coast of the Sea of Marmora about midway between Gallipoli and Constantinople. The population, formerly about 30,000, was in 1840 about 10,000, and at present may be estimated at 17,000.

RODRIGUEZ, an island in the Indian Ocean in  $19^{\circ} 41'$  S. latitude and  $63^{\circ} 23'$  E. longitude, which, after the Seychelles, forms, since 1814, the most important dependency of the British colony of Mauritius, from which it is distant 344 nautical miles. It is the easternmost of all the islands considered as belonging to Africa. With a length of thirteen miles east and west and a breadth of three to six north and south it has an area estimated at forty-two and a half square miles.

About 1845 the population of Rodriguez was about 250 persons. The original nucleus consisted of slaves from Mauritius, and recruits arrived from Madagascar and the African continent. By 1871 they had increased to 1,108, and by 1890 to 1,978.

ROE. See DEER.

ROE or ROW, SIR THOMAS, an eminent political agent of the reigns of James I. and Charles I., was born in 1568, and died in 1644.

ROEBLING, JOHN AUGUSTUS, civil engineer, was born at Mühlhausen, Prussia, June 6, 1806. He removed to the United States, and in 1831 entered on the practice of his profession in western Pennsylvania. He established at Pittsburgh a manufactory of wire rope, and in May, 1845, completed his first important structure, the suspended aqueduct of the Pennsylvania Canal across the Monongahela river. This was followed by the Monongahela suspension bridge at Pittsburgh and several suspended aqueducts on the Delaware and Hudson canal.

Removing his wire manufactory to Trenton, New Jersey, he began, in 1851, the erection at Niagara Falls of a long span wire suspension bridge with double roadway, for railway and carriage use, which was completed in 1855. Owing to the novelty of its design, the most eminent engineers, including Stephenson, regarded this bridge as foredoomed to failure; but, with its complete success, demonstrated by long use, the number of suspension bridges rapidly multiplied, the use of wire-ropes instead of chain-cables becoming all but universal. The completion, in 1867, of the still more remarkable suspension bridge over the Ohio river at Cincinnati, with a clear span of 1,057 feet, added to Roebling's reputation, and his design for the great bridge spanning the East River between New York and Brooklyn was accepted. While personally engaged in laying out the towers for the bridge, Roebling received an accidental injury, which resulted in his death, at Brooklyn, from tetanus, July 22, 1869.

ROEMER, OLE (Latinized OLAUS) Danish astronomer, was born at Aarhus in Jutland, September 25, 1644. He died on September 23, 1710.

ROERMOND or ROERMONDE (*i.e.*, "Roer-Mouth"), a town of the Netherlands in the province of Limburg (formerly Guelderland), on the right bank of the Maas (Meuse) at the mouth of the Roer, which separates it from the suburb of St. Jacob. The population of the town was 5,712 in 1840 and 8,797 in 1870; and that of the commune has increased from 6,005 in 1840 to 12,039 in 1890.

ROGATION DAYS, the Monday, Tuesday, and Wednesday before Ascension Day. The week in which they occur is sometimes called Rogation Week. See LITANY.

ROGER I., "grand count" of Sicily, the twelfth and youngest son of Tancred de Hauteville in Normandy, was born about 1031. He died in 1101. See SICILY.

ROGER II., count of Sicily, son of the preceding, was born about 1093 and died in 1154. He obtained from the antipope Anacletus II. the title of king of Sicily in 1130, and was crowned in the same year. The title was afterward confirmed in 1139 by Innocent II. See SICILY.

ROGER OF HOVEDON. See HOVEDON.

ROGER OF WENDOVER, who was a monk in the abbey of St. Albans, and who died prior of Belvoir in 1237, was long regarded as the sole author of a Latin chronicle entitled *Flores Historiarum*, being a history of the world from the creation down to the year 1235.

ROGERS, JOHN, editor of the English Bible known as Matthews, was born in 1500 and died in 1555.

ROGERS, SAMUEL, the "melodious Rogers" of Byron, the "memory Rogers" of the general reader, has a unique reputation among Englishmen of letters. Not only was he a poet of sufficient mark to be hailed by Byron—with perverse but sincere admiration—as one of the few men of genuine weight in an age of scribblers, but he was also for fifty years the most celebrated entertainer of celebrities in London. He was born at Newington Green (London) on July 30, 1763. He died in London on December 18, 1855, in his ninety-third year.

ROHAN, HENRI DE, a general and writer of eminence and one of the last and best representatives of the independent French noblesse, was born at the château of Bleins in Brittany on August 21, 1579. He joined Bernhard of Saxe-Weimar, and was serving in his army when he met with the wound which caused his death at Rheinfelden on March 14, 1638.

ROHAN, LOUIS RENÉ ÉDOUARD CARDINAL DE, prince de Rohan-Guéméné, archbishop of Strasbourg, the hero of the scandal of the diamond neck,



lace, and a cadet of the great family of Rohan (which traced its origin to the kings of Brittany, and was granted the precedence and rank of a foreign princely family by Louis XIV.), was born at Paris on September 25, 1734. Though a man of some ability, he became infatuated with the notorious charlatan Cagliostro in 1780, and lodged him in his palace, and in 1782 he made the acquaintance of Madame de Lamotte-Valois, a descendant of an illegitimate branch of the Valois, but a poor adventuress, and married to an adventurer. These people, having acquired great influence over Rohan, determined to turn his excessive desire to become reconciled to the queen to their own advantage. They persuaded him that Marie Antoinette wished him well, and contrived an interview between him and a girl named Oliva, who greatly resembled the queen, in the gardens of Versailles in August, 1784, so skillfully that he believed he had seen the queen herself and that she had given him a rose. The adventuress then persuaded him that the queen would be much gratified by the present of an extremely valuable diamond necklace which she had refused in 1778 and 1781, and on January 26, 1785, the cardinal purchased it for 1,600,000 francs, to be paid in three installments, and handed it over to a pretended valet of the queen on receipt of a forged letter of thanks signed "Marie Antoinette of France." The comte de Lamotte-Valois at once started for London, and, after breaking up the necklace, began to sell the diamonds separately. The plot soon came to light, and the king sent the cardinal to the Bastille. Though acquitted by the parliament of Paris, the cardinal was deprived of his office as grand almoner and exiled to his abbey of Chaise-Dieu. On February 17, 1803, he died at Ettenheim.

**ROHILKHAND** or **ROHILCUND**, a division or commissionership in the North-Western Provinces of India, lying between  $27^{\circ} 35'$  and  $30^{\circ} 1' N.$  latitude, and between  $78^{\circ} 1'$  and  $80^{\circ} 26' E.$  longitude. It comprises the six districts Bijnaur (Bijnor), Murádábád, Budáun, Bareilly (Bareilly), Sháhjahánpur, and Pilibhit, together containing an area of 10,885 square miles, with a population (1881) of 5,122,557.

**ROHTAK**, a British district of India, in the Hissar division, under the lieutenant-governorship of the Punjab, lying between  $28^{\circ} 19'$  and  $29^{\circ} 17' N.$  latitude, and between  $76^{\circ} 17'$  and  $77^{\circ} 30' E.$  longitude. It contains an area of 1,811 square miles, and is bounded on the north by Karnal, on the east by Delhi, on the south by Gurgaon, and on the west by Hissar and the native state of Jhind. In 1881 the population of Rohtak district numbered 553,609.

**ROHTAK**, municipal town and headquarters of the above district, lying in  $28^{\circ} 54' N.$  latitude, and  $76^{\circ} 38' E.$  longitude, with a population in 1881 of 15,699 (males 8,155, females 7,544).

**ROJAS-ZORILLA**, FRANCISCO DE, Spanish dramatist, a contemporary of Lope de Vega and Calderon, was born about the beginning of the seventeenth century. Of his personal history hardly anything has been recorded. Of his dramatic compositions some thirty still survive.

**ROKITANSKY**, CARL VON ROKITANSKY, FREIHERR VON, the founder of the Vienna school of pathological anatomy, was born in 1804 at Königgrätz in Bohemia. He finished his medical studies at Vienna, graduating there in 1828. Soon after he became assistant to Wagner, the professor of pathological anatomy, and succeeded him in 1834 as prosector, being at the same time made extraordinary professor. It was not till ten years later (1844) that he reached the rank of full professor. His death in 1878 elicited many genuine expressions of affection and of esteem for his upright character.

**ROLAND**. JEAN MARIE ROLAND DE LA PLATRIÈRE, who, along with his wife, MANON JEANNE PHLIPON (1754-1793), played a prominent part in the history of the French Revolution, in connection chiefly with the policy and fortunes of the Girondists, was born at Villefranche, near Lyons, in 1732.

For four years after their marriage Roland lived at Amiens, he being an inspector of manufactures; but his knowledge of commercial affairs enabled him to contribute articles to the *Encyclopédie Nouvelle*, in which, as in all his literary work, he was assisted by his wife. On their removal to Lyons the influence of both became wider and more powerful. In Lyons their views were publicly known; Roland was elected a member of the municipality, and when the depression of trade in the south demanded representation in Paris he was deputed by the council of Lyons to defend the interests of the city before the constituent assembly. Accompanied by his wife, he appeared in the capital in February, 1791.

They had made many and influential friends in advance, and Madame Roland's salon soon became the rendezvous of Brissot, Pétion, Robespierre, and other leaders of the popular movement. Her resolve was fixed, and gradually she impressed it upon all: the France of 1791 was a France of transition; a republic alone was its destiny, was the ideal of philosophy, the expression of liberty, the goal of history. This was the constant aim of her influence and her speech.

In September, 1791, Roland's mission being executed, they returned to Lyons. In December they again reached Paris. Roland became a member of the Jacobin Club. The rupture had not yet been made evident between the Girondist party and that section still more extreme, that of the Mountain. For a time the whole left united in forcing the resignation of the ministers. When the crisis came the Girondists were ready, and in March, 1792, Roland found himself appointed minister of the interior, but was soon dismissed.

After the abolition of royalty on August 10th, Roland was recalled to power, one of his colleagues being Danton. To his dismay he found that the passions which he had lent his aid in evoking he was powerless to allay, and that the party of the Mountain was, on the contrary, utilizing these passions for purposes of incredible excess. From this moment, though too late, the conduct of Roland with his wife, and the whole Gironde, became heroic. They fearlessly denounced the massacres of September, Roland writing boldly to the assembly on the subject. Both husband and wife became the butt of calumny and the object of increasing dislike on the part of the ultra-revolutionists—Robespierre shunning them, Danton denouncing them, and Marat in his journal heaping upon them the foulest falsehoods. Still the Girondists, from Vergniaud downward, banded themselves bravely on their side; but on January 22, 1793, Roland sent in his resignation. It was the day after the execution of the king.

Still they remained in Paris, unflinchingly, but with ever less and less success, attempting to regulate and elevate the Revolution. Calumny continued. Once Madame Roland appeared personally in the assembly to repel the falsehoods of an accuser, and her ease and dignity evoked enthusiasm and compelled acquittal. But violence succeeded violence, and early on the morning of June 1st she was arrested and thrown into the prison of the Abbaye. Roland himself escaped secretly to shelter in Ronen. Released for an hour from the Abbaye, she was again arrested and thrown among the horrors of Sainte Pélagie. Finally she was transferred to the Conciergerie. In prison she won the affections of the guards, and was allowed the privilege of writing materials and the occasional visits of devoted

friends. She there wrote her *Appeal to an Impartial Posterity*, those memoirs which display a strange alternation between self-laudation and patriotism, between the trivial and the sublime. On November 8, 1793, she was conveyed to the guillotine. One week later Roland, having heard of his wife's death, wandered some miles from his refuge in Rouen; maddened by despair and grief, he wrote a few words expressive of his horror at those massacres which could only be inspired by the enemies of France, protesting that "from the moment when I learned that they had murdered my wife I would no longer remain in a world stained with enemies." He affixed the paper to his breast, and unsheathing a sword-stick fell upon the weapon, which pierced his heart, on November 15, 1793.

**ROLAND, LEGEND OF.** The main incident of this legend is founded upon an undoubted historical event—the Spanish expedition of Charlemagne (778). The Frankish king, having crossed the Pyrenees and captured Pamplona, was beaten back from the walls of Saragossa. On his return the "Gascons" (Basques) surprised his rear guard, and, according to the testimony of Eginhard, cut it off to a man (*Vit. Car.*, c. i.)—"In which battle were slain Eggihard, provost of the royal table \* \* and Hruodlandus, prefect of the Britanic march." This account is supported by other evidence more or less contemporary, as, for example, the *Vita Hludowici*. From this work we gather that at the time of its composition (c. 840) the Roncesvalles disaster was already the subject of popular tradition; for its author, speaking of the Frankish chiefs slain in this battle, says, "quorum, quia vulgata sunt, nomina dicere supersedi." Yet in its earliest extant form the legend has already worked in the names and traditions of a later age, e.g., the traitor Genelon, who probably, as Leibnitz has suggested, represents Wenelon, archbishop of Sens, accused of treason toward Charles the Bald in 859.

**ROLLER**, a very beautiful bird, so called from its way of occasionally rolling or turning over in its flight, somewhat after the fashion of a tumbler-pigeon. It is the *Coracias garrulus* of ornithology, and is widely, though not very numerous, spread over Europe and Western Asia in summer, breeding so far to the northward as the middle of Sweden, but retiring to winter in Africa. The bird seems to be purely insectivorous. The genus *Coracias*, for a long while placed by systematists among the crows, has really no affinity whatever to them, and is now properly considered to belong to the heterogeneous group of birds in this work called *Picariæ*, in which it forms the type of the family *Coraciidæ*; and its alliance to the bee-eaters, *Merodidæ*, and KING-FISHERS, *Alcedinidæ*, is very evident. Some eight other species of the genus have been recognized.

**ROLLER MILL.** See FLOUR.

**ROLLIN, CHARLES**, was born at Paris on January 30, 1661. Rollin's literary work dates chiefly from the later years of his life, when he had been forbidden to teach. His once famous *Ancient History* (Paris, 1730-38) and the less generally read *Roman History*, which followed it, were avowed compilations, and compilations which were not only far from critical, but even somewhat inaccurate. But they have had the merit not merely of instructing but interesting generation after generation almost to the present day. A more original and really important work, though less generally known out of France, was his *Traité des Études* (Paris, 1726-31). Rollin died in 1741.

**ROLLING MILL.** See IRON.

**ROLLO, ROLF**, or **ROU**, Scandinavian rover, born c. 860, died 932. He made himself independent of Harold of Norway, visited Scotland, England, and Flanders in

pirating expeditions, and about 912 established himself on the Seine and laid the foundation of the duchy of NORMANDY. (*q. v.*)

**ROLLOCK, ROBERT**, the first principal of the university of Edinburgh, was the son of Edwin Rollock of Powis near Stirling, and was born in 1555. His death took place at Edinburgh on February 8, 1599.

**ROLLS, MASTER OF THE**, is the third member of the Supreme Court of Judicature in England, the lord chancellor, president of the Chancery Division, being the first and the lord chief justice, president of the Queen's Bench Division, being the second. At first he was the principal clerk of the Chancery and as such had charge of the records of the court, especially of the register of original writs and of all patents and grants under the great seal. Until the end of the fifteenth century he was called either the clerk or the keeper of the rolls, and he is still formally designated as the master or keeper of the rolls. The earliest mention of him as master of the rolls is in 11 Hen. VII. c. 18; and in 11 Hen. VII. c. 24 he is again described as clerk of the rolls, showing that his official designation still remained unsettled. In the beginning he only heard causes in conjunction with the other masters in Chancery and his decrees were invalid until they had been approved and signed by the lord chancellor. But later on he heard causes without assistance and his decrees held good until they were reversed on petition either to the lord chancellor or afterward to the lords justices of appeal.

**ROMAN CATHOLIC CHURCH**, the name generally given to that very numerous body of Christians who acknowledge the pope, or bishop of Rome, as head of their church. This name also signifies that the Roman Catholic Church is "Roman in its center and catholic in its circumference." The number of Catholics throughout the world is variously estimated, some statisticians placing it as low as 152,000,000, others at 213,518,000, and others at 218,000,000. The author of *Katholischer Missions-Atlas* (Rev. O. Werner, S. J.), largely furnished with Propaganda returns, distributes them as follows:—in Europe, 150,684,050; in Asia, 8,311,800; in Africa, 2,656,205; in both Americas, 51,422,566; in Australia and adjacent islands, 443,442; total, 213,518,063. But he considers that this calculation gives less than the whole number of Catholics throughout the world, and adds nearly a million more, making the total 214,370,000. Dr. Hugo Franz Brachelli, superior of the Austrian Statistical Department, in *Die Staaten Europa's*, gives the number of Catholics in Europe as 155,900,000, distributed mainly as follows:

Austria-Hungary	20,229,825
Prussia and German States	16,229,493
Great Britain and Ireland	6,000,000
France	35,387,703
Italy	26,658,679
Russia	8,500,000
Scandinavia: Sweden (1870), Norway (1875), Denmark (1880)	4,075
Netherlands	1,439,137
Luxemburg	207,782
Belgium, (population 5,519,844)	5,501,844
Liechtenstein, Monaco, etc., almost entirely	
Spain and Portugal (population 21,164,380)	21,148,880
Greece and Montenegro, over	124,000
Turkey	218,254
Bosnia and Herzegovina	209,391

The supreme pontiff, who traces his succession from St. Peter (see **POPE**), is regarded by Catholics as "vicar of Christ, head of the bishops, and supreme governor of the whole Catholic Church, of whom the whole world is the territory or diocese." He is also patriarch of the West, bishop of Rome and its district, and temporal prince over the states of the church

known as the Pontifical States—though the exercise of the last prerogative has been in abeyance since the events of 1859 and 1870. The pope has a primacy or supremacy, not only of honor, but of power, authority, and immediate jurisdiction, over the universal church. When he is canonically elected, and has given his consent to the election, he possesses, without any other confirmation, authority over the whole church, even though at his election he may not have been either bishop, priest, deacon, or subdeacon, but a simple layman. Hence the office of sovereign pontiff is a dignity not of order but of jurisdiction. His pronouncements are regarded as infallible when he defines a doctrine regarding faith and morals to be held by the whole church.

The office of pope is elective (see CONCLAVE), and lasts during the life of the occupant, although he may renounce his dignity. When the election has taken place the fact is made known by the cardinal dean. The cardinals are the princes and senators of the church, counselors of the pontiff, coöperators with him, and vicars in the functions of the pontificate. To Pope Evaristus, fifth successor of St. Peter, is attributed the creation of the first *titles* or parishes of Rome, the occupants of which were afterward known as cardinals. The cardinalate, in the sense at present attached to it, is different from what it was in earlier ages, being now the highest dignity after the papacy. The greater part of the administration of the church—the chief subject of this article—is directed by the cardinals who are members of congregations, which correspond, in a certain measure, to the political ministries in modern states. These congregations are established in Rome by the sovereign pontiff, and their objects are to inquire into, discuss, and decide the important affairs of the whole church and of the temporal dominions of the holy see. The cardinals are assisted by consultors or prelates, by distinguished ecclesiastics secular and regular, and by other officials appointed by the pope.

The head of every congregation is a cardinal prefect, though some congregations have the pope as prefect, *e.g.*, the holy office, the apostolic visit, and the consistory. The secretary is ordinarily a prelate; in the holy office he is a cardinal. The acts, decrees, rescripts, and letters issued in the name of a congregation are subscribed generally by the prefect, and always by the secretary. These two officials chiefly regulate the affairs of the congregation and submit to the pope, at periodical audiences, the matters which require its approval. The following are the more important congregations: Inquisition, consistorial, apostolic visit, bishops and regulars, council, residence of bishops, state of regulars, ecclesiastical immunities, propaganda fide, propaganda fide for Oriental affairs, commission for correction of books of the Oriental Church, index, sacred rites, ceremonial, regular discipline, indulgences and relics, examination of bishops, *fabbrica* of St. Peter's extraordinary ecclesiastical affairs and studies.

The work of the church in the world is directed immediately by the bishops, who receive their jurisdiction from the pope. The power inherent in the episcopal character and order is received from God directly and immediately. When established in a diocese by the pope, the bishop, in virtue of his title, receives the power of governing and of taking cognizance of all spiritual causes which regard his flock, whether laymen or ecclesiastics, with the exception of what is specially reserved to the head of the church, and he possesses and exercises these prerogatives under the jurisdiction of and in dependence on the pope. The bishops in the Catholic Church at the present time are (*Gerarchia Cattolica*, March, 1885) thus divided: (*a*) patriarchal sees, of the Latin rite, 7; of the Oriental rite, 5; (*b*)

archiepiscopal sees, of the Latin rite, immediately subject to the holy see, 14; with ecclesiastical provinces, 137; Oriental rite, with ecclesiastical provinces, 3, subject to patriarchates, 21; (*c*) episcopal sees, Latin rite, immediately subject to the holy see, 86; suffragans in ecclesiastical provinces, 579; Oriental rite, immediately subject to the holy see, 2; suffragans in ecclesiastical provinces, 8; subject to patriarchates, 41; (*d*) sees *nullius dioceseos*, 17. The titles dependent on the sacred congregation of Propaganda are—apostolic delegations, 7; vicariates apostolic, 123; prefectures apostolic, 35. The total of these hierarchical titles amounts to 1,085, and, including the 74 cardinalial titles, to 1,159. The vacant titles of all kinds amount to 107, and thus the whole hierarchy of the Catholic Church in March, 1885, reached the total of 1,266. Priests, placed in the second degree of the ecclesiastical hierarchy, who are generally divided into parish priests and curates or assistants, are immediately under the direction of the bishops and administer directly to the people. Their primary office is the offering of the sacrifice of the mass. They also preach, bless, and administer baptism, penance, communion, and extreme unction. Their functions are numerous and important, and they constitute the working force of the church in its direct relations with its members throughout the world. Priests of religious orders exercise like functions, save those properly parochial.

The Oriental churches in communion with the holy see, holding the same belief and the same principle of authority as the Latin Church, have their own special rites, discipline, and liturgical language. These are chiefly the Greek, Melchite, Bulgarian, Ruthenian, Maronite, Syro-Chaldaic, Coptic, Armenian, and Roumanian rites. The Greek Oriental rite is admitted by the pure Greeks, the Slavs (in Slav language), the Melchites of Syria (in Arabic), the Roumanians (in the Roumanian tongue), and the Georgians (in their own language). The Georgian Greek rite has no hierarchy, and many Georgians in Russia have passed to the Latin or Armenian rites. The Greek and Slav languages are approved by the church as ritual languages; Arabic is only tolerated.

ROMANCE in its widest sense includes the entire literature of fiction, as well as the early narrations in which fact and legend were blended in historical form, before the simple minds of the people had acquired a clear conception of their distinctness. There are, however, certain ill-defined limitations in the analysis of fiction which enable us to assign distinct places to the legend, the ballad, the epic, the fable, the tale, the romance, and the novel. As usual in all attempts at precise classification, we find that the lines of demarcation cannot be drawn with rigid exactness, and that many works may be referred to more than one division. But the general conception of romance is the one which will here be followed, and which roughly divides the subject into (*i*) *Romances of Chivalry*—chiefly their prose form—and (*ii*) the *Romances of Love and Adventure*, which follow them.

Romance, as a distinct branch of the literature of fiction, belongs essentially to the Middle Ages and Europe. The romance of chivalry, as it is called, prevailed during the four centuries of knighthood, and there can be little doubt that the institutions of chivalry were considerably influenced by the works of the early romancers. The establishment of the orders of St. John and the Temple was based upon an exalted conception of duty and devotion, which the hard test of experience soon modified, and which would have perished utterly but for the embodiment of its ideal in the Round Table romances. The characters of Galahad

and the original Perceval represent types of unattainable perfection, and were therefore models which, although commanding reverence, failed to excite as deep an interest as did the second Perceval, Sir Lancelot, Sir Tris, and Sir Gawain. In these the noblest qualities were blemished by human frailties, and, as a necessary consequence, the knights miscarried a little below the summit of perfect achievement. Walter Map cannot be sufficiently eulogized for the tact and skill with which he drew the two first-named personages. Galahad is brought upon the stage for but a very short time, and is then dismissed in a blaze of saintly glory, while Perceval, although adapted from the French writer's purer knight of that name, is allowed a much larger space upon canvas, at the cost of a few minor sins which suffice to insure his failure and to prove him a man. The other knights are brave, generous, self-sacrificing, and devout, but the indispensable virtue of chastity is absent from their lives, and they are foredoomed to misfortune. The perfect ideal, however, underlies the description of all their acts and motives, and the reader or hearer was never allowed to forget it amid the powerful attractions of the story.

The real prototype of the chivalric romance was the ancient epic; the Greek and Latin poems upon the winning of the Golden Fleece, the siege of Troy, the wanderings of Ulysses and of Æneas, furnish the truest parallel to the mediæval romances of knighthood. The tales which are usually dignified with the name of "classical romances" have really no claim to that rank; they were produced in the age of decadence and correspond much more closely to the mediæval *fabliau* and the seventeenth century novel than to the romance proper. As a matter of course every nation had its legends and popular tales, coëxistent with literary works of greater importance; but the Greeks at least, and the Romans following their example, never condescended during their ages of intellectual vigor to put such figments into written form, so that even the famous Milesian tales are now quite lost. It was not until the Greeks became a widely dispersed, a subject and deteriorated race, and not till the strength and manhood of Rome were buried in the slough of imperial corruption, that sophists and rhetoricians began to construct those artificial tales which we call Greek and Latin romances. They form, however, an epoch, as the earliest prose works of imagination in a European language, and cannot therefore remain unnoticed here. They were succeeded in time by Christian narratives, usually woven into the lives of saints or used as illustrations in the sermons of great preachers; these latter formed a transition to the semi-religious story of the Grail, a bowl or goblet confounded with the chalice used at the Last Supper, with the cup used to collect the precious blood of our Lord, and symbolically with the Holy Sepulcher itself. The achievers of the Grail-quest, or kings of the Grail, were typified in the Knights Templar and the Knights of St. John; thus the true school of romance arose in intimate connection with the changes in European life and manners which were brought about by the crusades.

The *chansons de geste*, which constituted a poetical introduction to the romances of chivalry, in France, were followed by the *fabliaux*, metrical novelettes which furnished material to the Italian writers of prose tales in the fourteenth and fifteenth centuries—a form of composition which was not acclimatized elsewhere than in Italy till the sixteenth century, and which then became the remote prototype of the modern novel. The older and nobler knighthood blossomed in France for the last time in Bayard, in England in Sir Philip Sidney; but the genuine literature of chivalric romance may be said to have come to an end with the fifteenth

century. The knightly romances produced in the sixteenth century were belated and artificial examples of their class; and although the effects of the conquest of Granada and the discovery of America did not wholly put an end to the lingering romantic spirit in Spain, it hardly survived them for half a century. Hence the inferior character of most of the *libros de caballerias*, which chiefly date from the sixteenth century. Out of them grew the fictions known as the sixteenth and seventeenth century romance in Spain, France, and England—monstrous and uninviting examples of perverted ingenuity, utterly dissonant from the literature of pure romance as we conceive it in the chivalrous fictions of the twelfth, thirteenth, and fourteenth centuries. A more practical and utilitarian spirit set in with the latter half of the seventeenth century, in which readers found themselves out of sympathy with the imaginative and mysterious atmosphere of romance. Accordingly the modern novel arose, a form of composition in which the manners and customs of everyday life were more or less faithfully depicted, and which has remained in undiminished popularity to the present time.

Although the distance in manner is immense between the *Ass* of Lucian and the *Amadis de Gaula*, and again between the latter and *Ivanhoe* or *Eugénie Grandet*, there are few varieties of modern fiction which are not faintly shadowed forth in the literatures of Greece and Rome (including in this denomination the post-classical periods of Italy and Byzantium): fables and tales, historical, philosophical, and religious novels, love-stories and narratives of adventure, marvelous voyages, collections of fictitious letters—all forms are represented.

The first we hear of the Greek or Hellenistic novel is in the time of Trajan (*c.* 110), when Iamblichus, a Syrian by descent and a freeman, born and educated at Babylon, wrote in Greek his *Babylonica*, which is known from Suidas, Photius, and a scholium discovered by Henry Estienne on an ancient MS. of the latter writer. A complete codex existed in 1671; and a considerable fragment has been reprinted by Mai. Suidas states that the *Babylonica* consisted of thirty-nine books, but Photius, who gives a full abstract, only mentions seventeen. The story is that of Sinon and Rhodanes, married lovers, persecuted by Garmus, king of Babylon, who is fascinated by Sinon. They fly, and are pursued by the royal eunuchs, who give them no peace through many adventurous scenes. A remarkable resemblance between the fugitives and another couple, Euphrates and Mesopotamia, is the chief subject of the plot.

The review of the *origines* of the Greek novel shows that it arose with the decay of old Greek literature and carried on a feeble existence down to the twelfth century. Two facts make themselves apparent. First, the romance (or novel) proper came late into the field, where it remained in a secondary place; and secondly, it invariably turned upon a hackneyed circle of incidents and never attained anything of the highly artistic development reached by modern examples. The sameness observable in Greek romance arises from the fact that it was the product of literary decrepitude and impotence.

The contributions of Roman literature are limited to productions by two writers, Petronius and Apuleius and one story by Martianus Capella, of more recent date and typical nature. In the comic romance of PETRONIUS ARBITER (*q. v.*), the tale of the matron of Ephesus first appears among Western popular fictions. This was undoubtedly one of the Ephesian tales already referred to. We find it reproduced in the *Seven Wise Masters*, in the French *fabliaux*, and in Brantôme. It is also to be found in the Chinese.

The wonders revealed through the Asiatic expedition of Alexander gave rise to a remarkable development of the marvelous in historical composition. The histories of Onesicritus, Aristobulus, and Clitarchus, themselves members of the expedition, were so full of unheard-of things that they soon fell into disrepute. Callisthenes, another companion of Alexander, also wrote an account, which is lost, but his name remains connected with a spurious work in which were crystallized all the fabulous tales of the conqueror. The life of Alexander had every quality to appeal to the imagination. His marvelous career, his genius as a soldier and ruler, the beauty of his person, his early death, were subjects for legend almost in his own day; and a cloud of mythical story soon floated round his memory. Quintus Curtius, who drew from some of these suspicious sources, is a more critical authority, though he allowed rhetorical fancy to embellish his narration. It is a great fall from the Latin historian to the Pseudo-Callisthenes. The work we possess under the latter title represents the second stage of the Alexander myth. Some of the MSS. attribute it to Aristotle, Ptolemy, and Æsop, as well as to Callisthenes—all with equal verisimilitude. To reconstruct the true from the spurious work is an impossible task after the increased vogue given to the latter by the re-opening of the East to Europe by the Romans, when all the traditions became remolded in the form they now possess. Among the histories separate from Pseudo-Callisthenes and subsequent to Quintus Curtius is an *Itinerarium Alexandri*, in Latin, but of Greek origin, which is little else than an amplification of the apocryphal letter of Alexander to Aristotle. It is dedicated to Constans, son of the emperor Constantine.

The same origin is to be sought for the Alexander myths found in *Renart le Bestourné* and the *Speculum Historiale* of Vincentius Bellovacensis. Quintus Curtius was largely used for the *Alexandreis* (c. 1176–1202) of Gaultier de Châtillon. It was the theme of poetry in all European languages; six or seven German poets dealt with the subject, and it may be read in English, Spanish, Danish, Swedish, Icelandic, Flemish, and Bohemian.

Toward the close of the fifteenth century an anonymous writer worked up the subject into a prose romance, *L'histoire du noble et vaillant roy Alixandre le Grant* (1506), in which the *Historia de Præliis* is followed with tolerable exactness.

The oldest and certainly the most important of the cycles of mediæval romance is that which passes under the name of King Arthur, or of the Round Table. The names, characters, and actions of its heroes have permeated modern literature throughout Europe; yet so little do we know concerning the *origines* and the first authors of the tales which form the body of Arthurian romance, that there are few subjects in literary history more obscured and undefined. It can only be said with assurance that from about the year 1150 several poems were composed by minstrels (a class of men recruited from all ranks of society) upon incidents and personages familiar to readers of what is known as *Morte Arthur*, a compilation of the second half of the thirteenth century. The *Morte Arthur* was not originally so called, and it was not a direct compilation from the ballad of the twelfth century, but seems rather to have been a mere unskillful reduction into a single *corpus* of some five or six prose romances which had already grown out of the poems, and each of which professed to relate the adventures of nearly the same set of heroes. The first appearance of these stories in prose compositions is here our chief concern; and it is, unfortunately, likewise our chief difficulty. The sources of informa-

tion upon the subject are defective and vitiated to a singular degree; and the light thrown by the investigations of recent writers is frequently of the nature of cross-lights. The following attempt at constructing a brief literary history of the Arthurian romances is not offered as a complete analysis of the work which has been done, but as a summary of facts and probabilities.

The Round Table romances had their starting-point in Geoffrey's *Historia*, first published in 1138–39, revised and republished in its present form in 1147. Yet there is no mention in Geoffrey of Launcelot and Tristan, two heroes of much greater importance in the romances than Arthur himself. It does not seem to have been observed before that there is a curious set of resemblances between the personages of the romances and those of the Homeric siege of Troy.

The success of Geoffrey of Monmouth's *Historia* and of his *Merlin* brought indignant comment from some of the Anglo-Norman historians, but it inflamed the minds of other writers already excited by the extraordinary events of the period. The result was the genesis of modern fiction.

The cycle of Franco-Teutonic or French romance of which the mythical history of Charles the Great forms the central design is, so far as its original literary elements are concerned, more ancient than the Franco-British cycle of Arthur and his knights. The reduction into prose of the old *chanson de geste* and of the *poèmes cycliques* which followed them was, however, of much later date than the similar conversions of Round Table poems.

Arthur had become in Britain not only a national hero of romance but also a leading figure around whom might be grouped the adventures of subordinate knights. Charlemagne filled a similar place for French writers, but had the advantage of being a more distinct historical character than Arthur. In the Iberian peninsula, where we find the next great cycle of stories, the circumstances which produced the national hero (the Cid) were still progressive, and his history was too real to melt into such romantic action as dealt in France and England with remote and shadowy paladins and the wonders of fairyland. Therefore, while the Cid had an ever-present reality in ballads, the earliest appearance of prose romance in Spain was in an artificial imitation of the Franco-British cycle. As it was a work of great merit, its fictitious hero became, as it were, the central figure in the stories which followed and which bore to one another a strong family likeness. Most of the chief heroes are illegitimate, like Amadis; the adventures of two brothers are told; and there is much similarity of incident and character. Many of the scenes are laid in Constantinople. *Amadis de Gaula* is the poetical sire of an extraordinary series of romances, which in the words of Cervantes form an "innumerable linaje," and is itself the most interesting and remarkable of them. Although its reputation is due to the Spanish redaction of Montalvo, there was an earlier Portuguese version by Vasco de Lobeira (d. 1403), a gentleman of the court of João I.

The Anglo-Danish cycle of romance, by reason of its origin and type of adventures, may be fitly supplemented by the stories, eminently English in character, although furnished with an Anglo-Norman setting, which have been called "outlaw romances."

Tales of outlaws form a considerable portion of English fiction, and, as elsewhere, the same incidents occur over and over again, being always attributed to the favorite hero of the day. The oldest was that of Hereward the Saxon, whose exploits against William were renowned in prose and verse soon after his own time.

Most of the outlaw stories remain in ballad form; a prose example is the French *Fulk Fitzwarin* (about 1320), descriptive of outlaw life in the Welsh marches and other parts of England, Spain, etc., an embellished record of actual events from 1201 to 1203.

The inspiration of mediæval romance is gone; but it is necessary briefly to trace its final reflections to the close of the seventeenth century, when prose fiction began to assume more definitely the character of the modern novel.

We have seen how large a place in the history of romances is occupied by France down to the end of the sixteenth century. We first meet with the so-called "pastoral romance" in French in *L'Astrée* (1612) of Honoré d'Urfé, an enormous work inspired by Montemayor. Le Roy de Gomberville led the way to the new school of French romance in *Polexandre* (1632-39) and *La Cythérée* (1640-42), which were the models for the still more ponderous productions of La Calprenède and De Scudéry. These form a link between the genuine romance of chivalry and the so-called heroic style. Nearly all the familiar machinery of the old romances is now absent; we no longer meet with dragons, necromancers, giants, and enchanted castles. Formerly love was secondary to heroic achievement; now it becomes the ruling passion, and knightly deeds are performed only to excite the applauding smile of a mistress, and not for the sake of military glory. The jargon of gallantry used in these fictions exercised an evil influence upon contemporary literature, until it was laughed out of existence by the *Précieuses Ridicules* of Molière and the dialogue of Boileau on *Les Héros de Roman*. Such works as *Marie Stuart* (1675) by P. Le Pesant de Boisguilbert, *Fouvelles d'Élisabeth* (1680), and *Frédéric de Sicile* (1680), are a connecting link between the romance of De Scudéry and the modern historical novel.

ROMANCE LANGUAGES is the name generally adopted for the modern languages descended from the old Roman or Latin tongue, acted upon by inner decay or growth, by dialectic variety, and by outward influence, more or less marked, of all the foreign nations with which it came into contact.

Latin, like all other literary languages, began as a living popular speech. There was during this first period practically little difference between the vulgar and the literary language. In the oldest historical time Latin was spoken only in the small territory called Latium. The greater part of Italy proper was occupied by the Umbro-Oscan tribes, whose languages were Italic, related to Latin, yet so different as to be unintelligible to the Romans. The two most distinct types were Umbrian in the north and Oscan in the south. The chief difference between them is that Umbrian was in a much more advanced state of phonetic decay, and was in many respects a precursor of Italian and Romance, while Oscan was still more antique than Latin. When the territories where these dialects were spoken became subject to the Romans, about the beginning of the third century B.C., the language of the conquerors was introduced, but of course modified by the speech of the conquered. Thus two groups of provincial dialects were formed. (1) The North or Umbrian and Sabelian Latin, with which Etruscan Latin was closely connected, was peculiarly important, since it spread southward and extended to the neighborhood of Rome; thus Falerii, Præneste, and Tusculum spoke it. Later it spread to Northern Italy. Being really a fuller development of the tendencies of the old popular Latin and easier to pronounce than literary Latin, at last from the surrounding peasantry it reached the people of Rome and became the source of the modern tongues. (2)

The South or Oscan Latin was Latin with some slight phonetic modifications, which, in Modern South Italian, have lived through the leveling influence of the north dialect. Between the Umbrians and the Oscans lay the Sabellians, occupying linguistically as geographically a middle position, yet somewhat nearer to the north dialect than to the south. To the west of Umbria lay the mysterious Etruria, whose language, preserved in numerous inscriptions, has long been an unsolved riddle and is still a matter of dispute, some considering it as utterly unconnected with Italic or even Aryan, some, as Deecke and Sophus Bugge, thinking it Aryan, intermediate between Greek and Italic, but partly decayed. In the last respect it has much in common with Umbrian, but its tendency to a rapid and slovenly utterance is still more distinctly traceable than in Umbrian.

Of the other languages spoken in old Italy, such as Messapian, Celtic, Venetian, and Ligurian, too little is known to enable us to form an estimate of their phonetic character; but in general we see the peculiarities of North Latin penetrating more or less everywhere, in the north of Italy and in Spain (subjected at the end of the third century B.C.), as well as in Gaul, of which the southern part, Provincia (later Provence), was subjected first, and the rest, by Cæsar, in the first century B.C. All these countries were rapidly Latinized; but the provincial dialects did not always follow the phonetic development of the mother speech, just as American does not always follow the changes of English.

For the history and distinctive traits of the great modern Romance languages—the reader is referred to the separate articles.

1. *Italian* is distinguished by its harmonious form, its vocalic endings, and the rich fulness of its tones.
2. *Spanish* is distinguished by its regularity, by its short, distinct sounds, and its fixed tones, and by many Arabic words. Certain "thick" sounds, as the *j* (like Dutch and South German *ch*, though in the south of Spain much weaker, almost *h*) and the lisping *c, z* seem to be rather modern developments than due to direct Arabic influence.
3. *Portuguese* is, with *Gallego* (the dialect of Galicia), the western dialect of Spanish, and has almost the same words, but a very different pronunciation; in sound it approaches somewhat to French, as in the nasal vowels (which, however, are less purely vocalic than in French) and the voiced sounds of *s, z, and j*. It has partly retained the Old Spanish form, as in *filho* for Span. *hijo*, and partly it has a character of its own owing to its many obscured vowels and contractions, as *boa* for *bona*, *dôr* for *dolor*.
4. *Provençal* in many respects represents the earliest form of French; in others it has peculiar developments (see PROVENÇAL). *Catalan* is the southern dialect of Provençal.
5. *French* makes up for the want of the full forms and tones of Italian by its grace and delicacy. It has more of a history than the other Romance languages, Old French being very different from Modern.
6. *Ladino* (*Rumonsch*, Germ. *Churwälsch*, from the town of Chur) or *Central Romance* extends from the Grisons to Friuli on the Adriatic. It is not uniform, being only an agglomeration of cognate dialects; and it is scarcely more Latin than any other Romance language. It has chiefly been elucidated by Ascoli.
7. *Roumanian* has probably not survived from the old Roman colonists of Dacia, but been imported from Istria (which has a cognate dialect) or Northern Italy. It has been greatly mixed up with Slavonic words and sounds (such as the "mixed" vowels), and has some distinctive marks, such as the post-positive article,

*Romunul* = Romanus ille; compare the similar phenomenon in the Slavonic dialect of Bulgaria and in the Albanian language.

ROMAN LAW. THE REGAL PERIOD. *Contributions to People, Customs, and Law.*—The union of the Latin, Sabine, and, to a small extent, Etruscan bands that, as conquerors or conquered, old settlers or new immigrants, together constituted the first elements of the Roman people, did not necessarily involve contemporaneous adoption of identical institutions or identical notions of law. Although they were descended from the same Indo-European stock, and inherited the same primitive ideas about religion and government, those ideas must have been modified in the course of centuries of separate and independent development. The characteristics of the Latin race are said to have been its sense of the importance of discipline and the homage it paid to power and might; those of the Sabines were their religious feeling and their reverence for the gods; the characteristic of the Etruscans was their subservience to forms and ceremonies in matters both divine and human. Corresponding influences are very manifest in the growth of Rome's early public institutions, civil, military, and religious. It does not seem too much to say that these same influences are traceable also in the institutions of the private law. The *patria potestas*, with the father's power of life and death over his children; the *manus* and the husband's power over his wife; the doctrine that those things chiefly was a man entitled to call his own which he had taken by the strength of his arm; the right which a creditor had of apprehending and imprisoning his defaulting debtor and reducing him to slavery—all these seem to point to a persuasion that might made right. The religious marriage ceremony and the recognition of the wife as mistress of the household and participant in its sacred offices as well as its domestic cares; the family council of kinsmen, maternal as well as paternal, who advised the *paterfamilias* in the exercise of the domestic jurisdiction; the practice of adoption, to obviate the extinction of a family and to prevent its deceased members being deprived of the prayers and sacrifices necessary for the repose of their souls—these seem to have flowed from a different order of ideas and to bear evidence of Sabine descent. Etruscan influence could make itself felt only at a later date; but to it may possibly be attributed the strict regard that came to be required to the observance of ceremonials and words of style in the more important transactions both of public and private life.

While it can hardly be doubted that the result of the union of Latins and Sabines was that regulations were at once adopted which should apply to their public life as a united people, it is not only conceivable but probable that each tribe, as regarded the private relations of its members, continued for a time to accord a preference to its own ideas and traditions of right and law, and that the amalgamation was a gradual process, partly silent, partly due to regal or pontifical intervention.

*The Regulatives of Public and Private Order.*—We look in vain for, and it would be absurd to expect, any definite system of law in those early times. What passed for it was a composite of *fas*, *jus*, and *boni mores*, whose several limits and characteristics it is difficult to define. This may to some extent be accounted for by the fact that much of what was originally within the domain of *fas*, once it had come to be enforced by secular tribunals, and thus had the sanction of human authority, was no longer distinguishable from *jus*; while it may be that others of its behests, once pontifical punishments for their contraven-

tion, had gone into desuetude, sank to nothing higher than precepts *boni mores*.

By *fas* was understood the will of the gods, the laws given by heaven for men on earth, much of it regulative of ceremonial, but a by no means insignificant part embodying rules of conduct. It appears to have had a wider range than *jus*. There were few of its commands, prohibitions, or precepts that were addressed to men as citizens of any particular state; all mankind came within its scope.

This *jus* might be the result either of traditional and inveterate custom (*jus moribus constitutum*) or of statute (*lex*). We look in vain for any legislative enactment establishing such an institution, for example, as the *patria potestas*, or fixing the rules of succession on death. Statute may have regulated some of their details; but they had taken shape and consistency before Rome had its beginning.

What went by the name of *boni mores*, quite distinct from the *jus moribus constitutum*, must also be regarded as one of the regulatives of public and private order. Part of what fell within their sphere might also be expressly regulated by *fas* or *jus*; but there was much that was only gradually brought within the domain of these last, and even down to the end of the republic not a little that remained solely under the guardianship of the family tribunal or the censor's *regimen morum*. Its function was twofold: sometimes it operated in restraint of law by condemning—though it could not prevent—the ruthless and unnecessary exercise of legal right, as for example, that of the head of a house over his dependants; and sometimes it operated supplementarily, by requiring observance of duties that could not be enforced by any compulsor of law. Dutiful service, respect, and obedience from inferiors to superiors, chastity, and fidelity to engagements, express or implied (*fides*), were among the *officia* that were thus inculcated, and whose neglect or contravention not only affected the reputation but often entailed punishments and disabilities, social, political, or religious. It was the duty of those in authority to enforce their observance by such *animadversio* as they thought proper—the *paterfamilias* in his family, the *gens* among its members, the king in relation to the citizens generally; and many a wrong was prevented not by the fear of having to make reparation to the party injured, but by the dread of the penalties that would follow conduct unbecoming an upright citizen.

*The Quiritian Family.*—The word *familia* in Roman law had at once a more extensive and a more limited meaning than it has in its English form. Husband, wife, and children did not necessarily constitute an independent family among the Romans, nor were they all necessarily of the same one. Those formed a family who were all subject to the right or power—originally *manus*, but latterly *jus*—of the same family head (*paterfamilias*). He might have a whole host dependent on him—wife and sons and daughters, and daughters-in-law, and grandchildren by his sons, and possibly remoter descendants related through males; so long as they remained subject to him they constituted but one family, that was split up only on his death or loss of citizenship. But if his wife had not passed *in manum*—and that was common enough even during the republic, and universal in the later empire—she did not become a member of his family: she remained a member of the family in which she was born, or, if its head was deceased or she had been emancipated, was the sole member of a family of her own. Both sons and daughters on emancipation ceased to be of the family of the *paterfamilias* who had emancipated them. A daughter's children

could never under any circumstances be members of the family of their maternal grandfather; for children born in lawful marriage followed the family of their father, while those who were illegitimate ranked from the moment of birth as *patresfamilias* and *matresfamilias*.

With the early Romans, as with the Hindus and the Greeks, marriage was a religious duty a man owed alike to his ancestors and to himself. Believing that the happiness of the dead in another world depended on their proper burial and on the periodical renewal by their descendants of prayers and feasts and offerings for the repose of their souls, it was incumbent upon him above all things to perpetuate his race and his family cult. In taking to himself a wife, he was about to detach her from her father's house and make her a partner of his family mysteries. With the patrician at least this was to be done only with divine approval, ascertained by *auspicia*. His choice was limited to a woman with whom he had *conubium* (*ἐπιγαμία*) or right of inter-marriage. This was a matter of state arrangement; and in the regal period Roman citizens could have it outside their own bounds only with members of states with which they were in alliance, and with which they were connected by the bond of common religious observances. The *patria potestas* was the name given to the power exercised by a father, or by his *paterfamilias* if he was himself *in potestate*, over the issue of such *justae nuptiae*.

It might happen that a marriage was fruitless, or that a man saw all his sons go to the grave before him, and that the *paterfamilias* had thus to face the prospect of the extinction of his family and of his own descent to the tomb without posterity to make him blessed. To obviate so dire a misfortune he resorted to the practice of adoption, so common in India and Greece. If it was a *paterfamilias* that he adopted the process was called adrogation (*adrogatio*); if it was a *filiusfamilias* it was simply *adoptio*.

The *manus* and the *patria potestas* represent the masterful aspects of the patrician's domestic establishment. Its conjugal and parental ones, however, though not so prominent in the pages of the jurists, are not to be lost sight of. The Roman family in the early history of the law was governed as much by *fas* as by *jus*. It was an association hallowed by religion, and held together not by might merely but by conjugal affection, parental piety, and filial reverence. The purpose of marriage was to rear sons who might perpetuate the house and the family *sacra*. In entering into the relationship the wife renounced her rights and privileges as member of her father's house; but it was that she might enter into a lifelong partnership with her husband, and be associated with him in all his family interests, sacred and civil. The husband was priest in the family, but wife and children alike assisted in its prayers, and took part in the sacrifices to its lares and penates.

In Greece the *patria potestas* never reached such dimensions as in Rome, and there it ceased, *de facto* at least, when a son had grown up to manhood and started a household of his own. But in Rome, unless the *paterfamilias* voluntarily put an end to it, it lasted as long as the latter lived and retained his status. The acquisition of domestic independence by the death of the family head frequently involved the substitution of the guardianship of tutors (*tutela*) for the *potestas* that had come to an end. This was so invariably in the case of females *sui juris*, no matter what their age: they remained under guardianship until they had passed by marriage *in manum mariti*. It was only pupil males, however, who required tutors, and their office came to an end when puberty was attained.

*The Quiritian Law of Property.*—The distribution

of land among the early Romans is one of the puzzling problems of their history. The Servian constitution classified the citizens and determined their privileges, duties, and burdens according to the extent of their freeholds; and yet we know very little with certainty of the way in which these were acquired. We have indeed a traditional account of a partition by Romulus of the little territory of his original settlement into three parts, not necessarily of equal dimensions, one of which was intended for the maintenance of the state and its institutions, civil and religious, the second (*ager publicus*) for the use of the citizens and profit of the state, and the third (*ager privatus*) for subdivision among his followers. Varro and Pliny further relate that to each of them he assigned a homestead (*heredium*) of two jugers, equal to about an acre and a quarter, to be held by him and his heirs (*quae heredem sequerentur*), Pliny adding that to none did the king give more. There can be no doubt that a portion of the territory, gradually augmented through new conquests, was reserved as *ager publicus*; that is sufficiently attested by the complaints made for centuries by the plebeians of its monopolization by the patricians. But it is impossible to admit the accuracy of the account of the mode in which the *ager privatus* was dealt with. The fact that the majority of the Servian local tribes bore the names of well-known patrician *gentes* leads to the conclusion that many at least of the clans held tracts of land in their corporate capacity, and that their constituent families settled alongside each other, each with its own homestead in separate and independent right. It can hardly be assumed, however, that two and a half jugers was its maximum. Seven jugers, about four and one half acres, seems to have been the normal extent of royal grants to plebeians, and a patrician's freehold is not likely to have been less; probably in the ordinary case it was larger, seeing the minimum qualification for the third Servian class was ten jugers, and for the first twenty. To enable him to make grants during pleasure to his clients he must have held more than seven. But he did not necessarily hold all his lands by gratuitous assignation either from the state or from his *gens*; purchase from the former was by no means uncommon; and it may have been on his purchased lands, outside his *heredium* proper, that his clients were usually employed. Those dependents were also employed in large numbers upon those parts of the *ager publicus* which were occupied by the patricians under the name of *possessionses*, and which really were the source of their wealth. These, however, were not the property of their occupant; it was the lands acquired by assignation or purchase that were alone regarded as his *ex jure Quiritium*—what he held in independent ownership to him and his heirs according to the law and custom of the Quirites.

There are some who maintain that in the regal period, anterior to the reign of Servius Tullius, there was no private property in movables. The proposition thus broadly stated is manifestly untenable. If no more be meant by it than this, that movables were not then recognized as objects of quiritarian right that could be vindicated as such by a real action *per sacramentum*, it may be admitted that down to the time of Servius, with exception perhaps of captured slaves and cattle, there was no property in movables. But, if it be meant to negative the right of a man to alienate by tradition what he held as his own, and to protect himself, or have protection from the authorities, against any attempt to deprive him of it by theft or violence, then the non-existence of ownership of movables must be emphatically denied. Theft was theft, though the stolen article had been acquired only by natural means—by barter in the market, by the industry of the maker,



or as the product of something already belonging to its holder.

*The Quiritian Law of Succession.*—The legal order of succession in the regal period was extremely simple. It was this: On the death of a *paterfamilias* his patrimony devolved upon those of his children *in potestate* who by that event became *sui juris*, his widow taking an equal share with them, and no distinction being made between movables and immovables, personalty and realty; and, failing widow and children, it went to his *gens*. The notion that between the descendants and the *gens* came an intermediate class under the name of agnates does not seem well founded as regards the regal period; they were introduced by the XII. Tables to meet the case of the plebeians, who, having no *gentes*, were without legal heirs in default of children.

There were two sorts of testaments made use of by the patricians of the regal period—that made in the comitia of the curies (*test. calatis comitiis*) and that made in the presence of a few comrades on the eve of battle (*test. in procinctu factum*). The first at least—and the second was just a substitute for it on an emergency—was far from being an independent exercise of the testator's *voluntas*.

The accounts of the early distributions of land among the plebeians are even more uncertain than those we have of its distribution among the patricians. They had undoubtedly become freeholders in large numbers before the Servian reforms. But they probably attained that position only by gradual stages. There are indications that their earliest grants from the kings in their character of royal clients (as Cicero calls them) were only during pleasure; but latterly, as they increased in numbers and importance, they obtained concessions of *heredia* varying in extent from two to seven jugers. That those who had the means also frequently acquired land by purchase from the state may be taken for granted.

As regards the law of succession it may safely be assumed that by custom at all events the children of a plebeian usually took his estate on his death. But, as he was not a member of a *gens*, there was no provision for the devolution of his succession on failure of children. The want of them he could not supply by adrogation, as he had for long no access to the assembly of the curiæ; and it is very doubtful if adoption of a *filius-familias* was known before the reforms of Servius Tullius. The same cause that disqualified him for adrogating a *paterfamilias* disqualified him for making a testament *calatis comitiis*; and even one *in procinctu* was impossible, since, although before the time of Servius plebeians may occasionally have served in the army, they were not citizens, and so had not the requisite capacity for making a testament. Until therefore the XII. Tables introduced the succession of agnates a plebeian unsurvived by children was necessarily heirless—that is to say heirless in law. But custom seems to have looked without disfavor on the appropriation of his *heredium* by an outsider: a brother or other near kinsman would have the earliest opportunity, and, if he maintained his possession of it in the character of heir for a reasonable period, fixed by the XII. Tables at a year, the law dealt with him as heir, and in course of time the pontiffs imposed upon him the duty of maintaining the family *sacra*.

*Public and Private Offenses and their Punishment.*—For anything like a clear line of demarkation between crimes, offenses, and civil injuries we look in vain in regal Rome. Offenses against the state itself, such as trafficking with an enemy for its overthrow (*proditio*) or treasonable practices at home (*perduellio*), were of course matter of state concern, prosecution and punishment from the first. But in the case of those that

primarily affected an individual or his estate there was a halting between, and to some extent a confusion of, the three systems of private vengeance, sacral atonement, and public or private penalty. It has been attempted to explain the coexistence of these systems by reference to the different temperaments of the races that constituted united Rome; and this certainly is a consideration that cannot be left out of view. But the same sequence is observable in the history of the laws of other nations whose original elements were not so mixed, the later system gradually gaining ground upon the earlier and eventually overwhelming it.

THE JUS CIVILE. (*From the Establishment of the Republic until the Subjugation of Central and Southern Italy.*) *Formative Agencies of the Law. The Legislative Bodies of the Period.*—The limits and scope of this article do not permit of any detailed account of the consequences of the change from kings to consuls, or of the tribulations of the plebeians during the first two centuries of the republic. Stage by stage they fought and conquered in the uphill battle for social and political equality. In 260 U.C. they got their own special protectors in their tribunes, with the *ædiles* as their assistants, and *judices decemviri* to act under their instructions as arbiters in disputes among themselves. In 283 they obtained state sanction for their *concilium*, and recognition of its power to regulate purely plebeian interests. The XII. Tables of 303 were the fruit of their agitation for a revision and written embodiment of the law. It was in deference to their complaints of their practical disfranchisement through the unduly preponderating influence of the patricians in the comitia of the centuries that in 305 the comitia of the tribes was instituted. Their repeated protests against the monopolization of the public domain land by members of the higher order resulted at last in the definite recognition of their right to participate in its occupation by one of the Licinian laws of 387. The long course of cruel oppression of plebeian insolvents by their patrician creditors was put an end to by the Pœtilian law of 428 abolishing nexal contract, and prohibiting the use of chains and fetters on persons incarcerated for purely civil debt. By the Hortensian law of 467 the resolutions of the plebeian council (*plebiscita*) were declared binding not only on the plebeians themselves but on the whole body of the citizens. And from 333, when a plebeian first reached the magistracy through the quætorship, down to 502, when they attained to the supreme pontificate, they gradually vindicated their right as citizens to share in all the honors and dignities of the state.

The legislative bodies were thus three in number—the comitia of the centuries, the *concilium plebis*, and the comitia of the tribes. The first, if not organized by Servius Tullius, at all events grew out of his distribution of the populace into classes and centuries according to the value of their freeholds as appearing on the census-list. As only the national army assembled for a peaceful purpose (*exercitus civilis*), it could be convened and presided over originally only by a magistrate possessing the military *imperium*, i.e., a consul; but, after the creation of the censorship in 311 and the prætorship in 387, the holders of those offices were entitled to convoke it—the former for its assent to arrangements for the census, and the latter for state trials. It was the centuries that passed the XII. Tables; but for the most part their legislation was upon questions affecting public and constitutional rather than private interests. The procedure in the centuriate comitia was somewhat cumbrous. There was publication of the proposed law (*promulgatio rogationis*) a fortnight before the day appointed, sometimes one or more meetings (*conciones*) being held in the inter-

val for its consideration and discussion. When the day arrived, the *auspicia* were taken by the presiding magistrate, assisted by an augur; if favorable, the citizens were summoned anew by blast of trumpet, and on their assembling, which originally they did under arms, prayer and sacrifice were offered by president, pontiffs, and augurs. A final *concio* might then be held if thought necessary; and, after it was over, on the order to "proceed to the comitia," the citizens marched to the Campus Martius (the formal assembly being incompetent within the city). There the *rogatio* was read and, if no sign from heaven indicated the dissent of the gods and warned the assembly to disperse, was at once put to the vote—"Is it your pleasure, Quirites, to hold this as law?" The vote was taken by centuries, those of the knights and the freeholders of full valuation voting first; if they were unanimous it went no further, for these formed more than a majority of the whole *comitia*. The resolution, if adopted, was *populi jussum*, but not yet law. It had still to run the gauntlet of the "fathers," whether the senate or only its patrician members is disputed; it was in their power to refuse to authorize it (*auctores fieri*), usually putting their dissent on the ground that the gods willed it not; but if they ratified it, then it became a *lex*, ordinarily getting the name of the magistrate by whom it had been proposed. The power of veto, however, was considerably qualified by a Publilian law of the year 415, which enacted that in future the "fathers" should grant (or refuse) their *auctoritas* before the vote was taken.

The points of difference between the enactments of the *concilium plebis* and the later *comitia tributa* are indicated by Mommsen in a paper in his *Researches*. (1) The *comitia* was an assembly of the whole body of the people, voting according to tribes instead of centuries; the *concilium* was an assembly of plebeians only, also voting *tributim*. (2) The *comitia* was convened and presided over by a patrician magistrate, not necessarily, however, with military *imperium*, and therefore very frequently by the prætor; whereas the *concilium* could be convened and presided over only by a plebeian official, either a tribune or an ædile. (3) In the *comitia* the *auspicia* had to be taken before the proceedings commenced; in the *concilium* the will of the gods was not demanded, although listened to if communicated in a thunder-storm or the like. (4) The resolution of the *comitia* required to be confirmed by the "fathers;" while that of the *concilium* did not. (5) An enactment of the *comitia* was a *lex*, and bound the whole people; but before the Hortensian law an enactment by the *concilium plebis* was in the ordinary case no more than a *plebiscitum*, and of force only among the plebeians themselves. But there was an exception when, because of some constitutional change proposed by it, the senate had previously sanctioned the legislation, as in the case of the Terentilian law, which paved the way for the XII. Tables, of the Canuleian law authorizing the intermarriage of patricians and plebeians, of the Licinian laws about the occupation of the public lands, etc.; in such cases, although the final vote was that of the *concilium*, the enactment was binding on the citizens generally, and was spoken of as a *lex* rather than as the *plebiscitum*. The latter name seems practically to have been dropped after the Hortensian law had equalized them so far as their effects were concerned. The greater part of the legislation for amending the private law latterly fell to the *concilium*, owing so far, perhaps, to the greater simplicity of its procedure, but also to some extent to the fact that the prætors preferred making their amendments tentatively by edicts (which were revocable), instead of embodying them in statutes, which, as passed under divine *auspices*

and representing the divine will, could not easily be repealed.

*Development of the Substantive Institutions of the law. The Citizen and his "Caput."*—The early law of Rome was essentially personal, not territorial. A man enjoyed the benefit of its institutions and of its protection, not because he happened to be within Roman territory, but because he was a citizen—one of those by whom and for whom its law was established. The theory of the early *jus gentium* was that a man sojourning within the bounds of a foreign state was at the mercy of the latter and its citizens, that he himself might be dealt with as a slave, and all that belonged to him appropriated by the first comer; for he was outside the pale of the law. Without some sort of alliance with Rome a stranger had no right to claim protection against maltreatment of his person or attempt to deprive him of his property; and even then, unless he belonged to a state entitled by treaty to the international judicial remedy of *recuperatio*, it was by an appeal to the good offices of the supreme magistrate, or through the intervention of a citizen to whom he was allied by the (frequently hereditary) bond of *hospitium*, and not by means of any action of the *jus civile* set in motion by himself. A non-citizen—originally *hostis*, and afterward usually called *peregrinus*—in time came to be regarded as entitled to all the rights the *jus gentium* recognized as belonging to a freeman, and to take part as freely as a Roman in any transaction of the *jus gentium*; but that was not until Rome, through contact with other nations and the growth of trade and commerce, had found it necessary to modify her jurisprudence by the adoption of many new institutions of a more liberal and less exclusive character than those of the *jus civile*.

A citizen's civil personality was technically his *caput*. Whenever a citizen either ceased altogether to be a member of a Roman family or passed from one family into another, there was technically *capitis minutio* or *diminutio*, except in the cases of *filiofamilias* and *filiaefamilias* becoming flamens or vestals; for, though they changed their family, yet it was by passing from a human into a divine one. When a citizen forfeited his freedom, his *capitis diminutio* was said to be *maxima*; he lost all capacity, whether under the *jus civile* or the *jus gentium*. When, retaining freedom, he went into exile or joined a Latin colony, or otherwise became a peregrin, the diminution of his capacity was only *media* or *minor*; it was his rights and privileges under the *jus civile* that alone were affected. When both freedom and citizenship remained, and no more occurred than the severance of his connection with a particular family (*familiae mutatio*), the diminution was said to be *minima*.

*The Law of the Family Relations.*—So far as appears no serious inroad was made by the XII. Tables on the law affecting husband and wife, unless in the recognition of the legality of marriage entered into without any solemnity, and not involving that subjection of the wife to the husband (*manus*) which was a necessary consequence of the patrician confarreation and plebeian coemption. These were left untouched.

*Guardianship and the Introduction of the Order of Agnates.*—So long as Rome was patrician the *gens* charged itself with the guardianship of a clansman's orphaned pupil children and his widow, and unmarried daughters above pupilarity after his decease (*tutela*), as well as with that of male members of his family who were *sui juris*, but above the age of pupilarity, when they chanced to be lunatic, imbecile, prodigal, or helplessly infirm (*cura, curatio, curatela*).

But, as this gentile tutory could not be extended to

the plebeians, among whom some law of guardianship was as much required as among their fellow-citizens of the higher order, the decemvirs found it expedient to devise a new one of universal application. The Tables contained no express authority for testamentary nomination of tutors to the widow of the testator, or to his pupil children and grown-up unmarried daughters; but such appointment, if unknown previously, was soon held to be justified by a liberal interpretation of the very inclusive provision, "uti legassit suae rei, ita jus esto." In the absence of testamentary appointment the nearest male agnates of lawful age were to be tutors. This tutory of agnates was an invention of the decemvirs, just as was the agnates' right of succession on intestacy.

*Mancipation and the Law of Property.*—In the early law there was no technical word for ownership of things; it was an element of the house-father's *manus*. In time, although it is impossible to say when, the word *dominium* came into use; but, so far as can be discovered, it did not occur in the XII. Tables, and must have been of later introduction.

*Changes in the Law of Succession.*—The forms of testament of the regal period still remained in use in the early republic; but in course of time they were displaced by the general adoption of that executed with the copper and the scales (*testamentum per aes et libram*.) It seems to be the general opinion that it was to the first two that the words applied which stood in the forefront of the provisions of the XII. Tables about inheritance—"uti legassit suae rei, ita jus esto." Whether resort was to the comitia or to the army, the testator's own will in the matter was henceforth to be supreme. There was to be no more reference to the pontiffs as to the expediency of the testament in view of the interests of the family *sacra* and of creditors of the testator's; from legislators sanctioning a departure from the ordinary rules of succession, the assembled Quirites became merely witnesses—recipients of the oral declaration of the testator's will in regard to his inheritance.

*The Law of Obligations.*—The jurists of the classical period attribute obligation either to contract, or delict, or miscellaneous causes (*variae causarum figurae*); and those arising from contract fill a place in the later jurisprudence vastly greater than those arising from delict. In the XII. Tables it was very different. In them delicts were much more prominent than contracts—wrongs entitling the sufferer to demand the imposition of penalties upon the wrongdoer that in most cases covered both reparation and punishment. The disproportion in the formulated provisions in reference to the two sources of obligation, however, is not surprising. For, first of all, the purpose of the decemviral code was to remove uncertainties and leave as little as possible to the arbitrariness of the magistrates. In nothing was there more scope for this than in the imposition of penalties; and, as different offenses required to be differently treated, the provisions in reference to them were necessarily multiplied. In the next place, the intercourse that evokes contract was as yet very limited. Agriculture was the occupation of the great majority; trade and commerce were more backward than in the later years of the regal period; coined money was just beginning to be used as a circulating medium. Lastly, the safeguards of engagement then lay to a great extent in the sworn oath or the plighted faith, of which the law had hardly begun to take cognizance, but which found a protection quite as potent in the religious and moral sentiments that had so firm a hold on the people.

*Introduction of the Stipulation.*—Few events in the history of the private law were followed by more far-reaching consequences than the introduction of the

stipulation. It exercised an enormous influence on the law of contract; for by means of it there was created a unilateral obligation that in time became adaptable to almost every conceivable undertaking by one man in favor of another. By the use of certain words of style in the form of question and answer any lawful agreement could thereby be made not only morally but legally binding, so that much which previously had no other guarantee than a man's sense of honor, now passed directly under the protection of the tribunals. Stipulations became the complement of engagements which without them rested simply on good faith, as when a vendor gave his stipulatory promise to his vendee to guarantee peaceable possession of the thing sold, or its freedom from faults, and the vendee in turn gave his promise for payment of the price. The question and answer in the form prescribed by law made the engagement fast and sure. Hence the generic name of the contract.

THE *JUS GENTIUM* AND *JUS HONORARIUM*. (*Latter half of the Republic*). *Influences that Operated on the Law. Growth of Commerce and Influx of Foreigners.*—While it may be admitted that commerce was beginning to take root in Rome in the fifth century, yet it was not until the sixth that it really became of importance. The campaigns in which Rome was engaged until the end of the First Punic War absorbed all its energies. But after that time the influx of strangers, and their settlement in the city for purposes of trade, became very rapid—first Latins and other allies, and afterward Greeks, Carthaginians, and Asiatics. For them and the regulation of their affairs the *jus civile*—the law peculiar to Rome and its citizens—was applicable only if they were members of allied states to which *Commercium* and *recuperatio* were guaranteed by treaty. But multitudes were not in this favored position; and even those who were soon found the range of Roman modes of acquiring property and contracting obligations too narrow for their requirements. Hence a *jus gentium* was gradually developed which very early in its history drove treaty covenants *recuperatio* out of use; its application may for a time have been limited to transactions between non-citizens or between citizens and non-citizens, but it was eventually accepted in the dealings of citizens *inter se* and became part and parcel of the *jus Romanorum*. Gaius and Justinian speak of it as "the common law of mankind," "the law in use among all nations;" but the language must not be taken too literally. The Roman *jus gentium* was not built up by the adoption of one doctrine or institution after another that was found to be generally current elsewhere. In the earliest stages of its recognition it was "an independent international private law, which, as such, regulated intercourse between peregrins or between peregrins and citizens on the basis of their common *libertas*;" during the republic it was purely empirical and free from the influence of scientific theory, but its extensions in the early empire were a creation of the jurists—a combination of comparative jurisprudence and rational speculation. To say that it was *de facto* in observance everywhere is inaccurate; on the contrary, it was Roman law, built up by Roman jurists, though called into existence through the necessities of intercourse with and among non-Romans.

It may be a little difficult for a modern jurist to say with a perfect precision what were the doctrines and institutions of the *jus gentium* as distinguished from the *jus civile*. But the distinction must have been very familiar to the Romans; otherwise we should not have had the statement of Marcian in reference to the ἀπόλιδες—that they enjoyed all the rights competent

to a man under the former, but none of those competent to him under the latter.

THE *JUS NATURALE* AND MATURITY OF ROMAN JURISPRUDENCE. (*The Empire until the time of Diocletian.*) *Characteristics and Formative Agencies of the Law during the Period. Characteristics generally and Recognition of a Jus Naturale in particular.*—The first three centuries of the empire witnessed the perfection of Roman jurisprudence and the commencement of its decline. During that time the history of the law presents no such great landmarks as the enactment of the XII. Tables, the commencement of a prætor's edict, the recognition of simple consent as created of a contractual bond, or the introduction of a new form of judicial procedure; the establishment of a class of patented jurists speaking as the mouthpieces of the prince and the admission of all the free subjects of the empire to the privileges of citizenship, are about the only isolated events to which one can point as productive of great and lasting results. There were, indeed, some radical changes in particular institutions, such as the caducary legislation of Augustus, intended to raise the tone of domestic morality and increase fruitful marriages, and the legislation of the same emperor and his immediate successor for regulation of the status of enfranchised slaves; but these, although of vast importance in themselves, and the first of them influencing the current of the law for centuries, yet left upon it no permanent impression. It was by much less imposing efforts that it attained the perfection to which it reached under the sovereigns of the Severan house—a steady advance on the lines already marked out in the latter years of the republic. The sphere of the *jus Quiritium* became more and more circumscribed, and one after another of the formalities of the *jus civile* was abandoned. The *manus* of the husband practically disappeared; the *patria potestas* of the father lost much of its significance by the recognition, notwithstanding it, of the possibility of a separate and independent estate in the child; slaves might be enfranchised by informal manumission; *res mancipi* constantly passed by simple tradition, the right of transferee being secured by the Publican action; servitudes and other real rights informally constituted were maintained as effectual *tuitione prætoris*; an heir's acceptance of a succession could be accomplished by any indication of his intention, without observance of the formal *cretio* of the earlier law; and many of the incidental bargains incident to consensual contract, but varying their natural import, that used to be embodied in words of stipulation, came to be enforceable on the strength of formless contemporaneous agreements.

The preference accorded by jurists and judges to the *jus gentium* over the *jus civile* is insufficient to account for these and many other changes in the same direction, as well as for the ever-increasing tendency evinced to subordinate word and deed to the *voluntas* from which they arose. They are rather to be attributed to the striving on the part of many after a higher ideal, to which they gave the name of *jus naturale*. It is sometimes said that the notion of a *jus naturale* as distinct from *jus gentium* was peculiar to Ulpian, and that it found no acceptance with the Roman jurists generally. But this is inaccurate. Justinian, indeed, has excerpted in the *Digest* and put in the forefront of his *Institutes* a passage from an elementary work of Ulpian's, in which he speaks of a *jus naturale* that is common to man and the lower animals, and which is substantially instinct. This is a law of nature of which it is quite true that we find no other jurist taking account. But many of them refer again and again to the *jus naturale*; and Gaius is the only one (Justinian following him)

who occasionally makes it synonymous with *jus gentium*. There can be no question that the latter was much more largely imbued with precepts of natural law than was the *jus civile*, but it is impossible to say they were identical; it is enough to cite but one illustration, pointed out again and again in the text: while the one admitted the legality of slavery, the other denied it. While the *jus civile* studied the interests only of citizens, and the *jus gentium* those of freemen irrespective of nationality, the law of nature had theoretically a wider range and took all mankind within its purview. We have no hint that the doctrine of the *jus gentium* differed in this respect from the *jus civile*—that a slave was nothing but a chattel; yet we find the latter, when tinctured with the *jus naturale*, recognizing many rights as competent to a slave, and even conceding that he might be debtor or creditor in a contract, although his obligation or claim could be given effect to only indirectly, since he could neither sue nor be sued.

*Concession of Peculiar Privileges to Soldiers.*—While the period with which we are dealing saw the substantial disappearance of the distinction between citizen and peregrin, it witnessed the rise of another—that between soldiers and civilians (*milites, pagani*). The most remarkable effluxes of the *jus militare* (as it is sometimes called) were the military testament and the *castrense peculium*. The first set at naught all the rules of the *jus civile* and the prætors' edict alike as to the form and substance of last wills. It might be in writing, by word of mouth, by the unspoken sign perhaps of a dying man; all that was required was the *voluntas* so manifested as not to be mistaken. More extraordinary still—it was sustained even though its provisions ran counter to the most cherished rules of the common law. Contrary to the maxim that no man could die partly testate and partly intestate, a soldier might dispose of part of his estate by testament and leave the rest to descend to his heirs *ab intestato*. Contrary also to the maxim *semel heres semper heres*, he might give his estate to A for life or for a term of years, or until the occurrence of some event, with remainder to B. Contrary to the general rule, a Latin or peregrin, or an unmarried or married but childless person, might take an inheritance or a bequest from a soldier as freely as could a citizen with children. His testament, in so far as it disposed only of *bona castrensia*, was not affected by *capitis deminutio minima*. It was not invalidated by præterition of *sui heredes*, nor could they challenge it because they had less under it than their "legitim"; nor could the instituted heir claim a Falcidian fourth, even though nine-tenths of the succession had been assigned to legatees. Finally, a later testament did not nullify an earlier one, if it appeared to be the intention of the soldier testator that they should be read together.

THE PERIOD OF CODIFICATION. (*Diocletian to Justinian.*) *Historical Events that Influenced the Law. Supremacy of the Emperors as Sole Legislators.*—From the time of Diocletian downward the making of the law was exclusively in the hands of the emperors. The senate still existed, but shorn of all its old functions alike of government and legislation. The responses of patented jurists were a thing of the past. It was to the imperial consistory alone that men looked for interpretation of old law or promulgation of new.

In the reign of Diocletian rescripts were still abundant; but the constitutions in the Theodosian and Justinian Codes from the time of Constantine downward are mostly of a wider scope, and of the class known as general or edictal laws (*leges generales edictales*). It

would be wrong, however, to infer that rescripts had ceased; for Justinian's *Code* contains various regulations as to their form, and the matter is dealt with again in one of his *Novels*. The reason why so few are preserved is that they were no longer authoritative except for the parties to whom they were addressed.

*Antejustinianian Collections of Statute and Jurisprudence.*—The first of these *Codes* was a collection of imperial rescripts (with a few edicts, etc.) made by one Gregorianus in the very end of the third century, and probably at the instigation of Diocletian, though whether in the east or the west critics are unable to decide. The collection of Hermogenianus, also of rescripts, seems to have been a supplement to the earlier one. As the latest enactment in it belongs to the year 365, the probability is that the collection was published about that time. Both *Codes* although the work of private parties, received statutory recognition from Theodosius and Valentinian in their commission for the preparation of a collection of edictal law; and from the language of Justinian in reference to them there is reason to believe that in the courts they were regarded as authoritative, even to the ignoring of all rescripts not embodied in them. Three years after the publication of the "law of citations" Theodosius nominated a commission to initiate the preparation of a body of law which, if his scheme had been carried into execution, would have rendered that of Justinian unnecessary.

*Justinian's Collection and his own Legislation.*—It is unnecessary to revert to the history of Justinian outside his legislative achievements, or even to speak of his collections in detail, for both have already been described in the article JUSTINIAN I. Ambitious to carry out a reform more complete even than that which Theodosius had planned but failed to execute, he took the first step toward it little more than six months after the death of his uncle Justin, in the appointment of a commission to prepare a collection of statute law (*leges*), among which he included the rescripts of the Gregorian and Hermogenian *Codes*. It was published in April, 529; and in rapid succession there followed his *Fifty Decisions* (529–532), his *Institutes* (November 21, 533), his *Digest* of excerpts from the writings of the jurists (December 16, 533), and the revised edition of his *Code*, in which he incorporated his own legislation down to date (November 16, 534). From that time down to his death in 565 there followed a series of *Novels* (*novellae constitutiones*), mostly in Greek, which were never officially collected, and of which probably many have been lost.

*The Justinian Law-Books. Their Use in the Courts and in the Schools.*—Although the *Institutes* were primarily intended to serve as a text-book in the schools, it was expressly declared that they and the *Digest* and the *Code* should be regarded as just so many parts of one great piece of legislation and all of equal authority, and that, although *Digest* and *Code* were but collections of legislation and doctrine that had proceeded originally from many different hands, yet they were to be treated with the same respect as if they had been the work of Justinian himself. But, while everything within them was to be held as law, nothing outside them was to be looked at, not even the volumes from which they had been collected; and so far did this go that, after the publication of the revised *Code*, neither the first edition of it nor the *Fifty Decisions* were allowed to be referred to. If a case arose for which no precedent was to be found, the emperor was to be resorted to for its decision, as being outside his collections the only fountain of the law. To preserve the purity of the texts Justinian forbade the use of con-

ventional abbreviations (*sigla*) in making transcripts, visiting an offender with the penalties of falsification (*crimen falsi*). Literal translations into Greek were authorized, and indeed were very necessary for many of his subjects; so were *παράτιτλα* or summaries of the contents of individual titles (although the jurists read the word less strictly). Commentaries and general summaries were forbidden under heavy penalties, as an interference with the imperial prerogative of interpretation; but the prohibition does not seem to have been enforced, as we have accounts and remains not only of translations but of commentaries, notes, abridgements, excerpts, and general summaries even in Justinian's lifetime. These, it is true, were mostly by professors (*antecessores*), and their productions may have been intended primarily for educational purposes; but there can be little doubt that they soon passed into the hands of the practitioners and were used without scruple in the courts. A Greek *Paraphrase of the Institutes*, usually attributed to Theophilus, a professor in Constantinople and one of Justinian's commissioners, is commonly supposed to have been used by him in his lectures. It embodies much more historical matter than is to be found in the *Institutes*; but its value has been very differently rated by different critics.

ROMAN LITERATURE. It would be impossible within the limits allowed for this article to attempt, even in outline, any history of the course of Roman literature which would include an account, not only of the extant works which it contains and of their authors, but also of the principal works and writers known to us from ancient testimony. All that is possible to accomplish here is to pass in rapid review the first four of the five periods into which Roman literature may most conveniently be divided, to ascertain the chief literary motives and characteristics of each, and to connect these with the works and writers in whom they are most conspicuously displayed.

The actual beginning of Roman artistic literature can be assigned to a definite date, the year 240 B. C., when Livius Andronicus produced on a Roman stage a drama with a regular plot, instead of the unconnected dramatic dialogues (*saturæ*) by which the holidays of the people had previously been enlivened.

But the historical event which brought about the greatest change in the intellectual condition of the Romans, and thereby exercised a decisive influence on the whole course of human culture, was the capture of Tarentum in 272. After the capture many Greek slaves were brought to Rome, and among them the young Livius Andronicus, who was employed in teaching Greek in the family of his master, a member of the Livian gens. From that time to learn Greek became a regular part of the education of a Roman noble. The capture of Tarentum was followed by the complete Romanizing of all Southern Italy. Soon after came the First Punic War, the principal scene of which was Sicily, where, from common hostility to the Carthaginian, Greek and Roman were brought into friendly relations, and the Roman armies must have become familiar with the spectacles and performances of the Greek theater. In the year following the conclusion of the war (240), after the armies had returned and the people were at leisure to enjoy the fruits of victory ("et post Punica bella quietus," Hor., *Ep.*, ii. 162), Livius Andronicus "took the bold step" ("ausus est primus argumento fabulam serere," Liv., vii. 2) of substituting at one of the public festivals a regular drama translated or adapted from the Greek for the musical medleys (*saturæ*) hitherto in use. From this time dramatic performances became a regular accompaniment of the public games, and came more and more to encroach on the

older kinds of amusement, such as the chariot races. His immediate successor, Cn. Nævius, was not, like Livius, a Greek, but either a Roman citizen or one who enjoyed the limited citizenship of a Latin, and who had served in the Roman army in the First Punic War. His first appearance as a dramatic author was in 235. He adapted both tragedies and comedies from the Greek, but the bent of his genius, the tastes of his audience, and the condition of the language, developed through the active intercourse and business of life, gave a greater impulse to comedy than to tragedy. He was not only the first in point of time, and according to ancient testimony one of the first in point of merit, among the comic poets of Rome, and in spirit, though not in form, the earliest of the line of Roman satirists, but he was also the oldest of the national poets. His younger contemporary Plautus (d. 184) was the greatest comic and dramatic genius of Rome, and is still read as one of the great comic and dramatic writers of the world. He lived and wrote only to amuse his contemporaries, and thus, although more popular in his lifetime and more fortunate than any of the older authors in the ultimate survival of a large number of his works, he is less than any of the great writers of Rome in sympathy with either the serious or the caustic spirit in Roman literature. He is the one extant witness to the humor and vivacity of the Italian temperament at a stage between its early rudeness and rigidity and its subsequent degeneracy. Thus far Roman literature, of which the predominant characteristics are dignity, gravity, and fervor of feeling, and which more than any other literature aimed at fortifying and elevating the character, seemed likely to become a mere vehicle of amusement adapted to all classes of the people in their holiday mood. It was by Q. Ennius (239-169) of Calabria that a new direction was given to Roman literature and new and deeper springs of emotion were elicited from the native genius.

First among his special services to Roman literature was the fresh impulse which he gave to tragedy. He turned the eyes of his contemporaries from the commonplace social humors of later Greek life to the contemplation of the heroic age. He animated the heroes of early Greece with the martial spirit of Roman soldiers, and the spirit of elevation and moral authority breathed into tragedy by Ennius passed into the ethical and didactic writings and the oratory of a later time. His greatest work, which made the Romans regard him as the father of their literature, was his epic poem, in eighteen books, the *Annales*, in which the record of the whole career of Rome was unrolled with idealizing enthusiasm and realistic detail. The idea which inspired Ennius was ultimately realized in both the national epic of Virgil and the national history of Livy. And the metrical vehicle which he conceived as the only one adequate to his great theme was a rude experiment, which was ultimately developed into "the state-liest meter ever molded by the lips of man."

There is still one other name belonging partly to this, partly to the next generation, to be added to those of the men of original force of mind and character who created Roman literature, that of M. Porcius Cato (234-149), the younger contemporary of Ennius. More than Nævius and Plautus he represented the pure native element in that literature, the mind and character of Latium, the plebeian pugnacity, which was one of the great forces in the Roman state. He strove to make literature ancillary to politics and to objects of practical utility, and thus started prose literature on the main lines which it afterward followed. Through his industry and vigorous understanding he gave a great impulse to the creation of Roman oratory, history, and systematic

didactic writing. He was one of the first to publish his speeches and thus to bring them into the domain of literature. Porcius Cato also heads the roll of the Roman historians, at least of those whose works are ranked as literature.

Nævius, Plautus, Ennius, and Cato not only represent but may be said actually to have been the contending forces which strove for ascendancy in determining what was to be the character of the new literature. The work begun by them was carried on by younger contemporaries and successors, that of Plautus by Cæcilius Statius and others, the tragedy of Ennius by his kinsman, Pacuvius, and, in the following generation, by Accius. The impulse given to oratory by Cato, Sulpicius Gallus, and others, and along with it the development of prose composition, went on with increased momentum till the age of Cicero. Terence has nothing Roman or Italian except his pure and idiomatic Latinity. The comedies of Terence give some indication of the tastes of Scipio, Lælius, and their friends, in their youth. The influence of Panætius and Polybius was more adapted to their maturity, when they led the State in war, statesmanship, and oratory, and when the humaner teaching of Stoicism began to enlarge the sympathies of Roman jurists. But in the last years during which this circle kept together a new spirit appeared—C. Lucilius of Aurunca (166?-102). Among the writers before the age of Cicero he alone deserves to be named with Nævius, Plautus, Ennius, and Cato as a great originative force in literature.

The general results of the last fifty years of the first period, from *c.* 130 to *c.* 70, may be thus summed up. In poetry we have the satires of Lucilius, the tragedies of Accius and of a few successors among the Roman aristocracy, who thus exemplified the affinity of the Roman stage to Roman oratory; the "comœdia togata" of Afranius, in which comedy, while assuming a Roman dress, did not assume the virtue of a Roman matron; various annalistic poems; minor poems of an epigrammatic and erotic character; works of criticism in trochaic tetrameters by Porcius Licinus and others, which may be regarded as rude precursors of the didactic epistles that Horace devoted to literary criticism.

The only extant prose work which may be assigned to the end of this period is the treatise on rhetoric known by the title of *Ad Herennium*. But the great literary product of this period was oratory, developed indeed with the aid of these rhetorical studies, but itself the immediate outcome of the imperial interests, the legal conflicts, and the political passions of that time of agitation. The speakers and writers of a later age looked back on Scipio and Lælius, the Gracchi and their contemporaries, L. Crassus and M. Antonius, as masters of their art. In history, regarded as a great branch of prose literature, it is not probable that much was accomplished, although, with the advance of oratory and grammatical studies, there must have been not only greater fluency of composition but the beginning of a richer and more ornate style.

Although the artistic product of the first period of Roman literature which has reached us in a complete shape is limited to the comedies of Plautus and Terence, the influence of the lost literature in determining the spirit, form, and style of the eras of more perfect accomplishment which followed is unmistakable.

The last age of the republic coincides with the first half of the Golden Age of Roman literature. It is the age of purest excellence in prose, and of a new birth of poetry, characterized rather by great original force and

artistic promise than by perfect accomplishment. The five chief representatives of this age who still hold their rank among the great classical writers are Cicero, Cæsar, Sallust, Lucretius, and Catullus. The works of other prose writers, Varro and Cornelius Nepos, have been partially preserved; but these writers have no claim to rank with those already mentioned as creators and masters of literary style. Even oratory was intended quite as much for readers as for the audiences to which it was immediately addressed; and some of the greatest speeches which have come down from that great age of orators were never delivered at all, but were published as manifestoes after the event with the view of influencing educated opinion, and as works of art with the view of giving pleasure to educated taste. Thus the speeches of Cicero (106-43), more certainly than any modern speeches, belong to the domain of literature quite as much as to that of forensic or political oratory. And, although Demosthenes is a master of style unrivaled even by Cicero, the literary interest of most of Cicero's speeches is greater than that of the great mass of Greek oratory—a result of what from a forensic point of view would now be regarded as a serious defect.

Among the many rival orators of the age the most eminent were Hortensius and Cæsar. The former, like other members of the aristocracy, such as Memmius and Torquatus, and like Q. Catulus in the preceding generation, was a kind of dilettante poet and a precursor of the poetry of pleasure, which attained such prominence in the elegiac poets of the Augustan age. Of Julius Cæsar (100-44) as an orator we can judge only by his reputation and by the testimony of his great rival and adversary, Cicero; but we are able to appreciate the special praise of perfect taste in the use of language attributed to him. In his *Commentaries*, by laying aside the ornaments of oratory, he created the most admirable style of prose narrative. While he shows the persuasive art of an orator by presenting the subjugation of Gaul and his own action in the Civil War in the light most favorable to his claim to rule the Roman world, he is entirely free from the Roman fashion of self-laudation or disparagement of an adversary. The man is stamped on every line that he writes, and reveals himself especially in a perfect simplicity of style, the result of the clearest intelligence and the strongest sense of personal dignity.

In the simplicity of his style, the directness of his narrative, the entire absence of any didactic tendency, Cæsar presents a marked contrast to another prose writer of that age—the historian Sallust (87-34). He was the first of the purely artistic historians, as distinct from the annalists and the writers of personal memoirs. He imitated the Greek historians in taking particular actions—the *Jugurthan War* and the *Catilinarian Conspiracy*—as subjects of artistic treatment. He wrote also a continuous work, *Historiæ*, treating of the events of the twelve years following the death of Sulla, of which only fragments are preserved. His style aims at effectiveness by pregnant expression, sententiousness, archaism. He produces the impression of caring more for the manner of saying a thing than for its truth.

While the imaginative and emotional side of Roman poetry was powerfully represented by Lucretius, attention was directed to its artistic side by a younger generation, who molded themselves in a great degree, though not exclusively, on Alexandrian models. Of this small group of poets, who were bound together by common tastes and friendship, one only has survived, fortunately the man of most genius among them, Valerius Catullus (84-54). He, too, was a new force in

Roman literature. His most original contribution to the substance of Roman literature was that he first shaped into poetry the experience of his own heart, as it had been shaped by Alcæus and Sappho in the early days of Greek poetry. No poet has surpassed him in the power of vitally reproducing the pleasure and pain of the passing hour, not recalled by idealizing reflection as in Horace, nor overlaid with mythological ornament as in Propertius, but in all the keenness of immediate impression. He also introduced into Roman literature that personal as distinct from political or social satire which appears later in the *Epodes* of Horace and the *Epigrams* of Martial. His greatest contribution to poetic art consisted in the perfection which he attained in the phalæcian, the pure iambic, and scæzon meters, and he has the interest of being the last poet of the free republic.

The literature of the later republic reflects the sympathies and prejudices of an aristocratic class, sharing in the conduct of national affairs and living on terms of equality with one another. The great inspiring influence of the new literature was the enthusiasm produced first by the hope and afterward by the fulfillment of the restoration of peace, order, national glory, under the rule of Augustus.

The earliest in the order of time of the poets who adorn this age—Virgil (70-19)—is also the greatest in genius, the most richly cultivated, and the most perfect in art. He is the idealizing poet of the hopes and aspirations and of the purer and happier life of which the age seemed to contain the promise. He is the true representative poet of Rome and Italy, of national glory and of the beauty of nature, the artist in whom all the efforts of the past were made perfect, and the unapproachable standard of excellence to future times. While more richly endowed with sensibility to all native influences, he was more deeply imbued than any of his contemporaries with the poetry, the thought, and the learning of Greece. It was by leaning on these supports that his genius felt its way and expanded into higher and wider development.

The second great poet of the time—Horace (65-8)—holds a lower place in the reverence of the world, but is perhaps as much loved and is even more largely and familiarly known. He is both the realist and the idealist of his age. If we want to know the actual lives, manners, and ways of thinking of the Romans of the generation succeeding the overthrow of the republic, it is in the *Satires* and partially in the *Epistles* of Horace that we shall find them. If we ask what there was in the life of that time of more exquisite or more piquant charm, of more elevated enthusiasm, of graver experience, to stir the fancy and move the mood of imaginative reflection, it is in the lyrical poems of Horace that we shall find the most varied and trustworthy answer.

But the poetry of the latter half of the Augustan age destined to survive did not follow the lines either of lyrical or of dramatic art marked out for them by Horace. The latest form of poetry adopted from Greece and destined to gain and permanently to hold the ear of the world was the elegy. The greatest masters of this kind of poetry are the elegiac poets of the Augustan age—Tibullus, Propertius, and Ovid. Of these Tibullus (d. 19) is the most refined and tender. As the poet of love he gives utterance to the pensive melancholy rather than to the pleasures associated with it. A poet of more strength and more powerful imagination but of less refinement in his life and less exquisite taste in his art, is Propertius (c. 50-c. 15), "the Roman Callimachus;" while the most facile and brilliant of the elegiac poets and the least serious in tone and spirit is Ovid (43 B.C.-17 A.D.), the latest in order of time. As

an amatory poet he is the poet of pleasure and intrigue rather than of tender sentiment or absorbing passion. We know him in the intense liveliness of his feeling and the human weakness of his nature more intimately than any other writer of antiquity, except perhaps Cicero. As Virgil marks the point of maturest excellence in poetic diction and rhythm, Ovid marks that of the greatest facility. The past of Rome had always a peculiar fascination for Roman writers. Virgil in a supreme degree, and Horace, Propertius, and Ovid in a less degree, had expressed in their poetry the romance of the past. But it was in the great historical work of Livy (59 B.C.—17 A.D.) that the record of the national life, colored by idealizing retrospect, received its most systematic exposition. The conception of his work must have nearly coincided in point of time with the impulses with which the *Æneid* and the national *Odes* of Horace had their origin. Its execution was the work of a life prolonged through the languor and dissolution following so soon upon the promise of the new era, during which time the past became glorified by contrast with the disheartening aspect of the present. The value of the work consists not in any power of critical investigation or weighing of historical evidence but in the intense sympathy of the writer with the national ideal, and the vivid imagination with which under the influence of this sympathy he gives life to the events and personages, the wars and political struggles, of times remote from his own.

For more than a century after the death of Augustus Roman literature continues to flow in the old channels. Rome continues the center of the literary movement. The characteristics of the great writers are essentially national, not provincial nor cosmopolitan. In prose the old forms—oratory, history, the epistle, treatises or dialogues on ethical and literary questions—continue to be cultivated. Scientific and practical subjects, such as natural history, architecture, medicine, agriculture, are treated in more elaborate literary style.

New elements, however, appear in the literature. As the result of the severance from the active interests of life, a new interest is awakened in the inner life of the individual. The extreme immorality of the age not only affords abundant material to the satirist but deepens the consciousness of moral evil in purer and more thoughtful minds. To these causes we attribute the pathological observations of Seneca and Tacitus, the new sense of purity in Persius called out by contrast with the impurity around him, the glowing if somewhat sensational exaggeration of Juvenal, the vivid characterization of Martial. The literature of no time presents so powerfully the contrast between moral good and evil. In this respect it is truly representative of the life of the age. Another new element is the influence of a new race. This new cosmopolitan element introduced into Roman literature draws into greater prominence the characteristics of the last great representatives of the genuine Roman and Italian spirit—Tacitus and Juvenal.

This fourth period is itself subdivided into three divisions:—(1) that extending from the accession of Tiberius to the death of Nero, 68—the only important part of it being the Neronian age, 54 to 68; (2) the Flavian era, from the death of Nero to the death of Domitian, 96; (3) the period included in the reigns of Nerva and Trajan and part of the reign of Hadrian.

A high ideal of culture, literary as well as practical, was realized in Germanicus, which seems to have been transmitted to his daughter Agrippina, whose patronage of Seneca had important results in the next generation. A fresh impulse was given to letters on the accession of Nero, and this was partly due to the theatrical and artistic tastes of the young emperor.

Four writers of the Neronian age still possess considerable interest—Seneca, Lucan, Persius, and Petronius. The first three represent the spirit of their age by exhibiting the power of the Stoic philosophy as a moral, political, and religious force; the last is the most cynical exponent of the depravity of the time.

A greater sobriety of tone was introduced both into life and literature with the accession of Vespasian. Under Vespasian Pliny the elder is the most important prose-writer, and Valerius Flaccus, author of the *Argonautica*, the most important among the writers of poetry. The reign of Domitian, although it silenced the more independent spirits of the time, Tacitus and Juvenal, witnessed more important contributions to Roman literature than any age since the Augustan—among them the *Institutes* of Quintilian, the *Punic War* of Silius Italicus, the epics and the *Silvæ* of Statius, and the *Epigrams* of Martial.

But it was under Nerva and Trajan that the greatest and most truly representative works of the empire were written, those which at once present the most impressive spectacle to the imagination and have made its meaning sink most deeply into the heart and conscience of the world. The *Annals* and *Histories* of Tacitus (54–119), with the supplementary *Life of Agricola* and the treatise *On the Manners of the Germans*, and the *Satires* of Juvenal (c. 47–130) have summed up for all aftertimes the moral experience of the Roman world from the accession of Tiberius to the death of Domitian. In them alone among the writers of the empire the spirit of the Roman republic seems to revive. The *Letters* of Pliny (61–c. 115), though they do not contradict the representation of Tacitus and Juvenal regarded as an exposure of the political degradation and moral corruption of prominent individuals and classes, do much to modify the pervadingly tragic and somber character of their representation, and to show that life even in the higher circles of Roman society had still sources of pure enjoyment and well-being. With the death of Juvenal, the most important part of whose activity falls in the reign of Trajan, Roman literature as an original and national expression of the experience, character, and sentiment of the Roman state and empire, as one of the great literatures of the world, may be considered as closed. A kind of archaic revival took place in the reign of Hadrian, which showed itself both in affectation of style and in a renewed interest in the older literature. The most important works of the age succeeding that of Juvenal are the *Biographies* of Suetonius (c. 75–160), which did much to preserve a knowledge of both political and literary history. The writer of most original genius among the successors of Juvenal and Tacitus is probably Apuleius, and his most original work, the *Metamorphoses*, has nothing of Roman or Italian coloring. The last writer who combines genius with something of national spirit is the poet Claudian, who wrote his epics under the immediate inspiring influence of a great national crisis and a national hero. As fresh blood came to the nearly exhausted literary genius of Italy from Spain in the first century of the empire, so in the later centuries it came from Africa. Whatever of original literary force appears either in the pagan or Christian literature written in the Latin language between the second and the sixth century is due to Romanized settlements in Africa. We have to remember during all these comparatively barren centuries that secular literature had again found its organ in the Greek language, and that the new spiritual life of the world had come into stern antagonism with many of the most powerful motives of classical poetry.

ROMANS, a town of France, in the department of Drôme, twelve miles northeast of Valence by the rail-



way connecting this town with Grenoble, stands at the foot of an eminence on the right bank of the Isère, 530 feet above the sea. A fine stone bridge unites it with Bourg du Péage on the other side of the river. Both towns owe their prosperity to their situation in the most fertile part of the valley of the Isère, where land is sometimes sold at \$1,000 per acre. The population of Romans was 11,916 (13,806 in the commune) in 1881, and 15,106 in 1890. Romans has a wealthy hospital and a large seminary. Besides the silk trade the local industries comprise shoemaking, tanning, hat-making, oil-refining, etc.

**ROMANS, EPISTLE TO THE.** The origin of the Christian community at Rome is involved in obscurity. According to Catholic tradition it was founded by Peter, who was its bishop for a quarter of a century. But neither allegation has historical support. The most striking proof of the contrary is precisely this epistle of Paul. After the conquest of Jerusalem by Pompey (63 B.C.) numbers of Jewish prisoners of war were brought to Rome and there sold as slaves. Of these many were soon afterward emancipated by their masters, Jewish slaves being a peculiarly inconvenient kind of property on account of the strictness of their observance of their law, especially in the matter of clean and unclean meats (Philo, *Leg ad Caium*, ii. 568, ed. Mangey). These freedmen became the nucleus of a Jewish community, which ultimately settled in Trastevere and organized itself into an independent religious communion.

From the midst of this Jewish community it was that the Christian congregation doubtless arose.

If the foregoing suppositions are correct, Paul's epistle to the church at Rome was written some six or eight years after its formation. The purpose of the epistle, to speak generally, was to secure a connection with the community at Rome, to gain it for himself and the gospel he carried.

Paul was afraid that the Judaizers who had wrought with such effect within the churches founded by himself in Galatia and Corinth might also lay hold on that at Rome. Perhaps they had already arrived there and the apostle knew it. At all events he perceived a threatening danger. He was unwilling to delay until he could visit the church personally, and accordingly sent forth with an elaborate document in establishment and vindication of the gospel as free from the law, so that the Roman Christians might be confirmed in their free practice and might be strengthened to withstand the agitations of Judaizers. This is the explanation of the fact that a letter addressed to a Gentile Christian church, not in bondage to the law, is yet almost entirely devoted to the refutation of the Judaistic positions. The genuineness of the epistle is practically undisputed.

The more recent literature relating to the Epistle to the Romans has been fully catalogued and discussed in the work of Grafe (*Ueber Veranlassung u. Zweck des Römerbriefes*, Tübingen, 1881). The most important works in the list have already been named in the present article.

**ROMANUS I.** (Lecapenus), who shared the imperial throne with CONSTANTINE VII. (*q.v.*) and exercised all the real power from 919 to 944, was admiral of the Byzantine fleet on the Danube when, hearing of the defeat of the army at Achelous (August 17, 917), he resolved to sail for Constantinople. Popular caprice as well as his influence over his sailors aided his ambition, and, after the marriage of his daughter Helena to Constantine, he was first proclaimed "basileopater" in April, 919, and afterward crowned colleague of his son-in-law on December 17th of the same year. His reign,

which was undistinguished and uneventful, was terminated by his own sons Stephen and Constantine, who in 944 carried him off to the island of Prote and compelled him to become a monk. He died in 948.

**ROMANUS II.**, emperor of the East, succeeded his father Constantine VII. in 959 at the age of twenty-one, and died—poisoned, it was believed, by his wife, Theophano—in 963. He was a pleasure-loving sovereign, but showed judgment in the selection of his ministers. The great event of his reign was the conquest of Crete by Nicephorus Phocas.

**ROMANUS III.** (Argyrus), emperor of the East, was an accomplished but otherwise undistinguished member of the Byzantine aristocracy when, summoned to the palace of the dying Constantine VIII., he was informed that he had been selected to marry one of the imperial princesses and succeed the emperor. His hesitation as already a married man was removed by his wife, who generously took the veil; and his union with Zoe and their joint coronation were celebrated on November 19, 1028. Two days later Constantine died. A serious defeat which Romanus sustained in person at Azaz in Syria, when marching to take possession of Aleppo, considerably impaired the popularity among his subjects which he had sought to purchase by lavish concession to various classes, and soon afterward he began to show symptoms of disease, attributed by many to slow poison administered by connivance of the empress. His death took place on April 11, 1034, and he was forthwith succeeded by MICHAEL IV., (*q.v.*)

**ROMANUS IV.** (Diogenes), emperor of the East from 1068 to 1071, was a member of a distinguished Cappadocian family and had risen to distinction in the army when he was convicted of treason against the sons of Constantine X. While waiting execution, he was summoned into the presence of their mother, Eudocia Macrembolitissa, the empress regent, whom he so fascinated that she granted him a free pardon and shortly afterward married him. Taking the field soon after his coronation, he carried on three campaigns against the Saracens and the Seljuk Turks without achieving any decisive success, and in a fourth he was disastrously defeated by Alp Arslan on the banks of the Araxes and taken prisoner. Released from captivity after promising to pay a large ransom and concluding a treaty of peace, he returned homeward only to find revolution in full flood, and after a second defeat of his arms by the troops of Michael VII. he was compelled to resign the empire and retire to the island of Prote, where he soon died in great misery. It was during this reign that by the surrender of Bari (April 15, 1071), the Byzantine empire lost its last hold upon Italy.

**ROMAN WALL.** See ANTONINUS, WALL OF, and HADRIAN, WALL OF.

**ROME, MODERN.** Modern Rome occupies the plain on each side of the Tiber and the slopes of the seven hills. Its geographical position at the observatory of the Collegio Romano is latitude 41° 53' 52" N., longitude 12° 28' 40" E., and its height above the level of the sea, on the Tiber under the Ælian bridge, is twenty feet. The population in 1881 was 272,010 (Commune in 1881, 300,467). The members of religious orders in Rome were 7,400, including thirty cardinals, thirty-five bishops, 2,832 monks and 2,215 nuns. It contained 4,650 Jewish residents, still compelled to inhabit a particular quarter called the Ghetto. Within the last ten years there has been a considerable increase in the population, which was returned in May, 1891, at 355,000.

The city is built on marshy ground and is divided by the Tiber into two very unequal parts, that on the left bank being Rome proper, and that on the right bank

being the Leonine City, or Trastevere. The walls, twelve miles in circuit and containing sixteen gates, of which four are built up, inclose a space of which little more than one-third is inhabited, the greater part to the south of the Capitol being cultivated as gardens or vineyards. The site of the ancient Campus Martius constitutes the lower and most densely-populated part of the town, in which all the trade is carried on. Its central part is crossed by the Corso, a street about one mile long, and running from the Piazza del Popolo, or great northern entrance of Rome, to the Palazzo di Venezia, at the foot of the Capitol. From the Piazza del Popolo, a handsome open space, with an obelisk from the Temple of the Sun at Heliopolis in the middle, branch out to the right and left of the Corso, the Piazza di Spagna, the favorite quarter of foreigners, and the Ripetta. More than half way up the Corso, and to the right, runs the wide street or Strada del Gesù, leading to the noble church and convent of that name, the chief residence of the order of the Jesuits. On either side of the Corso the buildings are regular and substantial and consist of palaces, such as the Borghese, the Rūspoli, the Ghigi, and others, besides many churches. Between the Corso and the Tiber to the west, the streets are irregular, densely peopled with inferior tradesmen, and consisting mainly of market places, shops, and dwellings of a low class. In this quarter is the university La Sapienza, between which and the Corso is the Rotunda or Pantheon. South of Ponte Sisto, on the left bank of the Tiber and winding around the western base of the Capitol to the foot of the Palatine is the Ghetto, or Jew's quarter, consisting of dirty narrow alleys, with rows of high old houses.

Still further south, and on the left bank of the Tiber, runs a series of narrow streets as far as the Palatine, containing some of the oldest churches in Rome, such as the Santa Maria in Cosmedin, built in the third century. Beyond this extend to the southeast the Aventine, Palatine, and Cœlian hills, which are covered with gardens, vineyards, and orchards, besides churches, convents and ruins. At the eastern extremity of the Cœlian stands the magnificent Basilica of San Giovanni in Laterano (better known as St. John Lateran). To the south of the Aventine, and between it, the river, and the walls, are the Prati del Popolo Romano, forming part of the large space of low lying cultivated ground. Near the Prati lies the Protestant cemetery.

On the slope of the Pincian and Quirinal hills, and covering part of the plateau which joins all the eastern hills of Rome, lies the upper town, consisting mainly of palaces, villas, churches, convents, and other buildings on a large scale. It abounds with ample courts and gardens, and is crossed by two long streets, which intersect each other at right angles on the crest of the Quirinal. The Pincian is laid out in fine walks, which are the favorite promenade of the Romans; while between the Pincian and the Quirinal stands the great Barberini Palace. On the summit of the Quirinal is the famous Pontifical palace and garden, now occupied by the King of Italy; and in the square before the palace are the two colossal statues of Castor and Pollux, with their horses, whence the hill receives its other name of Monte Cavallo. On the Esquiline, which here joins the Quirinal, and forms the eastern extremity of the city, stands the magnificent church of St. Maria Maggiore; beyond it to the north, east and south, the Esquiline is entirely covered with gardens, villas, and fields, with here and there a church. The principal buildings on the Capitol are three palaces, the work of Michael Angelo, which form three sides of a square, in the center of which stands the equestrian statue of M. Aurelius Antoninus. One of the palaces is the Capitoline Museum, one of

the finest collections of statuary and sculpture in Italy.

The third great division of the modern city lies on the right bank of the river and is subdivided into two parts—the Vatican (otherwise called Il Borgo) and the Trastevere. Divided from the latter by an inner wall, the Borgo or Leonine city occupies the space between the bridge of St. Angelo and the Piazza of St. Peter's. Its chief buildings are the palace of the Vatican, and the Basilica of St. Peter's. Besides the Vatican and St. Peter's the Leonine city contains the great hospital of Santo Spirito, which accommodates annually 13,500 patients laboring under all diseases, whether mental or bodily. The Castle of St. Angelo, with its massive circular tower, called from its founder the "Mole of Hadrian," is surrounded with ramparts, ditches, and bastions, mounted with cannon, and forms the citadel of Rome.

To the south of the Borgo, and between the Janiculum and the Tiber is the Trastevere, properly so called. The Janiculum, a straight ridge about a mile and a half long from north to south, rises about 300 feet above the level of the river. The northern half of its length is occupied by a long street called the Lungara, running closely parallel to the Tiber, which at the southern extremity of the Lungara, makes a bend to the east, and bounds the greater part of the Trastevere district. On the Janiculum is the Villa Spada, near the gate, outside of which is the Villa Pamfili, a favorite promenade of the Roman youth. On the same hill, the fountain called L'Acqua Paola, the largest in Rome, occupies a commanding site, and as seen from a distance resembles a triple triumphal arch, through which streams of water rush.

The churches, of which there are upward of three hundred, form a notable feature in art, from their architecture, their paintings, and other decorations. So also do the palaces of the aristocracy, which are often of great magnitude, with vast courts and spacious apartments. Of even better style as residences are the villas, both within and without the walls; while the handsome fountains, of which there are at least twelve principal ones, impart a cheerful and refreshing aspect to the city. There are three modern aqueducts, which keep Rome supplied with an abundance of water; the Acqua Vergine, the Acqua Felice (the ancient Acqua Marcia and Claudia), and the Acqua Paola (the ancient Alsietina).

Rome is, on the whole, a healthy city, except at the close of summer and beginning of autumn, when the malaria is prevalent. The Trastevere is its most uniformly healthy district, the inhabitants of which are superior in physical development to those of the other parts. The neighborhoods of the Pincian and the Quirinal, particularly the former, are most frequented by foreigners. The trade of the city is insignificant, consisting of a few trivial manufactures of hats, silk scarfs, gloves, artificial feathers, false pearls, mosaic trinkets, etc., and such articles as artists need and visitors fancy. The only great manufacture, if it can be so called, is that of pictures, original and copied; for the painting of these, are offered not only the advantage of numerous galleries of art, but purity of sky. The worst feature of Rome was formerly its dirty streets and houses. All this has been changed and nowhere, not even in London or Paris, has the march of improvement been more strongly shown than in Rome within the last decade. After the acquirement of the Eternal City by the Italian government, and its establishment as the capital of united and regenerated Italy, plans were prepared for its enlargement and improvement. These plans contemplated the construction of a magnificent system of boulevards, and the consequent demo-

lition of thousands of old houses and the uprooting of the slums. In dealing with such a city as this it was naturally impossible to improve without also destroying, and many historic landmarks had to give way to the exigencies of modern civilization. Rome has been built and rebuilt, destroyed and restored so often that there is scarcely a square foot of it but is of antiquarian interest. In carrying out the latest plan of improvement a wise conservatism has been exercised, and the result is that while Rome now possesses all the modern advantages of fine streets and rural improvements, the great works of ancient art and architecture which mark her for all time have been brought out in bolder relief and freed from the debasing influence of ignoble and squalid surroundings.

Both the city and the state of Rome are represented in tradition as having been gradually formed by the fusion of separate communities. The original settlement of Romulus is said to have been limited to the Palatine Mount. With this were united before the end of his reign the Capitoline and the Quirinal; Tullus Hostilius added the Cælian, Ancus Martius the Aventine, and finally Servius Tullius included the Esquiline and Viminal, and inclosed the whole seven hills with a stone wall. The growth of the state closely followed that of the city. To the original Romans on the Palatine were added successively the Sabine followers of King Tatius, Albans transplanted by Tullus, Latins by Ancus, and lastly the Etruscan comrades of Cæles Vibenna. The structure of the early Roman state, while it bears evident marks of a fusion of communities, shows no traces of a mixture of race. Nor is it easy to point to any provably Sabine element in the language, religion, or civilization of primitive Rome. The theory of a Sabine conquest can hardly be maintained in the face of the predominantly Latin character of both people and institutions. On the other hand the probability of a Sabine raid and a Sabine settlement, possibly on the Quirinal Hill, in very early times may be admitted.

Such is all we know of the manner in which the separate settlements on the seven hills grew into a single city and community. How long Rome took in the making, or when or by whom the work was completed, we cannot say. Nor is it possible to give more than a very meager outline of the constitution and of the history of the united state in the early days of its existence.

The "populus Romanus" was, we are told, divided into three tribes, Ramnes, Tities and Luceres, and into thirty "curiæ." The three tribes probably represent a primitive clan division, older than the Roman state itself.

At their head was the "rex," the ruler of the united people. The Roman "king" is not simply either the hereditary and patriarchal chief of a clan, the priestly head of a community bound together by common sacra, or the elected magistrate of a state, but a mixture of all three.

By the side of the king stood the senate or council of elders. In the descriptions left us of the primitive senate, as in those of the "rex," we can discover traces of a transition from an earlier state of things when Rome was only an assemblage of clans or village communities, allied, indeed, but each still ruled by its own chiefs and headmen, to one in which these groups have been fused into a single state under a common ruler.

The popular assembly of united Rome in its earliest days was that in which the freemen met and voted by their *curiæ* (*comitia curiata*). The assembly met in the *comitium* at the northeast end of the forum, at the summons and under the presidency of the king, or, failing him, of the "interrex." By the "rex" or "interrex" the question was put, and the voting took place "*curiatim*," the *curiæ* being called up in turn.

The vote of each *curiæ* was decided by the majority of individual votes, and a majority of the votes of the *curiæ* determined the final result. But the occasions on which the assembly could exercise its power must have been few.

A history of this early Roman state is out of the question. The names, dates and achievements of the first four kings are all too unsubstantial to form the basis of a sober narrative; a few points only can be considered as fairly well established. If we except the long eventless reign ascribed to King Numa, tradition represents the first kings as incessantly at war with their immediate neighbors. The details of these wars are no doubt mythical; but the implied condition of continual struggle, and the narrow range within which the struggle is confined, may be accepted as true. The picture drawn is that of a small community with a few square miles of territory, at deadly feud with its nearest neighbors, within a radius of some twelve miles round Rome. Nor, in spite of the repeated victories with which tradition credits Romulus, Ancus and Tullus, does there seem to have been any real extension of Roman territory except toward the sea.

With the reign of the fifth king, Tarquinius Priscus, a marked change takes place. The traditional accounts of the last three kings not only wear a more historical air than those of the first four, but they describe something like a transformation of the Roman city and state. Under the rule of these latter kings the separate settlements are for the first time inclosed with a rampart of colossal size and extent. The low grounds are drained, and a forum and circus elaborately laid out; on the Capitoline Mount a temple is erected, the massive foundations of which were an object of wonder even to Pliny. To the same period are assigned the redivision of the city area into four new districts and the introduction of a new military system. The kings increase in power and surround themselves with new splendor. Abroad, too, Rome suddenly appears as a powerful state ruling far and wide over southern Etruria and Latium. These startling changes are, moreover, ascribed to kings of alien descent, who one and all ascend the throne in the teeth of established constitutional forms. Finally, with the expulsion of the last of them—the young Tarquin—comes a sudden shrinkage of power. At the commencement of the republic Rome is once more a comparatively small state, with hostile and independent neighbors at her very doors.

The Etruscan princes are represented, not only as having raised Rome for the time to a commanding position in Latium and lavished upon the city itself the resources of Etruscan civilization, but also as the authors of important internal changes. They are represented as favoring new men at the expense of the old patrician families, and as reorganizing the Roman army on a new footing. From among the leading families of the conquered Latin states a hundred new members were admitted to the senate and these *gentes* thenceforth ranked as patrician, and became known as "*gentes minores*." The changes in the army, begun, it is said, by the elder Tarquin and completed by Servius Tullius, were more important.

The entire available body of freeholders was divided into two equal portions, a reserve corps of "*seniores*" and a corps of "*juniores*" for active service. Each of these corps consisted of eighty-five centuries or 8,500 men, *i. e.*, of two legions of about 4,200 men each, the normal strength of a consular legion under the early republic. The four "tribes," also instituted by Servius, were probably intended to serve as the basis for the levy of freeholders for the new army. As their names show, they correspond with the

natural local divisions of the city territory, but that they included freeholders residing on Roman territory but outside Rome is indicated by the fact that both Ostia and Alba belonged to the Palatine tribe.

The last of these Etruscan lords to rule in Rome was Tarquin the Proud. He is described as a splendid and despotic monarch. His sway extended over Latium as far south as Circeii. Aristodemus, tyrant of Cumæ, was his ally, and kinsmen of his own were princes at Collatia, at Gabii, and at Tusculum. The Volscian highlanders were chastised, and Signia with its massive walls was built to hold them in check. In Rome itself the Capitoline temple and the great cloaca bore witness to his power. But his rule pressed heavily upon the Romans, and at the last, on the news of the foul wrong done by his son Sextus to a noble Roman matron, Lucretia, the indignant people rose in revolt. Tarquin, who was away besieging Ardea, was deposed; sentence of exile was passed upon him and upon all his race; and the people swore that never again should a king rule in Rome. Freed from the tyrant, they chose for themselves two yearly magistrates who should exercise the supreme authority, and thus the republic of Rome was founded. Three times the banished Tarquin strove desperately to recover the throne he had lost. First of all the men of Veii and Tarquinii marched to his aid, but were defeated in a pitched battle on the Roman frontier. A year later Lars Porsena, prince of Clusium, at the head of all the powers of Etruria, appeared before the gates of Rome, and closely besieged the city, until, moved by the valor of his foe, he granted honorable terms of peace and withdrew. Once again, by Lake Regillus, the Romans fought victoriously for their liberty against Tarquin's son-in-law Mamilius, prince of Tusculum, and chief of the Latin name. Mamilius was slain; Tarquin in despair found a refuge at Cumæ, and there soon afterward died.

So, in brief, ran the story of the flight of the kings, as it was told by the chroniclers whom Livy followed. Its details are most of them fabulous; it is crowded with inconsistencies and improbabilities; there are no trustworthy dates; the names even of the chief actors are probably fictitious, and the hand of the improver, Greek or Roman, is traceable throughout. The struggle was doubtless longer and sharper, and the new constitution more gradually shaped, than tradition would have us believe. Possibly, too, this revolution in Rome was but a part of a widespread wave of change in Latium and central Italy, similar to that which in Greece swept away the old heroic monarchies. But there is no room for doubting the main facts of the emancipation of Rome from the rule of alien princes and the final abolition of the kingly office.

PERIOD I. 509-265 B.C.—(a) *The Struggle between the Orders.*—It is characteristic of Rome that the change from monarchy to republic should have been made with the least possible disturbance of existing forms. The title of king was retained, though only as that of a priestly officer (*rex sacrorum*) to whom some of the religious functions of the former kings were transferred. The two annually elected consuls, or "praetores," were regarded as joint heirs of the full kingly authority, and as holding the "imperium," and the correlative right of auspices, by direct transmission from the founder of the city. The revolution which expelled the Tarquins gave the patricians, who had mainly assisted in bringing it about, an overwhelming ascendancy in the state. The plebs had indeed gained something. Not only is it probable that the strictness of the old tie of clientship had somewhat relaxed, and that the number of the "clientes" was smaller and their dependence on patrician patrons less complete, but the

ranks of the plebs had, under the later kings, been swelled by the admission of conquered Latins, and the freeholders among these had with others been enrolled in the Servian tribes, classes, and centuries. The establishment of the republic invested this military levy of freeholders with political rights as an assembly, for by their votes the consuls were chosen and laws passed, and it was the plebeian freeholders who formed the main strength of the plebs in the struggle that followed. But these gains were greater in appearance than in reality.

It was by their own efforts that the plebeians first obtained any real protection against magisterial despotism. The traditional accounts of the first secession are confused and contradictory, but its causes and results are tolerably clear. The seceders were the plebeian legionaries recently returned from a victorious campaign. Indignant at the delay of the promised reforms, they ignored the order given them to march afresh against Volsci and Æqui, and instead intrenched themselves on a hill across the Anio, some three miles from Rome, and known afterward as the Mons Sacer. The frightened patricians came to terms, and a solemn agreement (*lex sacrata*) was concluded between the orders, by which it was provided that henceforth the plebeians should have annual magistrates of their own (*tribuni plebis*), members of their own order, who should be authorized to protect them against the consuls, and a curse was invoked upon the man who should injure or impede the tribune in the performance of his duties. The number of tribunes was at first two, then five, and before 449 B.C. it had been raised to ten.

But from the first the tribunes were for the plebs not only protectors but leaders, under whom they organized themselves in opposition to the patricians. The tribunes convened assemblies of the plebs (*concilia plebis*), and carried resolutions on questions of interest to the order. This incipient plebeian organization was materially advanced by the Publilian law of 471 B.C., which appears to have formally recognized as lawful the plebeian *concilia*, and established also the tribune's right "cum plebe agere," *i.e.*, to propose and carry resolutions in them. These assemblies were "tributa," or, in other words, the voting in them took place not by curies or centuries but by tribes. In them, lastly, after the Publilian law, if not before, the tribunes were annually elected. By this law the foundations were laid both of the powerful "comitia tributa" of later days and also of the legislative and judicial prerogatives of the tribunes. The patricians maintained indeed that resolutions (*plebiscita*) carried by tribunes in the *concilia plebis* were not binding on their order, but the moral weight of such resolutions, whether they affirmed a general principle or pronounced sentence of condemnation on some single patrician was no doubt considerable.

It is at any rate certain that the passing of the Publilian law was followed by increased activity on the part of the tribunes. The attack on the consular authority was continued, and combined with it we have a persistent effort made to secure for the plebs their fair share of the common lands of the state (*agri publici*). The main object, however, of this early agrarian agitation was not economic but political. Membership in a tribe was now more than ever important for a plebeian, as giving a vote not only in the *comitia centuriata* but also in the plebeian "concilia," and membership in a tribe was possible as yet only for freeholders. To increase the number of freeholders became therefore a matter of importance, and the simplest mode of increasing the number of freeholders was for the state to create freeholds on the common lands. But such a policy met with bitter opposition from the patricians, who had long en-

joyed a virtual monopoly of these lands, and had excluded the plebeians even from those more recently acquired tracts which they had helped to win by their swords. Against this patrician monopoly the tribunes unceasingly protested from a few years after the first secession down to 465 B.C. In that year a compromise was effected by the colonization of Antium, which had been taken the year before, and the plebeians obtained land without any disturbance of patrician occupiers. Eleven years later the common lands on the Aventine were reclaimed and assigned to plebeians by a *lex Icilia*.

But this agrarian agitation, though destined subsequently to play an important part in the history, was for the time far less fruitful in results than that which was directed against the consular authority.

The proposal of C. Terentilius Arsa (460 B.C.) to appoint a plebeian commission to draw up laws restricting the powers of the consuls was resolutely opposed by the patricians, but after ten years of bitter party strife a compromise was effected. A commission of ten patricians was appointed, who should frame and publish a code of law binding equally on both the orders. These decemviri were to be the sole and supreme magistrates for the year, and the law of appeal was suspended in their favor. The code which they promulgated, the famous XII. Tables, owed little of its importance to any novelties or improvements contained in its provisions. For the most part it seems merely to have reaffirmed existing usages and laws. But it substituted a public, written law, binding on all citizens of Rome, for an unwritten usage, the knowledge of which was confined to a few patricians, and which had been administered by this minority in their own interest. We are told of a second secession of the plebs, this time to the Janiculum, and of negotiations with the senate, the result of which was the enforced abdication of the decemvirs. The plebs joyfully chose for themselves tribunes, and in the *comitia centuriata* two consuls were created. But this restoration of the old regime was accompanied by legislation which made it an important crisis in the history of the struggle between the orders. With the fall of the decemvirate this struggle enters upon a new phase. The tribunes appear as at once more powerful and more strictly constitutional magistrates; the plebeian "*concilia*" take their place as formal *comitia* by the side of the older assemblies; and finally this improved machinery is used not simply in self-defense against patrician oppression but to obtain complete political equality. This change was no doubt due in part to circumstances outside legislation, above all to the expansion of the Roman state, which swelled the numbers and added to the social importance of the plebs as compared with the dwindling forces of the close corporation of patrician *gentes*. Still the legislation of 449 clearly involved more than a restoration of the old form of government. The Valerio-Horatian laws, besides reaffirming the right of appeal and the inviolability of the tribunes, improved the condition of the plebeian assemblies by enacting that "*plebiscita*" passed in them, and, as seems probable approved by the *patres*, should be binding on patricians as well as plebeians. By this law the tribunes obtained a recognized initiative in legislation. Henceforth the desired reforms were introduced and carried by tribunes in what were now styled "*comitia tributa*," and, if sanctioned by the *patres*, became laws of the State. From this period, too, must be dated the legalization, at any rate, of the tribune's right to impeach any citizen before the assembly of the tribes. Henceforward there is no question of the tribune's right to propose to the plebs to impose a fine, or of the validity of the sentence when passed. The efficiency of these new weapons of attack was

amply proved by the subsequent course of the struggle. Only a few years after the Valerio-Horatian legislation came the *lex Canuleia* (445 B.C.), by which mixed marriages between patricians and plebeians were declared lawful, and the social exclusiveness of the patriciate broken down. In the same year with this measure, and like it in the interest primarily of the wealthier plebeians, a vigorous attack commenced on the patrician monopoly of the consulate, and round this stronghold of patrician ascendancy the conflict raged until the passing of the Licinian laws in 367. The original proposal of Canuleius in 445 that the people should be allowed to elect a plebeian consul was evaded by a compromise. The senate resolved that for the next year, in the stead of consuls, six military tribunes, with consular powers, should be elected, and that the new office should be open to patricians and plebeians alike. The consulship was thus for the time saved from pollution, as the patricians phrased it, but the growing strength of the plebs is shown by the fact that in fifty years out of the seventy-eight between 444 and 366 they succeeded in obtaining the election of consular tribunes rather than of consuls. A good omen for their ultimate success was a victory they won in connection with the inferior office of the *quæstorship*. Down to the time of the decemvirate the *quæstors* had been nominated by the consuls, but in 447 their appointment was transferred to the plebeian "*comitia tributa*," and in 421 a plebeian first became eligible to the office. Despite, however, these discouragements, the patricians fought on. Each year they strove to secure the creation of consuls rather than consular tribunes, and failing this, strained every nerve to secure for their own order at least a majority among the latter. Even the institution of the censorship (435), though rendered desirable by the increasing importance and complexity of the census, was, it is probable, due in part to their desire to discount beforehand the threatened loss of the consulship by diminishing its powers. Other causes, too, helped to protract the struggle. Between the wealthier plebeians, who were ambitious of high office, and the poorer, whose minds were set rather on allotments of land, there was a division of interest of which the patricians were not slow to take advantage, and to this must be added the pressure of war. The death struggle with Veii and the sack of Rome by the Gauls absorbed for the time all the energies of the community. In 377, however, two of the tribunes, C. Licinius Stolo and L. Sextius, came forward with proposals which united all sections of the plebs in their support. Their proposals were as follows:—(1) that consuls and not consular tribunes be elected; (2) that one consul at least should be a plebeian; (3) that the priestly college, which had the charge of the Sibylline books, should consist of ten members instead of two, and that of these half should be plebeians; (4) that no single citizen should hold in occupation more than 500 acres of the common lands, or pasture upon them more than 100 head of cattle and 500 sheep; (5) that all landowners should employ a certain amount of free as well as slave labor on their estates; (6) that interest already paid on debts should be deducted from the principal, and the remainder paid off in three years. The three last proposals were obviously intended to meet the demands of the poorer plebeians, and to secure their support for the first half of the scheme. Ten years of bitter conflict followed, but at last, in 367 B.C., the Licinian rogations became law, and one of their authors, L. Sextius, was created the first plebeian consul. For the moment it was some consolation to the patricians that they not only succeeded in detaching from the consulship the administration of civil law,

which was intrusted to a separate officer, "praetor urbanus," to be elected by the comitia of the centuries, with an understanding apparently that he should be a patrician, but also obtained the institution of two additional aediles ("aediles curules"), who were in like manner to be members of their own order. With the opening of the consulship, however, the issue of the long contest was virtually decided, and the next eighty years witnessed a rapid succession of plebeian victories. Now that a plebeian consul might preside at the elections, the main difficulty in the way of the nomination and election of plebeian candidates was removed. The proposed patrician monopoly of the new curule aedileship was almost instantly abandoned. In 356 the first plebeian was made dictator, in 350 the censorship and in 337 the praetorship were filled for the first time by plebeians, and lastly, in 300, by the lex Ogulnia, even the sacred colleges of the pontiffs and augurs, the old strongholds of patrician supremacy, were thrown open to the plebs. The patricians lost also the control they had exercised so long over the action of the people in assembly. The "patrum auctoritas," the sanction given or refused by the patrician senators to laws and to elections, had hitherto been a powerful weapon in their hands. But in 339 a law of Q. Publilius Philo, a plebeian dictator, enacted that this sanction should be given beforehand to all laws; and by a lex Maenia, carried apparently some fifty years later, the same rule was extended to elections. Henceforward the "patrum auctoritas" sank into a meaningless form, though as such it still survived in the time of Livy. A second Publilian law affirmed afresh the validity of "plebiscita," *i.e.*, of measures carried in the plebeian comitia tributa. Apparently, however, their validity was still left subject to some conditions, for in 287 a lex Hortensia, carried by another plebeian dictator, was found necessary finally to settle the question. From 287 onward it is certain that measures passed by the plebs, voting by their tribes, had the full force of laws without any further conditions whatsoever. The legislative independence of the plebeian assembly was secured, and with this crowning victory ended the long struggle between the orders.

(b) *Conquest of Italy.*—Twelve years after the passing of the lex Hortensia, King Pyrrhus, beaten at Beneventum, withdrew from Italy, and Rome was left mistress of the peninsula.

Before this date the city had been in a state of continual warfare with first one and then another alien enemy. She had also acquired new domain by sending out colonies. Her wars with the Sabines continued after the expulsion of the Tarquins, but at the same time she formed an alliance with the Latins and the Hancians, and thus assured her first success from this period. This alliance lasted over one hundred years—till the outbreak of the Latin war. The Aequi and Volsci were also in turn engaged in wars with the republic, and were not fully conquered till after 390 B.C. Veii was captured by the Romans in 396, thus giving to the republic the mastery of Etruria as far as the Ciminian forest. But not long after this she received a severe setback in the shape of the capture and sack of the city by the Gauls. But she soon recovered from the shock, and in 353 she had completed the subjugation of Etruria. In 343 the first Samnite war broke out and lasted two years. This was followed by the Latin war, which was promptly and successfully brought to an end in two campaigns. In 327 the second Samnite war broke out, and lasted twenty-two years, being ended by a treaty between the two states. Meantime Rome had been steadily augmenting her territory by annexing the lands of her weaker neighbors. The peace with the Samnites lasted

only six years; the third war lasted eight years, and ended by the formation of an alliance between the two states. The next war was with Pyrrhus, which resulted as above stated, and left the republic mistress of the peninsula.

A few years later (272) Tarentum was surrendered to Rome by its Epirot garrison; it was granted a treaty of alliance, but its walls were razed and its fleet handed over to Rome. In 270 Rhegium also entered the ranks of Roman allies, and finally in 269 a single campaign crushed the last efforts at resistance in Samnium. Rome was now at leisure to consolidate the position she had won. Between 273 and 263 three new colonies were founded in Samnium and Lucania—Pæstum in 273, Beneventum in 268, Æsernia in 263. In central Italy the area of Roman territory was increased by the full enfranchisement (268) of the Sabines, and of their neighbors to the east, the Picentes. To guard the Adriatic coast colonies were established at Ariminum (268), at Firmum, and at Castrum Novum (264), while to the already numerous maritime colonies was added that of Cosa in Etruria.

Rome was now the undisputed mistress of Italy. The limits of her supremacy to the north were represented roughly by a line drawn across the peninsula from the mouth of the Arno on the west to that of the Æsis on the east. Beyond this line lay the Ligurians and the Celts; all south of it was now united as "Italy" under the rule of Rome.

The administrative needs of this enlarged Rome were obviously such as could not be adequately satisfied by the system which had done well enough for a small city state with a few square miles of territory. The old centralization of all government in Rome itself had become an impossibility, and the Roman statesmen did their best to meet the altered requirements of the time. The urban communities within the Roman pale, colonies and municipia, were allowed a large measure of local self-government. The Roman citizen in a colony or municipium enjoyed of course the right of appeal to the Roman people in a capital case. We may also assume that from the first some limit was placed to the jurisdiction of the local magistrate, and that cases falling outside it came before the central authorities. But an additional safeguard for the equitable and uniform administration of Roman law, in communities to many of which the Roman code was new and unfamiliar, was provided by the institution of prefects ("praefecti iuridicundo"), who were sent out annually, as representatives of the Roman praetor, to administer justice in the colonies and municipia. To prefects was, moreover, assigned the charge of those districts within the Roman pale where no urban communities, and consequently no organized local government, existed. In these two institutions, that of municipal government and that of prefectures, we have already two of the cardinal points of the later imperial system of government.

PERIOD II. ROME AND THE MEDITERRANEAN STATES, 265-146 B.C.—(a) *Conquest of the West.*—Though marked out by her geographical position as the natural center of the Mediterranean, Italy had hitherto played no active part in Mediterranean politics, but now that she was for the first time united, it was felt throughout the Mediterranean world that a new power had arisen, and Rome, as the head and representative of Italy, found herself irresistibly drawn into the vortex of Mediterranean affairs. With those of the eastern Mediterranean indeed she was not immediately called upon to concern herself. Her repulse of Pyrrhus, and the news that the Greek cities of South Italy had acknowledged her suzerainty, had, it is true, suddenly

revealed to the Eastern world the existence of a powerful Italian state. Egypt sought her alliance, and Greek scholars began to interest themselves keenly in the history, constitution, and character of the Latin republic which had so suddenly become famous. But this was all, and not until fifty years after the retreat of Pyrrhus did Rome seriously turn her attention eastward. Westward of Italy the case was different. The western coasts of the peninsula were the most fertile and populous and wealthy, and it was westward rather than eastward that the natural openings for Italian commerce were to be found. But it was precisely on this side that Rome had serious ground for anxiety. Carthage was now at the height of her power. Her outposts were threateningly near to Italy in Sardinia and in Sicily, while her fleets swept the seas and jealously guarded for the benefit of Carthage alone the hidden treasures of the west.

It was above all things essential for Rome that the Carthaginians should advance no farther eastward. But already in 272 Tarentum had almost fallen into their grasp, and seven years later Rome was threatened with a danger at least as serious, the establishment of Carthaginian rule in the east of Sicily, and within sight of the Italian coast. In 265 a body of Campanian mercenaries, who had seized Messana, found themselves hard pressed by Hiero, king of Syracuse. One party among them appealed for aid to Carthage. The Carthaginians readily responded, and a Carthaginian garrison occupied the citadel of Messana. But at Messana, as once at Tarentum, there were others who turned to Rome, and, as Italians themselves, implored the aid of the great Italian republic, offering in return to place Messana under the suzerainty of Rome. The Roman assembly voted that assistance should be sent to the Mamertines, and in 264 the Roman legions for the first time crossed the sea. Messana was occupied, and, after sustaining a defeat, the Carthaginians and Syracusans were forced to raise the siege and withdraw. The opening years of the war which was thus begun gave little promise of the length of the struggle. In the spring of 260 the first regular Roman fleet consisting of one hundred quinqueremes and twenty triremes set sail; and the brilliant naval victory of Mylæ, won by the consul C. Duilius in the same year, seemed to promise the Romans as much success by sea as they had won by land. But the promise was not fulfilled; and in 256 the senate, impatient of the slow progress made in Sicily, determined on boldly invading Africa. It was a policy for which, if Africa were once reached, the defenseless state of the Carthaginian territories, the doubtful loyalty of her Libyan subjects, and the unwarlike habits of her own citizens, gave every hope of success, and, but for the blunders of the Romans themselves, it might have succeeded now as it did fifty years later. The passage to Africa was opened by the defeat of the Carthaginian fleet of Ecnomus; the two consuls, L. Manlius Vulso and M. Atilius Regulus, landed in safety and rapidly overran the country. But these successes led the senate, at the close of the summer, into committing the serious blunder of recalling one of the consuls, Manlius, with a large portion of the troops. The rashness and overconfidence of Regulus aggravated the effects of the senate's action. Emboldened by further successes, and notwithstanding his diminished forces, he met the Carthaginian proposals for peace by terms so harsh that the latter, though the Romans were almost at their gates, their soldiers disheartened, and the nomad tribes swarming on their frontiers, indignantly broke off the negotiations and prepared to resist to the last. At this crisis, so the story runs, the arrival of Xanthippus, a Spartan soldier of fortune, changed the face of affairs,

as that of Gylippus had formerly done at Syracuse. His superior military skill remedied the blunders of the Carthaginian generals; confidence was restored; and in 255 he triumphantly routed the Roman forces a few miles outside the city. Regulus was taken prisoner; and only a miserable remnant of 2,000 men escaped to the Roman camp on the coast. Here they were rescued by a Roman fleet, but their ill-fortune pursued them. On its way home the fleet was wrecked, and all but eighty vessels out of a total of 364 were lost.

Still, though abandoning all thoughts of invading Africa, the Romans were unwilling to renounce all thoughts of facing their enemy on the sea. But fresh disasters followed. Disheartened by these repeated disasters, the senate resolved to trust only to the legions, and by sheer force of perseverance slowly to force the enemy out of the few positions to which he still clung in Sicily. But, though for five years (248-243) no fresh naval operations were attempted, no compensating success by land followed. Hamilcar Barca, the new Carthaginian commander, not only ravaged with his fleet the coasts of Italy, but from his impregnable position at Ercte incessantly harassed the Roman troops in the west of the island, and even recaptured Eryx. Convinced once more of the impossibility of driving the Carthaginians out of Sicily as long as their navy swept the seas, the Romans determined on a final effort. The treasury was empty; but by the liberal contributions of private citizens a fleet was equipped, and C. Lutatius Catulus, consul for 242, started for Sicily early in the summer of that year with 200 quinqueremes. From Drepana, whither he had gone to aid in the blockade, he sailed out to meet a Carthaginian fleet, dispatched from Africa against him; and a battle took place at the Ægates islands, some twenty miles from the Sicilian coast, in which Catulus completely defeated his enemy. The end of the long struggle had come at last. The Carthaginian Government, despairing of being able to send further aid to their troops in Sicily, authorized Hamilcar to treat for peace. His proposals were accepted by Catulus, and the terms agreed upon between them were confirmed in all essential points by the commissioners sent out from Rome. The Carthaginians agreed to evacuate Sicily and the adjoining islands, to restore all prisoners, and to pay an indemnity of 2,300 talents. In its duration and its severity the First Punic War is justly ranked by Polybius above all other wars of his own and preceding times, though neither in the military talent displayed nor in the importance of its results can it be compared with the war that followed. The interval between the First and Second Punic Wars was employed by both Rome and Carthage in strengthening their respective positions.

A second war with Carthage was no unlooked-for event at Rome; but the senate seems to have confidently expected that it would be waged at a distance from Italy—in Africa and in Spain, where Saguntum would have given them a convenient point of support; and to this hope they clung even after Saguntum was lost. In 218, the first year of the war, one consul, P. Cornelius Scipio, was dispatched to Spain, and the other, T. Sempronius Gracchus, to Sicily, and thence to Africa. But Hannibal's secrecy and promptitude baffled all their calculations. Leaving New Carthage early in 218, in the space of five months he crossed the Pyrenees, reached the Rhone just as Scipio arrived at Massilia on his way to Spain, passed the Alps in spite of endless difficulties and hardships, and startled Italy by descending into the plains of Cisalpine Gaul. In two battles on the Ticinus and the Trebia he defeated the forces hastily collected to bar his progress southward; the Celtic tribes rallied to his standard; and at the be-

ginning of the next year he prepared to realize the dream of his life and carry fire and sword into Italy itself. His own force numbered 26,000 men; the total available strength of Rome and her allies was estimated at over 700,000. But Hannibal's hope lay in the possibility that by the rapidity of his movements he might be able to strike a decisive blow before Rome could mobilize her levies, or get her somewhat cumbrous military machinery into working order. From a first success he expected no less a result than the breakup of the Roman confederacy, and the isolation of Rome herself, while it would also increase the readiness of his own government to render him effective support. His trust in himself and his army was not misplaced, for to the last he had the advantage over the Roman legions wherever he met them in person. Except, however, in South Italy, his brilliant victories and dashing marches brought him no allies, and it was his inability to shake the loyalty of northern and central Italy and of the Latin colonies everywhere, even more than the indomitable perseverance of Rome and the supineness of Carthage which caused his ultimate failure.

In the spring of 217 Hannibal crossed the Apennines and marched southward through the lowlands of eastern Etruria, the route taken before him by the Celtic hordes. In April he annihilated Flaminius and his army at the Trasimene Lake, and pushed on to Spolegium, only a few days' march from Rome. But Rome was not yet his goal; from Spolegium, which had closed its gates against him, he moved rapidly eastward, ravaging the territories of Roman allies as he went, till he reached the Adriatic and the fertile lands of northern Apulia, where supplies and especially remounts for his Numidian cavalry were plentiful, and communication with Carthage easy, and where, moreover, he was well placed for testing the fidelity of the most recent and the least trustworthy of the Italian allies of Rome. A second victory here, on the scale of that at the Trasimene Lake, might be the signal for a general revolt against Roman rule. It was not, however, until the summer of the next year that his opportunity came. The patient tactics of Q. Fabius Cunctator had become unpopular at Rome; and the consuls of 216, L. Æmilius Paulus and M. Terentius Varro, took the field in Apulia, at the head of a larger force than Rome had yet raised, and with orders to fight and crush the daring invader. The result realized for the moment Hannibal's highest hopes. The Roman army was annihilated at Cannæ; and South Italy, with the exception of the Latin colonies and the Greek cities on the coast, came over to his side. Nor did the Roman misfortunes end here. Philip of Macedon concluded an alliance with Hannibal (215), and threatened an invasion of Italy. In the very next year Syracuse, no longer ruled by the faithful Hiero, revolted, and a Carthaginian force landed in Sicily; lastly, in 212 came the loss of the Greek cities on the south coast. But the truth of Polybius' remark that the Romans are most to be feared when their danger is greatest was never better illustrated than by their conduct in the face of these accumulated disasters. Patiently and undauntedly they set themselves to regain the ground they had lost. Philip of Macedon was first of all forced to retire from the allied city of Apollonia which he had attacked (214), and then effectually diverted from all thoughts of an attack on Italy, by the formation of a coalition against him in Greece itself (211); Syracuse was recaptured in 212, after a lengthy siege, and Roman authority reestablished in Sicily. In Italy itself the Roman commanders took advantage of Hannibal's absence in the extreme south to reconquer northern Apulia; but their main efforts were directed to the recovery of Campania, and above all of Capua.

The imminent danger of Capua, which he had named as the successor of Rome in the headship of Italy, recalled Hannibal from the south, where he was besieging a Roman garrison in the citadel of Tarentum. Failing to break through the lines which inclosed it, he resolved, as a last hope of diverting the Roman legions from the devoted city, to advance on Rome itself. But his march, deeply as it impressed the imagination of his contemporaries by its audacity and promptitude, was without result. Silently and rapidly he moved along the course of the Latin Way, through the heart of the territory of Rome, to within three miles of the city, and even rode up with his advanced guard to the Colline gate. Yet no ally joined him; no Roman force was recalled to face him; no proposals for peace reached his camp; and, overcome, it is said, by the unmoved confidence of his foe, he withdrew, as silently and rapidly as he had advanced, to his headquarters in the south. The fall of Capua followed inevitably (211), and the Roman senate saw with relief the seat of war removed to Lucania and Bruttium, and a prospect opening of some relief from the exhausting exertions of the last five years. Their hopes were quickly dashed to the ground. The faithful Massiliots sent word that Hasdrubal, beaten in Spain, was marching to join Hannibal in Italy. The anxiety at Rome was intense, and every nerve was strained to prevent the junction of the two brothers. Equally great was the relief when the news arrived that the bold march of the consul Claudius had succeeded, and that Hasdrubal had been defeated and slain on the river Metaurus (207). The war in Italy was now virtually ended, for, though during four years more Hannibal stood at bay in a corner of Bruttium, he was powerless to prevent the restoration of Roman authority throughout the peninsula. Sicily was once more secure; and finally in 206, the year after the victory on the Metaurus, the successes of the young P. Scipio in Spain (211-206) were crowned by the complete expulsion of the Carthaginians from the peninsula. Nothing now remained to Carthage outside Africa but the ground on which Hannibal desperately held out, and popular opinion at Rome warmly supported Scipio when on his return from Spain he eagerly urged an immediate invasion of Africa. The senate hesitated. Many were jealous of Scipio's fame, and resented his scarcely concealed intention of appealing to the people, should the senate decline his proposals. Others, like the veteran Q. Fabius, thought the attempt hazardous, with exhausted resources, and while Hannibal was still on Italian soil. But Scipio gained the day. He was elected consul for 205, and given the province of Sicily, with permission to cross into Africa if he thought fit. Voluntary contributions of men, money, and supplies poured in to the support of the popular hero; and by the end of 205 Scipio had collected in Sicily a sufficient force for his purpose. In 204 he crossed to Africa, where he was welcomed by the Numidian prince Masinissa, whose friendship he had made in Spain. In 203 he twice defeated the Carthaginian forces, and a large party at Carthage were anxious to accept his offer of negotiations. But the advocates of resistance triumphed. Hannibal was recalled from Italy, and with him his brother Mago, who had made a last desperate attempt to create a division in Italy by landing in Liguria. Mago died on the voyage, but Hannibal returned to fight his last battle against Rome at Zama, where Scipio, who had been continued in command as proconsul for 202 by a special vote of the people, won a complete victory. The war was over. The Roman assembly gladly voted that the Carthaginian request for peace should be granted, and intrusted the settlement of the terms to its favorite Scipio and a commission of



ten senators. Carthage was allowed to retain her own territory in Africa intact; but she undertook to wage no wars outside Africa, and none inside without the consent of Rome. She surrendered all her ships but ten triremes, her elephants, and all prisoners of war. Finally she agreed to pay an indemnity of 10,000 talents in fifty years. Masinissa was rewarded by an increase of territory, and was enrolled among the "allies and friends" of the Roman people.

The battle of Zama decided the fate of the West. The power of Carthage was broken, and her supremacy passed by the right of conquest to Rome. Henceforth Rome had no rival to fear westward of Italy, and it rested with herself to settle within what limits her supremacy should be confined, and what form it should take. The answer to both these questions was largely determined for her by circumstances. For the next fifty years Rome was too deeply involved in the affairs of the East to think of extending her rule far beyond the limits of the rich inheritance which had fallen to her by the defeat of Carthage; and it was not until 125 that she commenced a fresh career of conquest in the West by invading Transalpine Gaul.

In Africa there was no question at first of the introduction of Roman government by the formation of a province. Carthage, bound hand and foot by the treaty of 201, was placed under the jealous watch of the loyal prince of Numidia, who himself willingly acknowledged the suzerainty of Rome. But it was impossible for this arrangement to be permanent. Every symptom of reviving prosperity at Carthage was regarded at Rome with feverish anxiety, and neither the expulsion of Hannibal in 195 nor his death in 183 did much to check the growing conviction that Rome would never be secure while her rival existed. It was, therefore, with grim satisfaction that many in the Roman senate watched the increasing irritation of the Carthaginians under the harassing raids and encroachments of their favored neighbor, Masinissa, and waited for the moment when Carthage should, by some breach of the conditions imposed upon her, supply Rome with a pretext for interference. At last in 151 came the news that Carthage, in defiance of treaty obligations, was actually at war with Masinissa. In the year 146 Carthage was taken and razed to the ground. Its territory became the Roman province of Africa, while Numidia, now ruled by the three sons of Masinissa, remained as an allied state under Roman suzerainty, and served to protect the new province against the raids of the desert tribes. Within little more than a century from the commencement of the First Punic War, the whole of the former dominions of Carthage had been brought under the direct rule of Roman magistrates, and were regularly organized as Roman provinces.

In Italy itself the Hannibalic war was inevitably followed by important changes, and these changes were, naturally enough, in the direction of an increased Roman predominance.

(b) *Rome in the East, 200-133.*—Ever since the repulse of Pyrrhus from Italy, Rome had been slowly drifting into closer contact with the Eastern states. With one of the three great powers which had divided between them the empire of Alexander, with Egypt, she had formed an alliance in 273, and the alliance had been cemented by the growth of commercial intercourse between the two countries. In 228 her chastisement of the Illyrian pirates had led naturally enough to the establishment of friendly relations with some of the states of Greece proper. Further than this, however, Rome for the time showed no desire to go. In 214 the alliance between Philip and Hannibal, and the former's threatened attack on Italy, forced her into war with

Macedon, but even then she contented herself with heading a coalition of the Greek states against him, which effectually frustrated his designs against herself; and at the first opportunity (205) she ended the war by a peace which left the position unchanged. The results of the war were not only to draw closer the ties which bound Rome to the Greek states, but to inspire the senate with a genuine dread of Philip's restless ambition, and with a bitter resentment against him for his union with Hannibal. The events of the next four years served to deepen both these feelings. In 205 Philip entered into a compact with Antiochus of Syria for the partition between them of the dominions of Egypt, now left by the death of Ptolemy Philopater to the rule of a boy king. To cripple or at least to stay the growth of Philip's power was in the eyes of the senate a necessity, but it was only by representing a Macedonian invasion of Italy as imminent that they persuaded the assembly, which was longing for peace, to pass a declaration of war (200), an ostensible pretext for which was found in the invasion by Macedonian troops of the territory of Rome's ally, Athens.

The war commenced in the summer of 200 B.C., and, though the landing of the Roman legions in Epirus was not followed, as had been hoped, by any general rising against Philip, yet the latter had soon to discover that, if they were not enthusiastic for Rome, they were still less inclined actively to assist himself. Neither by force nor by diplomacy could he make any progress south of Bœotia. The fleets of Pergamum and Rhodes, now the zealous allies of Rome, protected Attica and watched the eastern coasts. The Achæans and Nabis of Sparta were obstinately neutral, while nearer home in the north the Epirots and Ætolians threatened Thessaly and Macedonia. His own resources both in men and in money had been severely strained by his constant wars, and the only ally who could have given him effective assistance, Antiochus, was fully occupied with the conquest of Cœle-Syria. It is no wonder then that, in spite of his dashing generalship and high courage, he made but a brief stand.

Antiochus III. of Syria, Philip's accomplice in the proposed partition of the dominions of their common rival, Egypt, returned from the conquest of Cœle-Syria (198) to learn first of all that Philip was hard pressed by the Romans, and shortly afterward that he had been decisively beaten at Cynoscephalæ. It was already too late to assist his former ally, but Antiochus resolved at any rate to lose no time in securing for himself the possessions of the Ptolemies in Asia Minor and in eastern Thrace, which Philip had claimed, and which Rome now pronounced free and independent. In 197-196 he overran Asia Minor and crossed into Thrace.

In 191 Glabrio landed at the head of an imposing force; and a single battle at Thermopylæ broke the courage of Antiochus, who hastily recrossed the sea to Ephesus, leaving his Ætolian allies to their fate. But Rome could not pause here. The safety of her faithful allies, the Pergamenes and Rhodians, and of the Greek cities in Asia Minor, as well as the necessity of chastising Antiochus, demanded an invasion of Asia. A Roman fleet had already (191) crossed the Ægean, and in concert with the fleets of Pergamum and Rhodes worsted the navy of Antiochus. In a space of little over eleven years (200-189) Rome had broken the power of Alexander's successors and established throughout the eastern Mediterranean a Roman protectorate.

The results of the protectorate in Greece, if less dangerous to Roman supremacy, were quite unfavorable to the maintenance of order. But from 189 to the defeat of Perseus in 167, no formal change of importance in

the status of the Greek States was made by Rome. The Greeks were still nominally free, and no separate province with a governor of its own was established, but the needed central control was provided by assigning to the neighboring governor of Macedonia a general supervision over the affairs of Greece. From the Adriatic to the Ægean, and as far north as the river Drilo and Mount Scardus, the whole peninsula was now under direct Roman rule.

Beyond the Ægean the Roman protectorate worked no better than in Macedonia and Greece, and the demoralizing recriminations, quarrels, and disorders which flourished under its shadow were aggravated by its longer duration, and by the still more selfish view taken by Rome of the responsibilities connected with it.

Both the western and eastern Mediterranean now acknowledged the suzerainty of Rome, but her relations with the two were from the first different. The West fell to her as the prize of victory over Carthage, and, the Carthaginian power broken, there was no hindrance to the immediate establishment in Sicily, Sardinia, Spain, and finally in Africa, of direct Roman rule. To the majority, moreover, of her Western subjects, she brought a civilization as well as a government of a higher type than any before known to them. And so in the West she not only formed provinces but created a new and wider Roman world. To the east, on the contrary, she came as the liberator of the Greeks, and it was only slowly that in this part of the empire her provincial system made way. In the East, moreover, the older civilization she found there obstinately held its ground. Her proconsuls governed and her legions protected the Greek communities, but to the last the East remained in language, manners, and thought Greek and not Roman.

PERIOD III. THE PERIOD OF THE REVOLUTION, (146-49 B.C.)—In the course of little more than a century, Rome had become the supreme power in the civilized world. By all men, says Polybius, it was taken for granted that nothing remained but to obey the commands of the Romans. For the future the interest of Roman history centers in her attempts to perform the two Herculean tasks which this unique position laid upon her—the efficient government of the subject peoples, and their defense against the barbarian races which swarmed around them on all sides. They were tasks under which the old republican constitution broke down, and which finally overtaxed the strength even of the marvelous organization framed and elaborated by Augustus and his successors.

Although in its outward form the old constitution had undergone little change during the age of war and conquest from 265 to 146, the causes, both internal and external, which brought about its fall had been silently at work throughout. Its form was in strictness that of a moderate democracy. The patriciate had ceased to exist as a privileged caste, and there was no longer any order of nobility recognized by the constitution. The senate and the offices of state were in law open to all, and the will of the people in their comitia had been in the most explicit and unqualified manner declared to be supreme alike in the election of magistrates, in the passing of laws, and in all matters touching the "caput" of a Roman citizen. But in practice the constitution had become an oligarchy. The senate, not the assembly, ruled Rome, and both the senate and the magistracies were in the hands of a class which, in defiance of the law, arrogated to itself the title and the privileges of a nobility. The ascendancy of the senate is too obvious and familiar a fact to need much illustration here.

The causes of this ascendancy of the senate are not to be found in any additions made by law to its consti-

tutional prerogatives, but first of all in the fact that the senate was the only body capable of conducting affairs in an age of incessant war. The voters in the assembly, a numerous, widely scattered body, many of whom were always away with the legions abroad, could not readily be called together, and when assembled were very imperfectly qualified to decide momentous questions of military strategy and foreign policy. The senate, on the contrary, could be summoned in a moment, and included in its ranks all the skilled statesmen and soldiers of the commonwealth, while its forms of procedure were at least better fitted than those of the comitia for securing the careful discussion and prompt decision of the question before it.

From the first, however, there was an inherent weakness in this senatorial government. It had no sound constitutional basis, and with the removal of its accidental supports it fell to the ground. Legally the senate had no positive authority. It could merely advise the magistrate when asked to do so, and its decrees were strictly only suggestions to the magistrate, which he was at liberty to accept or reject as he chose.

And from 167 at least, onward, there were increasing indications that both the acquiescence of the people and the loyalty of the magistrates were failing.

But if the senate was not to govern, the difficulty arose of finding an efficient substitute, and it was this difficulty that mainly determined the issue of the struggles which convulsed Rome from 133 to 49.

The first systematic attack upon the senatorial government is connected with the names of Tiberius and Gaius Gracchus, and its immediate occasion was an attempt to deal with no less a danger than the threatened disappearance of the class to which of all others Rome owed most in the past. For, while Rome had been extending her sway westward and eastward, while the treasury had been enriched, and while her nobles and merchants were amassing colossal fortunes abroad, the small freeholders throughout the greater part of Italy were sinking deeper into ruin under the pressure of accumulated difficulties. The Hannibalic war had laid waste their fields and thinned their numbers, and when peace returned to Italy it brought with it no revival of prosperity. The heavy burden of military service still pressed ruinously upon them, and in addition they were called upon to compete with the foreign corn imported from beyond the sea, and with the foreign slave-labor purchased by the capital of wealthier men. Farming became unprofitable, and the hard laborious life with its scanty returns was thrown into still darker relief when compared with the stirring life of the camps with its opportunities of booty, or with the cheap provisions, frequent largesses, and gay spectacles to be had in the large towns. The small holders went off to follow the eagles or swell the proletariat of the cities, and their holdings were left to run waste or merged in the vineyards, oliveyards, and above all in the great cattle-farms, of the rich, and their own place was taken by slaves. The evil was not equally serious in all parts of Italy. It was least felt in the central highlands, in Campania, and in the newly settled fertile valley of the Po. It was worse in Etruria and in southern Italy; but everywhere it was serious enough to demand the earnest attention of Roman statesmen. Of its existence the government had received plenty of warning in the declining numbers of able-bodied males returned at the census, in the increasing difficulties of recruiting for the legions, in servile outbreaks in Etruria and Apulia, and between 200 and 160 a good deal was attempted by way of remedy. In addition to the foundation of twenty colonies, there were frequent allotments of land to veteran soldiers, especially in Apulia and Samnium.

In 180 40,000 Ligurians were removed from their homes and settled on vacant lands once the property of a Samnite tribe, and in 160 the Pomptine marshes were drained for the purpose of cultivation. But these efforts were only partially successful. The colonies planted in Cisalpine Gaul and in Picenum flourished, but of the others the majority slowly dwindled away, and two required recolonizing only eight years after their foundation. The veterans who received land were unfitted to make good farmers; and large numbers, on the first opportunity, gladly returned as volunteers to a soldier's life. Moreover, after 160 even these efforts ceased, and with the single exception of the colony of Auximum in Picenum (157) nothing was done to check the spread of the evil, until in 133 Tiberius Gracchus, on his election to the tribunate, set his hand to the work.

The remedy proposed by Gracchus amounted in effect to the resumption by the state of as much of the "common land" as was not held in occupation by authorized persons and conformably to the provisions of the Licinian law. Unauthorized occupiers were to be evicted; in other cases the occupation was reduced to a maximum size of 1,000 acres; the public pastures were reclaimed for agriculture and the land thus rescued for the community from the monopoly of a few was to be distributed in allotments. It was a scheme which could quote in its favor ancient precedent as well as urgent necessity. The senate from the first identified itself with the interests of the wealthy occupiers, and Tiberius found himself forced into a struggle with the senate, which had been no part of his original plan. The organizer of this concerted attack upon the position of the senate fell, like his brother, in a riot.

The agrarian reforms of the two Gracchi had little permanent effect. Even in the lifetime of Gaius the clause in his brother's law rendering the new holdings inalienable was repealed, and the process of absorption recommenced. In 118 a stop was put to further allotment of occupied lands, and finally, in 111, the whole position of the agrarian question was altered by a law which converted all land still held in occupation into private land. The old controversy as to the proper use of the lands of the community was closed by this act of alienation. The controversy in future turns, not on the right of the poor citizens to the state lands, but on the expediency of purchasing other lands for distribution at the cost of the treasury.

But, though the agrarian reform failed, the political conflict it had provoked ended only with the dictatorship of Cæsar, and the lines on which it was waged were in the main those laid down by Gaius Gracchus. The struggle between the senate and the populares was resumed on account of the Jugurthan wars and again the populares were worsted.

The need of reform was clear, but it was not so easy to carry a reform which would certainly be opposed by the whole strength of the equestrian order, and which, as involving the repeal of a Sempronian law, would arouse the resentment of the popular party. The difficulties of the Italian question were more serious.

Marcus Livius Drusus, who as tribune gallantly took up the task of reform, is claimed by Cicero as a member of that party of the center to which he belonged himself. Noble, wealthy, and popular, he seems to have hoped to be able by the weight of his position and character to rescue the burning questions of the day from the grasp of extreme partisans and to settle them peacefully and equitably. But he, like Cicero after him, had to find to his cost that there was no room in the fierce strife of Roman politics for moderate counsels. His proposal to reform the law courts excited the equestrian

order and their friends in the senate to fury. The agrarian and corn laws which he coupled with it alienated many more in the senate, and roused the old anti-popular party feeling; finally, his known negotiations with the Italians were eagerly misrepresented to the jealous and excited people as evidence of complicity with a wide-spread conspiracy against Rome. His laws were carried, but the senate pronounced them null and void. Drusus was denounced in the senate house as a traitor, and on his way home was struck down by the hand of an unknown assassin. This was followed by the Social war which lasted from 90 to 89 B.C.

The termination of the Social war brought with it no peace in Rome. The old quarrels were renewed with increased bitterness, and the newly enfranchised Italians themselves complained as bitterly of the restriction which robbed them of their due share of political influence by allowing them to vote only in a specified number of tribes. The senate itself was distracted by violent personal rivalries—and all these feuds, animosities, and grievances were aggravated by the wide-spread economic distress and ruin which affected all classes. Lastly, war with Mithradates had been declared; it was notorious that the privilege of commanding the force to be sent against him would be keenly contested, and that the contest would lie between the veteran Marius, the conqueror of Jugurtha, and L. Cornelius Sulla.

For a period of ten years from this time Rome was the scene of civil war and massacres, of first the partisans of Sulla, and then of Marius. Sulla had at first been victorious and had entered Rome at the head of his army, held the consular elections and departed for the seat of war. No sooner had he gone than Cinna raised a revolt, and Marius returned from his flight from Sulla and assumed the government as consul (for the seventh time). His first act was a frightful massacre of his opponents. He did not long survive the triumph, dying in 86. Cinna continued in office as consul together with a trusted colleague. His government was a rank usurpation, and he was at last murdered by his soldiers. Sulla finally returned from Asia, where he had brought the Mithradatic war to a close. He entered Rome at the head of a large army, and, having conquered all opposition, at once seized the reins of government. His victory was instantly followed, not by any measures of conciliation, but by a series of massacres, proscriptions, and confiscations, of which almost the least serious consequence was the immediate loss of life which they entailed. From this time forward the fear of proscription and confiscation recurred as a possible consequence of every political crisis, and it was with difficulty that Cæsar himself dissipated the belief that his victory would be followed by a Sullan reign of terror. The legacy of hatred and discontent which Sulla left behind him was a constant source of disquiet and danger.

The Sullan system stood for nine years, and was then overthrown—as it had been established—by a successful soldier. It was the fortune of Cn. Pompeius, a favorite officer of Sulla, first of all to violate in his own person the fundamental principles of the constitution reëstablished by his old chief, and then to overturn it. In Spain the Marian governor Q. Sertorius (see SERTORIUS) had defeated one after another of the proconsuls sent out by the senate, and was already in 77 master of all Hither Spain. To meet the crisis, the senate itself took a step which was in fact the plainest possible confession that the system sanctioned afresh by Sulla was inadequate to the needs of the state. Pompey, who was not yet thirty, and had never held even the quæstorship, was sent out to Spain with proconsular

authority. Still Sertorius held out, until in 73 he was foully murdered by his own officers. The native tribes who had loyally stood by him submitted, and Pompey early in 71 returned with his troops to Italy, and in conjunction with Crassus (who had put down the servile insurrection of Spartacus) was made consul.

When his consulship ended, Pompey impatiently awaited at the hands of the politicians he had befriended the further gift of a foreign command. He declined an ordinary province, and from the end of 70 to 67 he remained at Rome in a somewhat affectedly dignified seclusion. But in 67 and 66 the laws of Gabinius and Manilius gave him all and more than all that he expected. The ravages of the pirates, encouraged in the first instance by the inactivity which had marked Roman policy in the East after 167, and by the absence of any effective Roman navy in the Mediterranean, had now risen to an intolerable height, and the spasmodic efforts made since 81 had done little to check them. The trade of the Mediterranean was paralyzed, and even the coasts of Italy were not safe from their raids. Aulus Gabinius, a tribune, and a follower of Pompey, now proposed to the people to entrust Pompey with the sole command against the pirates. His command was to last for three years. He was to have supreme authority over all Roman magistrates in the provinces throughout the Mediterranean and over the coasts for fifty miles inland. Fifteen legati, all of prætorian rank, were assigned to him, with 200 ships, and as many troops as he thought desirable. These powers were still further enlarged in the next year by the Manilian law, which transferred from Lucullus and Giabrio to Pompey the conduct of the Mithradatic war in Asia, and with it the entire control of Roman policy and interest in the East. The un-republican character of the position thus granted to Pompey, and the dangers of the precedent established, were clearly enough pointed out by such moderate men as Q. Lutatius Catulus, the "father of the senate," and by the orator Hortensius—but in vain. Both laws were supported, not only by the tribunes and the populace, but by the whole influence of the "publicani" and "negotiatores," whose interests in the East were at stake.

Pompey left Rome in 67, and did not return to Italy till toward the end of 62. The interval was marked in Rome by the rise to political importance of Cæsar and Cicero, and by Catiline's attempt at revolution.

The Catilinarian outbreak had been a blow to Cæsar, whose schemes it interrupted, but to Cicero it brought not only popularity and honor, but as he believed, the realization of his political ideal. The senate and the equestrian order, the nobles of Rome and the middle class in the country, had made common cause in the face of a common danger; and the danger had been averted by the vigorous action of a consul sprung from the people, under the guidance of a united senate, and backed by the mass of good citizens.

But Pompey was now on his way home, and again as in 70 the political future seemed to depend on the attitude which the successful general would assume; Pompey himself looked simply to the attainment by the help of one political party or another of his immediate aims, which at present were the ratification of his arrangements in Asia and a grant of land for his troops. It was the impracticable jealousy of his personal rivals in the senate, aided by the versatility of Cæsar, who presented himself not as his rival but as his ally, which drove Pompey once more, in spite of Cicero's efforts, into the camp of what was still nominally the popular party. In 60, on Cæsar's return from his proprætorship in Spain, the coalition was formed which is known

by the somewhat misleading title of the first triumvirate. Pompey was ostensibly the head of this new alliance, and in return for the satisfaction of his own demands he undertook to support Cæsar's candidature for the consulship. The wealth and influence of Crassus were enlisted in the same cause, but what he was to receive in exchange is not clear. Cicero was under no illusions as to the significance of this coalition. It scattered to the winds his dreams of a stable and conservative republic. Pompey, whom he had hoped to enlist as the champion of constitutional government, had been driven into the arms of Cæsar. The union between the senate and the equestrian order had been dissolved, and the support of the publicani lost by an untimely quarrel over the price to be paid for collecting the taxes of Asia, and, to crown all, both his own personal safety and the authority of the senate were threatened by the openly avowed intentions of Catiline's friends to bring the consul of 63 to account for his unconstitutional execution of Catiline's accomplices. His fears were fully justified by the results. The year 59 saw the republic powerless in the hands of three citizens. Cæsar as consul procured the ratification of Pompey's acts in Asia, conciliated the publicani by granting them the relief refused by the senate, and carried an agrarian law of the new type, which provided for the purchase of lands for allotment at the cost of the treasury, and for the assignment of the rich "ager Campanus." But Cæsar aimed at more than the carrying of an agrarian law in the teeth of the senate or any party victory in the forum. An important military command was essential to him, and he judged correctly enough that in the West there was work to be done which might enable him to win a position such as Pompey had achieved in the East. An obedient tribune was found, and by the *lex Vatinia* he was given for five years the command of Cisalpine Gaul and Illyricum, to which was added by a decree of the senate Transalpine Gaul also. It was a command which not only opened to him a great military career, but enabled him, as the master of the valley of the Po, to keep an effective watch on the course of affairs in Italy.

P. Clodius as tribune brought forward a law enacting that any one who had put a Roman citizen to death without trial by the people should be interdicted from fire and water. Cicero finding himself deserted even by Pompey left Rome in a panic, and by a second Clodian law he was declared to be outlawed. With Cæsar away in his province, and Cicero banished, Clodius was for the time master in Rome. But, absolute as he was in the streets, and recklessly as he parodied the policy of the Gracchi by violent attacks on the senate, his tribunate merely illustrated the anarchy which now inevitably followed the withdrawal of a strong controlling hand. A reaction speedily followed. Pompey, bewildered and alarmed by Clodius' violence, at last bestirred himself. Cicero's recall was decreed by the senate, and early in August, 57, in the *comitia centuriata*, to which his Italian supporters flocked in crowds, a law was passed revoking the sentence of outlawry passed upon him.

Intoxicated by the acclamations which greeted him, and encouraged by Pompey's support and by the salutary effects of Clodius' excesses, Cicero's hopes rose high, and a return to the days of 63 seemed not impossible. With indefatigable energy he strove to reconstruct a solid constitutional party, but only to fail once more. Pompey was irritated by the hostility of a powerful party in the senate, who thwarted his desires for a fresh command and even encouraged Clodius in insulting the conqueror of the East. Cæsar became alarmed at the reports which reached him that the repeal of his

agrarian law was threatened and that the feeling against the coalition was growing in strength; above all he was anxious for a renewal of his five years' command. He acted at once, and in the celebrated conference at Luca (56) the alliance of the three self-constituted rulers of Rome was renewed. Cicero succumbed to the inevitable and withdrew in despair from public life. Pompey and Crassus became consuls for 55. Cæsar's command was renewed for another five years, and to each of his two allies important provinces were assigned for a similar period—Pompey receiving the two Spains and Africa, and Crassus Syria. The coalition now divided between them the control of the empire. For the future the question was, how long the coalition itself would last. Its duration proved to be short. In 53 Crassus was defeated and slain by the Parthians at Carrhæ, and in Rome the course of events slowly forced Pompey into an attitude of hostility to Cæsar. The year 54 brought with it a renewal of the riotous anarchy which had disgraced Rome in 58–57. Conscious of its own helplessness, the senate, with the eager assent of all respectable citizens, dissuaded Pompey from leaving Italy. His provinces were left to his legates, and he himself remained at home to maintain order by the weight of his influence. It was a confession that the republic could not stand alone. But Pompey's mere presence proved insufficient. The anarchy and confusion grew worse, and even strict constitutionalists like Cicero talked of the necessity of investing Pompey with some extraordinary powers for the preservation of order. At last in 52 he was elected sole consul, and not only so, but his provincial command was prolonged for five years more, and fresh troops were assigned him. The rôle of "savior of society" thus thrust upon Pompey was one which flattered his vanity, but it entailed consequences which it is probable he did not foresee, for it brought him into close alliance with the senate, and in the senate there was a powerful party who were resolved to force him into heading the attack they could not successfully make without him upon Cæsar. It was known that the latter, whose command expired in March, 49, but who in the ordinary course of things would not have been replaced by his successor until January, 48, was anxious to be allowed to stand for his second consulship in the autumn of 49 without coming in person to Rome. His opponents in the senate were equally bent on bringing his command to an end at the legal time, and so obliging him to disband his troops and stand for the consulship as a private person, or, if he kept his command, on preventing his standing for the consulship. Through 51 and 50 the discussions in the senate and the negotiations with Cæsar continued, but with no result. On January 1, 49, Cæsar made a last offer of compromise. The senate replied by requiring him on pain of outlawry to disband his legions. Two tribunes who supported him were ejected from the senate house, and the magistrates with Pompey were authorized to take measures to protect the republic. Cæsar hesitated no longer; he crossed the Rubicon and invaded Italy. The rapidity of his advance astounded and bewildered his foes. Pompey, followed by the consuls, by the majority of the senate and a long train of nobles, abandoned Italy as untenable, and crossed into Greece. At the end of March Cæsar entered Rome as the master of Italy. The story of the civil war which followed, down to the victory at Munda in the spring of 45, has been told elsewhere. We are concerned here with the work which Cæsar achieved in the brief intervals of rest allowed him during these stormy years, and with the place which his dictatorship holds in the history of Rome.

The task which Cæsar had to perform was no easy

one. It came upon him suddenly; for there is no sufficient reason to believe that Cæsar had long premeditated revolution, or that he had previously aspired to anything more than such a position as that which Pompey had already won, a position unrepugnant indeed, but accepted by republicans as inevitable. War was forced upon him as the alternative to political suicide, but success in war brought the responsibilities of nearly absolute power, and Cæsar's genius must be held to have shown itself in the masterly fashion in which he grasped the situation, rather than in the supposed sagacity with which he is said to have foreseen and prepared for it. In so far as he failed, his failure was mainly due to the fact that his tenure of power was too short for the work which he was required to perform. From the very first moment when Pompey's ignominious retreat left him master of Italy, he made it clear that he was neither a second Sulla nor even the reckless anarchist which many believed him to be. The Roman and Italian public were first startled by the masterly rapidity and energy of his movements, and then agreeably surprised by his lenity and moderation. No proscriptions or confiscations followed his victories, and all his acts evinced an unmistakable desire to effect a sober and reasonable settlement of the pressing questions of the hour; of this, and of his almost superhuman energy, the long list of measures he carried out or planned is sufficient proof. The "children of the proscribed" were at length restored to their rights, and with them many of the refugees who had found shelter in Cæsar's camp during the two or three years immediately preceding the war; but the extreme men among his supporters soon realized that their hopes of "novae tabulae" and grants of land were illusory. In allotting lands to his veterans, Cæsar carefully avoided any disturbance of existing owners and occupiers, and the mode in which he dealt with the economic crisis produced by the war seems to have satisfied all reasonable men. It had been a common charge against Cæsar in former days that he paid excessive court to the populace of Rome, and now that he was master he still dazzled and delighted them by the splendor of the spectacles he provided, and by the liberality of his largesses. But he was no indiscriminate flatterer of the mob. The popular clubs and guilds which had helped to organize the anarchy of the last few years were dissolved. A strict inquiry was made into the distribution of the monthly doles of corn, and the number of recipients was reduced by one-half; finally, the position of the courts of justice was raised by the abolition of the popular element among the judges.

Nor are we without some clue as to the policy which Cæsar had sketched out for himself in the administration of the empire, the government of which he had centralized in his own hands. The much-needed work of rectifying the frontiers he was forced, by his premature death, to leave to other hands, but our authorities agree in attributing to him the design of extending the rule of Rome to its natural geographical limits—to the Euphrates and the Caucasus on the east, to the Danube and the Rhine or possibly the Elbe on the north, and to the ocean on the west. Within the frontiers he anticipated Augustus in lightening the financial burdens of the provincials, and in establishing a stricter control over the provincial governors, while he went beyond him in his desire to consolidate the empire by extending the Roman franchise and admitting provincials to a share in the government. He completed the Romanization of Italy by his enfranchisement of the Transpadane Gauls, and by establishing throughout the peninsula a uniform system of municipal government, which under his successors was gradually extended to the provinces.

On the eve of his departure for the East, to avenge the death of Crassus and humble the power of Parthia, Cæsar fell a victim to the wounded pride of the republican nobles; and between the day of his death (March 15, 44), and that on which Octavian defeated Antony at Actium (September 2, 31), lies a dreary period of anarchy and bloodshed.

For a moment, in spite of the menacing attitude of Cæsar's self-constituted representative Antony, it seemed to one man at least as if the restoration of republican government was possible. With indefatigable energy Cicero strove to enlist the senate, the people, and above all the provincial governors in support of the old constitution. But, though his eloquence now and again carried all before it in senate, house and forum, it was powerless to alter the course of events. By the beginning of 43 civil war had recommenced; in the autumn Antony was already threatening an invasion of Italy at the head of seventeen legions. Toward the end of October Antony and his ally Lepidus coalesced with the young Octavian, who had been recently elected consul at the age of twenty, in spite of senatorial opposition; and the coalition was legalized by the creation of the extraordinary commission for the "reorganization of the commonwealth" known as the "second triumvirate." It was appointed for a period of five years, and was continued in 37 for five years more. The rule of the triumvirs was inaugurated in the Sullan fashion, and in marked contrast to the lenity shown by Cæsar, by a proscription, foremost among the victims of which was Cicero himself. In the next year the defeat of Brutus and Cassius at Philippi, by the combined forces of Octavian and Antony, destroyed the last hopes of the republican party. In 40 a threatened rupture between the two victors was avoided by the treaty concluded at Brundisium. Antony married Octavian's sister Octavia, and took command of the eastern half of the empire; Octavian appropriated Italy and the West; while Lepidus was forced to content himself with Africa. For the next twelve years, while Antony was indulging in dreams of founding for himself and Cleopatra an empire in the East, and shocking Roman feeling by his wild excesses and his affectation of oriental magnificence, Octavian was patiently consolidating his power. Of his only two rivals, Lepidus, his fellow triumvir, was in 36 ejected from Africa and banished to Circeii, while Sextus Pompeius, who had since his defeat at Munda maintained a semi-piratical ascendancy in the western Mediterranean, was decisively defeated in the same year, and his death in 35 left Octavian sole master of the West. The inevitable trial of strength between himself and Antony was not long delayed. In 32 Antony inflicted one more outrage upon Roman feeling, and openly challenged the hostility of Octavian by divorcing Octavia in favor of the beautiful and daring Egyptian princess, with whom, as the heiress of the Ptolemies, he aspired to share the empire of the Eastern world. By a decree of the senate Antony was declared deposed from his command, and war was declared against Queen Cleopatra. On September 2, 31, was fought the battle of Actium. Octavian's victory was complete. Antony and Cleopatra committed suicide (30), and the Eastern provinces submitted in 29. Octavian returned to Rome to celebrate his triumph and mark the end of the long-continued anarchy by closing the temple of Janus; at the end of the next year he formally laid down the extraordinary powers he had held since 43, and a regular government was established.

### *The Empire.*

PERIOD I.: THE PRINCIPATE, 27 B.C.—284 A.D.—  
(a) *The Constitution of the Principate.*—The conqueror

of Antony at Actium, the great-nephew and heir of the dictator Cæsar, was now summoned, by the general consent of a world wearied out with twenty years of war and anarchy, to the task of establishing a government which should as far as possible respect the forms and traditions of the republic, without sacrificing that centralization of authority which experience had shown to be necessary for the integrity and stability of the empire. It was a task for which Octavian was admirably fitted. To great administrative capacity and a quiet tenacity of purpose he united deliberate caution and unflinching tact; while his bourgeois birth and genuinely Italian sympathies enabled him to win the confidence of the Roman community to an extent impossible for Cæsar, with his dazzling preëminence of patrician descent, his daring disregard of forms, and his cosmopolitan tastes.

The new system which was formally inaugurated by Octavian in 28–27 B.C. assumed the shape of a restoration of the republic under the leadership of a "princeps." Octavian voluntarily resigned the extraordinary powers which he held since 43, and, to quote his own words, "handed over the republic to the control of the senate and people of Rome." The old constitutional machinery was once more set in motion; the senate, assembly, and magistrates resumed their functions; and Octavian himself was hailed as the "restorer of the commonwealth and the champion of freedom." It was not so easy to determine what relation he himself, the actual master of the Roman world, should occupy toward this revived republic. His abdication, in any real sense of the word, would have simply thrown everything back into confusion. The interests of peace and order required that he should retain at least the substantial part of his authority; and this object was in fact accomplished, and the rule of the emperors founded, in a manner which has no parallel in history. Any revival of the kingly title was out of the question, and Octavian himself expressly refused the dictatorship. Nor was any new office created or any new official title invented for his benefit. But by senate and people he was invested according to the old constitutional forms with certain powers, as many citizens had been before him, and so took his place among the lawfully appointed magistrates of the republic;—only, to mark his preëminent dignity, as the first of them all, the senate decreed that he should take as an additional cognomen that of "Augustus," while in common parlance he was henceforth styled "princeps," a simple title of courtesy, familiar to republican usage, and conveying no other idea than that of a recognized primacy and precedence over his fellow citizens. The ideal sketched by Cicero in *De Republica*, of a constitutional president of a free republic, was apparently realized; but it was only in appearance. For in fact the special prerogatives conferred upon Octavian gave him back in substance the autocratic authority he had resigned, and as between the restored republic and its new princeps the balance of power was overwhelmingly on the side of the latter.

On the accession of Augustus, there could be little doubt as to the nature of the work that was necessary, if peace and prosperity were to be secured for the Roman world. He was called upon to justify his position by rectifying the frontiers and strengthening the frontier defenses, by reforming the system of provincial government, and by reorganizing the finance; and his success in dealing with these three difficult problems is sufficiently proved by the prosperous condition of the empire for a century and a half after his death.

For a century and a half the policy initiated by Augustus secured the peace and prosperity of the empire; of the emperors who ruled during that period the

majority were able and vigorous administrators, and even the follies and excesses of Gaius, Claudius, and Nero did little harm beyond the limits of Rome and Italy. The firm rule of Vespasian repaired the damages inflicted by the wars of the rival emperors after Nero's death, and the abilities of Trajan, Hadrian, and the Antonines, if they failed to revive the flagging energies of the empire, at least secured tranquillity and good government. But few additions of importance were made to the territories of Rome. In Britain the work begun by Cæsar was taken up by Claudius, under whom the southern part of the island was constituted a province; the northern districts were subdued by Agricola (78-84 A.D.), and the limits of the province northward were finally fixed by the Wall of Hadrian (see BRITANNIA). The conquest of Dacia by Trajan (107) was provoked by the threatening attitude of the barbarian tribes on the lower Danube, and, though it remained part of the empire down to 256, its exposed position as lying beyond the Danube frontier rendered it always a source of weakness rather than strength. To Trajan's reign also belongs the annexation of Arabia Petræa. Otherwise on the frontier there was little change. In the north the revolt of Civilis (69-70 A.D.) owed its temporary success mainly to the confusion created by the rivalries of Otho, Vitellius, and Vespasian. The connection of the Rhine with the Danube frontier by a continuous wall, a work gradually carried out under the Flavian and Antonine emperors, was a strategical necessity, and involved no general advance of the Roman lines. On the Rhine itself the peaceful state of affairs is sufficiently proved by the reduction of the force stationed there from eight legions to four; and it was only on the Danube that there was any pressure severe enough to strain the strength of the Roman defense. The presence of Trajan himself was required to quell the Dacians under their able king Decebalus, and, though his campaigns were followed by sixty years of peace, a force of ten legions was considered necessary to guard the Danubian frontier. Far more serious was the irruption of the Marcomanni and other tribes in the reign of Marcus Aurelius (162-175). The tide of barbaric invasion which then swept across the upper Danube and over the provinces of Rhætia, Noricum, and Pannonia, till it touched the Alps and the soil of Italy, was indeed driven back after fourteen years of war, but it first revealed to the Roman world the strength of the forces which were gathered unnoticed in the distant regions beyond the limits of the "Roman peace." In the East Rome and Parthia still faced each other upon the banks of the Euphrates, and contended, now by arms now by diplomacy, for supremacy in the debatable land of Armenia. Trajan's momentary acquisitions were abandoned by Hadrian, and on this side of the empire the first changes of importance on the frontier belong to the reign of Septimius Severus. Within the frontiers the leveling and unifying process commenced by Augustus had steadily proceeded. A tolerably uniform provincial system covered the whole area of the empire. The client states had one by one been reconstituted as provinces, and even the government of Italy had been in many respects assimilated to the provincial type. The municipal system had spread widely; the period from Vespasian to Aurelius witnessed the elevation to municipal rank of an immense number of communities, not only in the old provinces of the West, in Africa, Spain, and Gaul, but in the newer provinces of the North, and along the line of the northern frontier; and everywhere under the influence of the central imperial authority there was an increasing uniformity in the form of the local constitutions, framed and granted as they all were by imperial edict. Throughout the empire

again the extension of the Roman franchise was preparing the way for the final act by which Caracalla assimilated the legal status of all free-born inhabitants of the empire, and in the west and north this was preceded and accompanied by the complete Romanizing of the people in language and civilization. Moreover, the empire, that was thus becoming one in its administrative system, its laws, and its civilization, had as yet continued to enjoy peace and order. The burdens of military service fell on the frontier provinces, and only the echoes of the border wars reached the Mediterranean territories. Yet, in spite of the internal tranquillity and the good government which have made the age of the Antonines famous, we can detect signs of weakness. Though the evils of excessive centralization were hardly felt while the central authority was wielded by vigorous rulers, yet even under Trajan, Hadrian, and the Antonines, we notice a failure of strength in the empire as a whole, and a corresponding increase of pressure on the imperial government itself. The reforms of Augustus had given free play to powers still fresh and vigorous. The ceaseless labors of Hadrian were directed mainly to the careful husbanding of such strength as still remained, or to attempts at reviving it by the sheer force of imperial authority. Among the symptoms of incipient decline which not the most heroic efforts of the government could entirely remove were the growing depopulation, especially of the central district of the empire, the constant financial difficulties, the deterioration in character of the local governments in the provincial communities, and the increasing reluctance exhibited by all classes to undertake the now onerous burden of municipal office. Lastly, the irruption of Marcomanni, and the revolt of Avidius Cassius (174-175) in the Eastern provinces, anticipated the two most serious of the dangers which ultimately proved fatal to the empire.

Marcus Aurelius died in 180, and his death was followed by a century of war and disorder, during which nothing but the stern rule of soldier emperors, such as Septimius Severus, Decius, Claudius, Aurelian, and Probus saved the empire from dissolution. The want of any legal security for the orderly transmission of the imperial power had been partially supplied during the second century by the practice of adoption. But throughout the third century the Roman world witnessed a series of desperate conflicts between rival generals put forward by their respective legions as claimants for the imperial purple. Between the death of Severus, in 211, and the accession of Diocletian, in 284, no fewer than twenty-three emperors sat in the seat of Augustus, and of these all but three died violent deaths at the hands of a mutinous soldiery, or by the orders of a successful rival. Of the remaining three, Decius fell in battle against the Goths, Valerian died a prisoner in the far East, and Claudius was among the victims of the chronic pestilence which added to the miseries of the time. The "tyrants," as the unsuccessful pretenders to the imperial purple were styled, reappear with almost unvarying regularity in each reign. The claims of Septimius Severus himself, the first and ablest of the soldier emperors, were disputed by Clodius Albinus in the West, and by Pescennius Niger in the East, and at the bloody battle of Lugdunum and the sack of Byzantium rival Roman forces, for the first time since the accession of Vespasian, exhausted each other in civil war. In 237-38 six emperors perished in the course of a few months. It was, however, during the reign of Gallienus (260-68) that the evil reached its height. The central authority was paralyzed; the barbarians were pouring in from the North; the Parthians were threatening to overrun the eastern provinces; and the legions on

the frontiers were left to repel the enemies of Rome as best they could.

Gallienus was murdered at Milan in 268, and the remaining sixteen years of this period were marked by the restoration of unity to the distracted empire. Palmyra was destroyed and Zenobia led a prisoner to Rome by Aurelian in 273; the next year the Gallic empire came to an end by the surrender of Tetricus, and the successors of Aurelian—Tacitus, Probus, and Carus (265–282) were at last rulers over the whole extent of the empire. While rival generals were contending for the imperial purple, the very existence of the empire which they aspired to rule was imperiled by foreign invasion. As early as 236 a new enemy, the Alemanni, had crossed the Rhine; but had been driven back by the valor of Maximinus (238), and in the same year the Goths first appeared on the banks of the Danube.

At the close of the second century the growing weakness of Parthia seemed to promise an immunity from danger on the eastern frontier. But with the revolution which placed the Sassanidæ upon the throne the whole situation was changed. Although any serious loss of territory had been avoided, the storms of the third century had told with fatal effect upon the general condition of the empire.

PERIOD II. 284–476 A.D.—(a) *From the Accession of Diocletian to the Death of Theodosius (284–365 A.D.)*.—The work begun by Aurelian and Probus, that of fortifying the empire alike against internal sedition and foreign invasion, was completed by Diocletian and Constantine the Great, whose system of government, novel as it appears at first sight, was in reality the natural and inevitable outcome of the history of the previous century. Its object was twofold, to give increased stability to the imperial authority itself, and to organize an efficient administrative machinery throughout the empire. In the second year of his reign Diocletian associated Maximian with himself as colleague, and six years later (292) the hands of the two “Augusti” were further strengthened by the proclamation of Constantius and Galerius as “Caesares.”

Diocletian and Maximian formally abdicated their high office in 305. Eighteen years later Constantine, the sole survivor of six rival emperors, united the whole empire under his own rule. His reign of fourteen years was marked by two events of first-rate importance—the recognition of Christianity as the religion of the empire, and the building of the new capital at Byzantium. The alliance which Constantine inaugurated between the Christian church and the imperial government, while it enlisted on the side of the state one of the most powerful of the new forces with which it had to reckon, imposed a check, which was in time to become a powerful one, on the imperial authority. The establishment of the new “City of Constantine” as a second Rome, with a second senate, a prefect of the city, regiones, and even largesses, did more than proclaim once again the deposition of Rome from her old imperial position. It paved the way for the final separation of East and West by providing the former for the first time with a suitable seat of government on the Bosphorus. The death of Constantine in 337 was followed, as the abdication of Diocletian had been, by the outbreak of quarrels among rival Cæsars. Of the three sons of Constantine who in 337 divided the empire between them, Constantine the eldest fell in civil war against his brother Constans; Constans himself was, ten years afterward, defeated and slain by Magnentius; and the latter in his turn was in 353 vanquished by Constantine’s only surviving son Constantius. Thus for the second time the whole empire was united under the rule of a member of the house of Constantine. But in

355 Constantius reluctantly granted the title of Cæsar to his cousin Julian and placed him in charge of Gaul, where the momentary elevation of a tyrant, Silvanus, and still more the inroads of Franks and Alemanni, had excited alarm. But Julian’s successes during the next five years were such as to arouse the jealous fears of Constantius. In order to weaken his suspected rival the legions under Julian in Gaul were suddenly ordered to march eastward against the Persians (360). They refused, and when the order was repeated replied by proclaiming Julian himself emperor and Augustus. Julian, with probably sincere reluctance, accepted the position, but the death of Constantius in 361 saved the empire from the threatened civil war. The chief importance of the career of Julian, both as Cæsar in Gaul from 355 to 361 and during his brief tenure of sole power (361–363), lies, so far as the general history of the empire is concerned, in his able defense of the Rhine frontier and in his Persian campaign; for his attempted restoration of pagan and in especial of Hellenic worship had no more permanent effect than the war which he courageously waged against the multitudinous abuses which had grown up in the luxurious court of Constantius. But his vigorous administration in Gaul undoubtedly checked the barbarian advance across the Rhine, and postponed the loss of the Western provinces, while, on the contrary, his campaign in Persia, brilliantly successful at first, resulted in his own death, and in the immediate surrender by his successor Jovian of the territories beyond the Tigris won by Diocletian seventy years before. Julian died on June 26, 363, his successor Jovian on February 17, 364; and on February 26th Valentinian was acknowledged as emperor by the army at Nicæa. In obedience to the expressed wish of the soldiers that he should associate a colleague with himself, he conferred the title of Augustus upon his brother Valens, and the long-impending division of the empire was at last effected—Valentinian became emperor of the West, Valens of the East. From 364 till his death in 375 the vigor and ability of Valentinian kept his own frontier of the Rhine tolerably intact, and prevented any serious disasters on the Danube. But his death, which deprived the weaker Valens of a trusted counselor and ally, was followed by a crisis on the Danube, more serious than any which had occurred there since the defeat of Decius. In 376 the Goths, hard pressed by their new foes from the eastward, the Huns, sought and obtained the protection of the Roman empire. They were transported across the Danube and settled in Mœsia, but, indignant at the treatment they received, they rose in arms against their protectors. In 378 at Hadrianople Valens was defeated and killed; the victorious Goths spread with fire and sword over Illyricum, and advanced eastward to the very walls of Constantinople. Once more, however, the danger passed away. The skill and tact of Theodosius, who had been proclaimed emperor of the East by Gratian, conciliated the Goths; they were granted an allowance, and in large numbers entered the service of the Roman emperor. The remaining years of Theodosius’ reign (382–395) were mainly engrossed by the duty which now devolved upon the emperor of the East of upholding the increasingly feeble authority of his colleagues in the West against the attacks of pretenders. Maximus, the murderer of Gratian (383), was at first recognized by Theodosius as Cæsar, and left in undisturbed command of Gaul, Spain, and Britain; but, when in 386 he proceeded to oust Valentinian II. from Italy and Africa, Theodosius marched westward, crushed him, and installed Valentinian as emperor of the West. In the very next year, however, the murder of Valentinian (392) by Arbogast, a Frank, was followed by the appearance of a fresh tyrant in the per-



son of Eugenius, a domestic officer and nominee of Arbogast himself. Once more Theodosius marched westward, and near Aquileia decisively defeated his opponents. But his victory was quickly followed by his own illness and death (395), and the fortunes of East and West passed into the care of his two sons Arcadius and Honorius.

(b) *From the Death of Theodosius to the Extinction of the Western Empire* (395-476).—Through more than a century from the accession of Diocletian the Roman empire had succeeded in holding at bay the swarming hordes of barbarians. But, though no province had yet been lost, as Dacia had been lost in the century before, and though the frontier lines of the Rhine and the Danube were still guarded by Roman forts and troops, there were signs in plenty that a catastrophe was at hand.

Even more ominous of coming danger was the extent to which the European half of the empire was becoming barbarized.

It was by barbarians already settled within the empire that the first of the series of attacks which finally separated the Western provinces from the empire and set up a barbaric ruler in Italy were made, and it was in men of barbarian birth that Rome found her ablest and most successful defenders, and the emperors both of East and West their most capable and powerful ministers. The Visigoths whom Alaric led into Italy had been settled south of the Danube as the allies of the empire since the accession of Theodosius. The greater part of them were Christians at least in name, and Alaric himself had stood high in the favor of Theodosius. The causes which set them in motion are tolerably clear. Like the Germans of the days of Cæsar, they wanted land for their own, and to this land-hunger was evidently added in Alaric's own case the ambition of raising himself to the heights which had been reached before him by the Vandal Stilicho at Ravenna and the Goth Rufinus at Constantinople. Alaric marched to the siege and sack of Rome (410). His death followed hard on his capture of Rome. Two years later (412) his successor Ataulf led the Visigoths to find in Gaul the lands which Alaric had sought in Italy.

It was about the same period that the accomplished fact of the division of Spain between the three barbarian tribes of Vandals, Suevi, and Alani was in a similar manner recognized and approved by the paramount authority of the emperor of the West.

Honorius died in 423. His authority had survived the dangers to which it had been exposed alike from the rivalry of tyrants and barbaric invasion, and with the single exception of Britain no province had yet formally broken loose from the empire. But over a great part of the West this authority was now little more than nominal.

The long reign of Valentinian III. (423-455) is marked by two events of first-rate importance—the conquest of Africa by the Vandals and the invasion of Gaul and Italy by Attila. Carthage was taken in 439, and by 440 the Vandal kingdom was firmly established.

Eleven years later (451) Attila invaded Gaul, but this Hunnish movement was in a variety of ways different from those of the Visigoths and Vandals. Nearly a century had passed since the Huns first appeared in Europe, and drove the Goths to seek shelter within the Roman lines. Attila was now the ruler of a great empire in central and northern Europe, and, in addition to his own Huns, the German tribes along the Rhine and Danube and far away to the north owned him as king. He confronted the Roman power as an equal; and, in

marked contrast to the Gothic and Vandal chieftains, he treated with the emperors of East and West as an independent sovereign. His advance on Gaul and Italy threatened, not the establishment of yet one more barbaric chieftain on Roman soil, but the subjugation of the civilized and Christian West to the rule of a heathen and semi-barbarous conqueror. But Rome now reaped the advantages of the policy which Honorius had perhaps involuntarily followed. The Visigoths in Gaul, Christian and already half Romanized, rallied to the aid of the empire against a common foe. Attila, defeated at Châlons by Aetius, withdrew into Pannonia (451). In the next year he overran Lombardy, but penetrated no farther south, and in 453 he died. With the murder of Valentinian III. (453) the western branch of the house of Theodosius came to an end, and the next twenty years witnessed the accession and deposition of nine emperors. The three months' rule of Maximus is memorable only for the invasion of Italy and the sack of Rome by the Vandals under Gaiseric. From 456-472 the actual ruler of Italy was Ricimer, the Sueve. Of the four emperors whom he placed on the throne, Majorian (457-461) alone played any imperial part outside Italy. Ricimer died in 472, and two years later a Pannonian, Orestes, aspired to fill the place which Ricimer had occupied. Julius Nepos was deposed, and Orestes filled the vacancy by proclaiming as Augustus his own son Romulus. But Orestes' tenure of power was brief. The barbarian mercenaries in Italy determined to secure for themselves a position there such as that which their kinsfolk had won in Gaul and Spain and Africa. Their demand for a third of the lands of Italy was refused by Orestes, and they instantly rose in revolt. On the defeat and death of Orestes they proclaimed their leader, Odoacer the Rugian, king of Italy. Romulus Augustulus laid down his imperial dignity, and the court at Constantinople was informed that there was no longer an emperor of the West.

#### HISTORY OF THE ROMAN REPUBLIC IN THE MIDDLE AGES.

The history of the Roman republic during the Middle Ages has yet to be written, and only by the discovery of new documents can the difficulties of the task be completely overcome.

The removal of the seat of the empire to Constantinople effected a radical change in the political situation of Rome; nor was this change neutralized by the formation of the weak Western empire soon to be shattered by the Germanic invasions. But we still find Roman laws and institutions; and no sign is yet manifest of the rise of a mediæval municipality. The earliest germ of one is seen during the barbarian invasions. Of these we need only enumerate the four most important—those of the Goths, Byzantines, Lombards, and Franks.

The wars of Belisarius and Narses against the Goths lasted twenty years (535-555 A.D.), caused terrible slaughter and devastation in Italy, and finally subjected her to Constantinople. In place of a Gothic king she was now ruled by a Greek patrician, afterward entitled the exarch, who had his seat of government at Ravenna as lieutenant of the empire.

The new organization outwardly resembled that of the Goths; one army had been replaced by another, the counts by dukes; there was an exarch instead of a king; the civil and military jurisdictions were more exactly defined. But the army was not, like that of the Goths, a conquering nation in arms; it was a Græco-Roman army, and did not hold a third of the territory which was now probably added to the possessions of the state. The soldiery took its pay from Constantinople, whence all instructions and appointments of superior officers

likewise emanated. In Rome we find a *magister militum* at the head of the troops. The Roman senate still existed, but was reduced to a shadow.

All Roman institutions were altered and decayed; but their original features were still to be traced, and no heterogeneous element had been introduced into them. A special state of things now arose in Rome. We behold the rapid growth of the papal power and the continual increase of its moral and political influence. This had already begun under Leo I., and been further promoted by the pragmatic sanction. Not only the superintendence but often the nomination of public functionaries and judges was now in the hands of the popes. And the accession to St. Peter's chair of a man of real genius in the person of Gregory I., surnamed the Great, marked the commencement of a new era. By force of individual character, as well as by historic necessity, this pope became the most potent personage in Rome. Power fell naturally into his hands; he was the true representative of the city, the born defender of church and state. His ecclesiastical authority, already great throughout Italy, was specially great in the Roman diocese and in Southern Italy.

It was at this moment that the new Roman commune began to take shape and acquire increasing vigor owing to its distance from the seat of the empire and its resistance to the Lombard besiegers. Its special character was now to be traced in the preponderance of the military over the civil power. A Roman element had penetrated into the army, which was already possessed of considerable political importance. The prefect of Rome loses authority and seems almost a nullity compared with the *magister militum*. Hardly anything is heard of the senate. The popes now make common cause with the people against the Lombards on the one hand and the emperor on the other. But they avoid an absolute rupture with the empire, lest they should have to face the Lombard power without any prospect of help. Later, when the growing strength of the commune becomes menacing, they remain faithful to the empire in order not to be at the mercy of the people. It was a permanent feature of their policy never to allow the complete independence of the city until they should be its sole and absolute masters. But that time was still in the future. Meanwhile, pope and people joined in the defense of their common interests.

In the midst of these warlike tumults a new constitution, almost a new state, was being set up in Rome. During the conflict with Philippicus, the Monothelite and heretical emperor who ascended the throne in 711, the *Liber Pontificalis* makes the first mention of the duchy of Rome (*ducatu Romanæ urbis*), and we find the people struggling to elect a duke of their own. In the early days of the Byzantine rule the territory appertaining to the city was no greater than under the Roman empire. But, partly through the weakness of the government of Constantinople, and above all through the decomposition of the Italian provinces under the Lombards, who destroyed all unity of government in the peninsula, this dukedom was widely extended, and its limits were always changing in accordance with the course of events.

The constitution of the city now begins to show the results of the conditions amid which it took shape. The separation of the civil from the military power has entirely disappeared.

At that time the inhabitants of Rome were divided into four principal classes—clergy, nobles, soldiers, and simple citizens. The nobles were divided into two categories, first the genuine *optimates*, *i.e.*, members of old and wealthy families with large estates, and filling high, and often hereditary, offices in the state, the church, and

the army. These were styled *proceres* and *primates*. The second category comprised landed proprietors, of moderate means but exalted position, mentioned as *nobiles* by Gregory I., and constituting in fact a numerous petty nobility and the bulk of the army. Next followed the citizens, *i.e.*, the commercial class, merchants, and craftsmen, who, having as yet no fixed organization and but little influence, were simply designated as *honesti cives*. These, however, were quite distinct from the plebeians, *plebs*, *vulgus populi*, *viri humiles*, who in their turn ranked above bondsmen and slaves.

We now come to a question of weightier import for all desiring to form a clear idea of the Roman government at that period. What had become of the senate? It had undoubtedly lost its original character now that the empire was extinct. But, after much learned discussion, historical authorities are still divided upon the subject. Certain Italian writers of the eighteenth century—Vendettini, for example—asserted with scanty critical insight that the Roman senate did not disappear in the Middle Ages. The same opinion backed by much learned research was maintained by the great German historian Savigny. And Leo, while denying the persistence of the curia in Lombard Italy; adhered to Savigny's views as regarded Rome. Papencordt did the same, but held the Roman senate to be no more than a curia. This judgment was vigorously contested, first by Hegel and Giesebrecht, then by Gregorovius. These writers believe that after the middle of the sixth century, the senate had a merely nominal existence. According to Gregorovius its last appearance was in the year 579. After that date it is mentioned in no documents, and the chroniclers are either equally silent or merely allude to its decay and extinction.

During this period the Roman constitution was very simple. The duke, commanding the army, and the prefect, presiding over the criminal court, were the chiefs of the republic; the armed nobility constituted the forces, filled all superior offices, and occasionally met in a council called the senate, though it had no resemblance to the senate of older times. In moments of emergency a general parliament of the people was convoked. The constitution differed little from that of the other Italian communes, where, in the same way, we find all the leading citizens under arms, a parliament, a council, and one or more chiefs at the head of the government.

But Rome had an element that was lacking elsewhere. We have already noted that, in the provinces, the administrators of church lands were important personages, and exercised during the Middle Ages, when there was no exact division of power, both judicial and political functions. It was very natural that the heads of this vast administration resident in Rome, should have a still higher standing, and in fact, from the sixth century, their power increased to such an extent that in the times of the Franks they already formed a species of papal cabinet, with a share and sometimes a predominance in the affairs of the republic. Thus Rome had two tribunals, that of the *judices de clero*, or *ordinarii*, presided over by the pope, and that of the *judices de militia*, leaders of the army, dukes, and tribunes, also bearing the generic title of consuls. First appointed by the exarch and frequently by the pope, these decided both civil and criminal cases. In the latter they were sole judges under the presidency of the prefect.

The pope was thus at the head of a large administrative body with judicial and civil powers that were continually on the increase, and, in addition to his moral authority over Christendom, was possessed of enormous revenues. So in course of time he considered himself the real representative of the Roman republic.

Stephen II. had appealed to Pippin the leader of the Franks, for aid, and Pippin had responded, the pope conferring on him in reward the title *patricius Romanorum* and crowning him king of the Franks.

The position of Rome and of the pope is now substantially changed. Duke, prefect, militia, and the people exist as heretofore, but are all subordinate to the head of the church, who, by the donations of Pippin and Charlemagne, has been converted into a powerful temporal sovereign. Henceforth all connection with Byzantium is broken off, but Rome is still the main-spring of the empire, the Roman duchy its sole surviving fragment in Italy, and the pope stands before the world as representative of both.

Leo III. (796-816) further strengthened the ties between Charlemagne and the church by sending the former a letter with the keys of the shrine of St. Peter and the banner of Rome. Charlemagne had already joined to his office of patrician the function of high justice. The new symbols now sent constituted him *miles* of Rome and general of the church. The pope urged him to dispatch an envoy to receive the oath of fealty, thus placing himself, the representative of the republic, in the subordinate position of one of the bishops who had received the immunities of counts. And all these arrangements took place without the slightest reference to the senate, the army, or the people. And finally on Christmas day, in St. Peter's, before an assemblage of Roman and Frankish lords, clergy, and the people, the pontiff placed the imperial crown on Charlemagne's head and all proclaimed him emperor.

Thus the new emperor was elected by the Romans and consecrated by the pope. But he was their real master and supreme judge. The pope existed only by his will, since he alone supplied the means for the maintenance of the temporal power, and already pretended to the right of controlling the papal elections.

The death of Charlemagne in 814 was the signal for a fresh conspiracy of the nobles against the pope, who, discovering their design, instantly put the ringleaders to death, and was severely blamed by Louis for this violation of the imperial prerogative. While the matter was under discussion the nobles broke out in fiercer tumults, both in Rome and the Campagna. At last, in 824, the emperor Lothair came to re-establish order in Rome, and proclaimed a new and noteworthy constitution, to which Pope Eugenius II. (824-27) gave his oath of adherence. By this the partnership of pope and emperor in the temporal rule of Rome and the states of the church was again confirmed. When, no longer sustained by the genius of its founder, the Frankish empire began to show signs of dissolution, the popes, finding their power thereby strengthened, began to assume many of the imperial attributes. Soon, however, as a natural consequence of the loss of the main support of the papacy, the nobles regained vigor and were once more masters of the city. Teutonic and feudal elements had now largely penetrated into their organization. The system of granting lands, and even churches and convents, as benefices according to feudal forms, became more and more general. It was vain for the popes to offer opposition, and they ended by yielding to the current. The fall of the Frankish empire left all Italy a prey to anarchy, and torn by the faction fights of Berengar of Friuli and Guido of Spoleto, the rival claimants to the crowns of Italy and the empire. The Saracens were advancing from the south, the Huns from the north; the popes had lost all power; and in the midst of this frightful chaos a way was opened for the rise of the republics. Anarchy was at its climax in Rome, but the laity began to overpower the clergy to such an extent that the *judices de militia* prevailed over

the *judices de clero*. For a long time no imperial missi or legates had been seen, and the papacy was incredibly lowered. The election of the popes had positively fallen into the hands of certain beautiful women notorious for their evil life and depravity. The aristocracy alone gained strength; now freed from the domination of the emperor, it continually wrested fresh privileges from the impotent pontiffs, and became organized as the ruling force of the republic. Gregorovius, notwithstanding his denial of the continuation of the senate after the sixth century, is obliged to acknowledge that it appeared to have returned to life in the power of this new baronage. And, although this body was now permeated with the feudal principle, it did not discard its ancient traditions. The nobles claimed to be the main source of the empire; they wished to regain the dignity and office of patricius, and to make it, if possible, hereditary in their families. Nothing is known of their system of organization, but it seems that they elected a chief bearing the title of *consul, senator, princeps Romanorum*, who was officially recognized by the pope, as a patricius presided over the tribunals, and was the head of the commune.

Theophylact was one of the first to assume this dignity. His wife Theodora, known as the *senatrix*, was one of the women then dominating Rome by force of their charms and licentiousness. She was supposed to be the concubine of Pope John X. (914-928), whose election was due to her influence. Her daughter Marozia, in all things her worthy rival, was married to Alberic, a foreign mercenary of uncertain birth who rose to a position of great influence, and, although an alien, played a leading part in the affairs of the city. He helped to increase the power of Theophylact, who seemingly shared the rule of the city with the pope. In the bloody war that had to be waged against the Saracens of southern Italy, and at the defeat of the latter on the Garigliano (916), Theophylact and Alberic were the Roman leaders, and distinguished themselves by their valor. They disappeared from the scene after this victory, but Marozia retained her power, and bore a son Alberic, who was destined to greater deeds. The pope found himself caught in this woman's toils, and struggled to escape, but Marozia, gaining fresh influence by her marriage with Hugo, margrave of Tuscany, imprisoned the pontiff himself in Castle St. Angelo (928). This fortress was the property of Marozia and the basis of her strength. The unfortunate John died within its walls. Raised to the chair by Theodora, he was deposed and killed by her daughter. The authority of the latter reached its culminating point in 931, when she succeeded in placing her son John XI. on the papal throne. On the death of her second husband she espoused Hugo of Provence, the same who in 928 had seized the iron crown at Pavia, and now aspired to the empire. Dissolute, ambitious, and despotic, he came to Rome in 932, and leaving his army outside the walls, entered Castle St. Angelo with his knights, instantly began to play the tyrant, and gave a blow to Alberic, his stepson, who detested him as a foreign intruder. This blow proved the cause of a memorable revolution; for Alberic rushed from the castle and harangued the people, crying that the time was come to shake off the tyrannous yoke of a woman and of barbarians who were once the slaves of Rome. Then, putting himself at the head of the populace, he closed the city's gates to prevent Hugo's troops from coming to the rescue, and attacked the castle. The king fled; Marozia was imprisoned, Alberic proclaimed lord of the Romans, and the pope confined to the Lateran in the custody of his own brother. Rome was again an independent state, a

republic of nobles. Rid of the temporal dominion of emperor and pope, and having expelled the foreigners with great energy and courage, it chose Alberic for its chief with the title of *princeps atque omnium Romanorum senator*.

In 933 Hugo made his first attack upon the city, and was repulsed. A second attempt in 936 proved still more unfortunate, for his army was decimated by a pestilence. Thoroughly disheartened, he not only made peace, but gave his daughter in marriage to Alberic, thus satisfying the latter's desire to ally himself with a royal house. But this union led to no conciliation with Hugo. For Alberic, finding his power increased, marched at the head of his troops to consolidate his rule in the Campagna and the Sabine land. On the death of his brother, Pope John XI., in 936, he controlled the election of several successive popes, quelled a conspiracy formed against him by the clergy and certain nobles instigated by Hugo, and brilliantly repulsed, in 941, another attack by that potentate. At last, however, this inveterate foe withdrew from Rome, being summoned to the north by the victories of his rival, Berengarius. But Alberic, after procuring the election of various popes who were docile instruments of his will, experienced a check when Agapetus II. (946-955), a man of firmness and resource, was raised to the papal throne. The fortunes of Berengarius were now in the ascendant. In 950 he had seized the iron crown, and ruled in the Pentapolis and the exarchate. This being singularly painful to the pope, he proceeded to make alliance with all those enemies of Berengarius preferring a distant emperor to a neighboring and effective sovereign, with the Roman nobles who were discontented with Alberic, and with all who foresaw danger, even to Rome, from the extended power of Berengarius. And Agapetus recurred to the old papal policy by making appeal to Otho I., whose rule in Germany was distinguished by a prestige almost comparable with that of Charlemagne.

Otho immediately responded to the appeal and descended into Italy; but his envoys were indignantly repulsed by Alberic, and, being prudent as well as firm, he decided to wait a more opportune moment for the accomplishment of his designs. Meanwhile Alberic died in 954, and the curtain fell on the first great drama of the Roman republic. The name of Octavian given by Alberic to his son leads to the inference that he meant to make his power hereditary. But, suddenly, he began to educate this son for the priesthood, and, assembling the nobles in St. Peter's shortly before his death, he made them swear to elect Octavian as pope on the decease of Agapetus II. They kept their word, for in this way they freed themselves from a ruler. Possibly Alberic trusted that both offices might be united, and that his son would be head of the state as well the church. But the nobles knew this to be a delusion, especially in the case of a nature such as Octavian's. The lad was sixteen years old when his father died, received princely honors until the death of Agapetus, and was then elected pope with the name of John XII. He desired to be both pope and prince, but utterly failed to be either. Before long, realizing the impossibility of holding in check Berengarius, who still ruled over the exarchate, he sought in 960 the aid of Otho I., and promised him the imperial crown. Thus the new ruler was summoned by the son of the man by whom he had been repulsed. Otho vowed to defend the church, to restore her territories, to refrain from usurping the power of the pope or the republic, and was crowned on February 2, 962, with unheard-of pomp and display.

Accordingly, after being extinct for thirty-seven years,

the empire was revived under different but no less difficult conditions. Otho once more united the empire and the church, Italy and Germany. But the difficulties of the enterprise at once came to light. John XII., finding a master in the protector he had invoked, now joined the discontented nobles who were conspiring with Berengarius against the emperor. But the latter hastened to Rome in November, 963, assembled the clergy, nobles, and heads of the people, and made them take an oath never again to elect a pope without his consent and that of his son. He also convoked a synod presided over by himself in St. Peter's, which judged, condemned, and deposed Pope John and elected Leo VIII. (963-965), a Roman noble, in his stead. All this was done at the direct bidding of the emperor, who thus deprived the Romans of their most valued privilege, the right of choosing their own pope.

But, although the emperor thus disposed of the papacy at his will, his arbitrary exercise of power roused a long and obstinate resistance, which had no slight effect upon the history of the commune. Leo VIII. died in 965, and the imperial party elected John XIII. (965-972).

Pope John XIII. was succeeded by Benedict VI. (973-974) and Otho I. by his son Otho II., a youth of eighteen married to the Byzantine princess Theophano. Thereupon the Romans, who had supported the election of another pope, and were in no awe of the new emperor, rose to arms under the command of Crescenzo, a rich and powerful noble. They not only seized Benedict VI. by force, but strangled him in Castle St. Angelo. The national and imperial parties then elected several popes who were either exiled or persecuted, and one of them was said to be murdered. In 985 John XV. was elected (985-996). During this turmoil, the national party, composed of nobles and people, led by Giovanni Crescenzo, son of the other Crescenzo mentioned above, had taken complete possession of the government. But the following year Otho III. came to Rome, and his party opened the gates to him. Although deserted by nearly all his adherents, Crescenzo held the castle valiantly against its besiegers. At last, on April 29, 998, he was forced to make terms, and the imperialists, violating their pledges, first put him to torture and then hurled him from the battlements. Gregory V. dying shortly after these events, Sylvester II., another German, was raised to the papacy (999-1003).

Thus Otho III. was enabled to establish his mastery of Rome.

By the emperor's death in January, 1002, the race of the Othos became extinct, the papacy began to decline, as at the end of the Carolingian period, and the nobles, divided into an imperial and a national party, were again predominant. They reserved to themselves the office of patrician, and, electing popes from their own ranks, obtained enlarged privileges and power.

The new emperor, Henry II., endeavored to reestablish order in Rome, and strengthen his own authority together with that of the pope. But the nobles had in all things the upper hand. They were regularly organized under leaders, held meetings, asserted their right to nominate both pope and emperor, and in fact often succeeded in so doing. Even Henry II. himself was obliged to secure their votes before his coronation.

Meanwhile John XIX. was succeeded by his nephew, Benedict IX. (1033-45), a lad of twelve, who placed his own brother at the head of the republic. Thus church and state assumed the aspect of hereditary possessions in the powerful house of the counts of Tusculum. But the vices and excesses of Benedict were so monstrous that the papacy sank to the lowest depth of corruption;

there followed a series of tumults and reactionary attempts, and so many conflicting elections that in 1045 three popes were struggling for the tiara in the midst of scandal and anarchy.

Pope Paschal II. (1099-1118) found himself entirely at the mercy of the tyrannous nobles who were alike masters of Rome, of its government, and its spiritual lord. The nobles were so completely the masters that the pope, in spite of having trusted them with the government, could only return to Rome with the aid of the Normans. Being now absorbed in the great investiture question, he had recourse to a daring plan. He proposed to Henry V. that the bishops should resign all property derived from the crown and depend solely on tithes and donations, while the empire should resign the right of investiture. Henry seemed disposed to accept the suggestion, but, suddenly changing his mind, took the pope prisoner and forced him to yield the right of investiture and to give him the crown (1111).

The popes were now the sport of the nobles whom they had aggrandized by continual concessions for the sake of peace. And peace seemed at hand when Innocent II. (1130-43), after triumphing over two antipopes, came to terms with Roger I., recognized him as king of Sicily, and gained his friendship and protection. But now still graver tumults took place.

In 1143 the rebellious people rushed to the Capitol, proclaimed the republic, reconstituted the senate, to the almost entire exclusion of the nobles, declared the abolition of the temporal power, issued coin inscribed to the senate, the people, and St. Peter, and began to reckon time from the day of the restoration of liberty. Arnold of Brescia was not, as has been incorrectly stated, the author of this revolution, for he had not yet arrived in Rome. It was the outcome of an historic necessity—above all of the renewed vigor of the people and its detestation of the feudal aristocracy. The pope was requested to resign the temporal power, the regalia, and every other possession, and content himself with the tithes and offerings of the faithful according to the scheme of Paschal II. He indignantly refused, marched at the head of the nobles against the Capitol, but was violently repulsed, and received a blow on the head from a stone, which is supposed to have occasioned his speedy death on February 15, 1145. Eugenius III. was then elected (1145-53), but soon had to fly to Viterbo in quest of armed assistance, in consequence of the senate's resolve to forcibly prevent his consecration until he recognized the new state of things in the Eternal City.

It was at this moment that Arnold of Brescia arrived in Rome. His ideas, already well known in Italy, had inspired and promoted the Roman revolution, and he now came to determine its method and direction. He urged the reconstitution of the ancient senate and senatorial order, which indeed was already partially accomplished, and of the ancient equestrian order, and the reconstruction and fortification of the Capitol. His proposed senate was a body somewhat resembling communal councils of Upper Italy, his equestrian order a mounted force composed of the lesser nobility, since at Rome, as elsewhere, the lower classes had neither time nor means to form part of it. All his suggestions were accepted; the citizens labored strenuously on the fortification of the Capitol. The pope soon beheld the revolution spread beyond the walls, and several cities of the state proclaimed their independence. The barons of the Campagna profited by the opportunity to act as independent sovereigns. Thus the whole domain of the church was threatened with dissolution. The pope marched toward Rome with his newly gathered army,

but hoped to come to terms. The Romans, in fact, recognized his authority, and he in turn recognized the republic. The office of patrician was abolished, and seems to have been replaced by that of gonfalonier, and the prefect, answering to the podestà of the other republics, was revived. The senators received investiture from the pope, who returned to Rome at Christmas, 1145.

The republic now seems to have been fully constituted.

As was easily to be foreseen, the agreement with the pope was of short duration. The revolution could not be checked; the Romans desired independence, and their spiritual lord fled to France, whence, in 1147, he proclaimed a new crusade, and now reëntered Italy, proclaimed Arnold a schismatic, and then advanced to Tusculum, assembled an army in order to attack Rome. In this emergency the Romans applied to Conrad III., the first emperor of the house of Hohenstaufen,

After long hesitation the king of the Romans at last replied to these appeals, stating that he would come "to reëstablish order, reward the faithful, and punish the rebellious." These words promised ill. In fact Conrad had already arranged terms with the pope; but his life came to an end on February 15, 1152.

He was succeeded by Frederick I., surnamed Barbarossa, who took no notice of the numerous letters urging him to come and receive the empire from the Roman people, which alone had the right of conferring it. In accordance with design of subduing all the independent cities, he made an agreement with the pope, in which he vowed to give no truce to the Romans, but subject them to their spiritual lord, whose temporal power should be restored. The pope, on his side, promised to crown him emperor. Thereupon the people again rose to arms, and Arnold broke off all negotiations with Eugenius III. Finally, to increase the gravity of the situation, an English pope, Hadrian IV., was elected (1154-59), who was also a man of strong and resolute temper. In fact, even before being able to take possession of the Lateran, he requested the Romans to banish Arnold, who, with greater eloquence than ever, was directing his thunders against the papacy. These utterances increased the wrath of Hadrian, who, encouraged by the knowledge that Frederick and his host were already in Italy, at last launched an interdict against Rome. It was the first time that a pope had ventured to curse the Eternal City. The interdict put a summary stop to the religious life of the inhabitants. Men's minds were seized with a sudden terror, and a fierce tumult broke out. Thereupon the senators, whose opposition to the pope was less courageous than that of the fallen magnates, prostrated themselves at his feet and implored pardon. But Hadrian demanded the expulsion of Arnold before consenting to raise the interdict. Arnold was therefore obliged to leave Rome. He was shortly afterward captured and hanged.

But the Romans who had so basely deserted their champion would not give up their republic. Their envoys went to meet Frederick near Sutri, and made an address in the usual fantastic style on the privileges of the Roman people and its sole right to confer the imperial crown. But Frederick indignantly cut short their harangue, and they had to depart full of rage. He then continued his march, and, entering Rome on June 18, 1155, was forthwith crowned in St. Peter's by the pope. Hadrian IV. died in 1159, and the national party elected Alexander III. (1159-1181), who energetically opposed the pretensions of Frederick, but, having to struggle with three antipopes successively raised against him by the imperial party, was repeatedly driven into exile.

Meanwhile Pope Alexander continued the crafty policy of Hadrian and with better success, for the Lombard cities had now formed a league and inflicted a signal defeat on the emperor at Legnano on May 29, 1176. One of the results of this battle was the conclusion of an agreement between the pope and the emperor, the latter resigning his pretensions on Rome and yielding all that he had denied to Hadrian. And by the treaty of Venice (August 1, 1177) the antipope was forsaken, Alexander III. recognized and hailed as the legitimate pontiff, and the prefect of Rome again nominated by the pope, to whom the emperor restored the temporal power, acknowledging him the independent sovereign of Rome and of the ecclesiastical state, from Acquapendente to Beprano.

From all this it is clear that the church had been made independent of the empire, and that the republic, despite its numerous concessions, was by no means subject to the church. The pope, in fact, had obtained liberty of election, and Frederick I., by resigning the investiture of the prefect, had virtually renounced his claim to imperial power in Rome.

Meanwhile the struggle between Frederick II. and the pope was once more renewed. The former sought to dominate Italy, separate the state from the church, and repress the republics. The latter, although really hostile to the Roman free government, joined it against the emperor, who on his side favored the republic of Rome and the nobles most adverse to the pope.

The republic meanwhile preserved its independence against the pope, who, among other concessions, had entirely given up to it the right of coinage. Nevertheless, being much harassed by the factiousness of the nobility, it was obliged in 1252 to decide on the election of an alien senator armed with ample powers, precisely as other communes gave the government into the hands of a podestà. Accordingly a Bolognese noble, Brancaleone degli Andalò, count of Casalecchio, and a Ghibelline of much energy and talent, was invited to Rome. But before accepting office he insisted on making definite terms. He desired to hold the government for three years; and this, although contrary to the statutes, was granted. Further, to insure his personal safety, he demanded that many scions of the noblest Roman houses should be sent as hostages to Bologna; and to this also the republic consented. Then, in August, 1252, he came with his judges and notaries, made oath to observe justice and the laws, and began to govern. He was head of the republic in peace and in war, supreme judge and captain in chief. He nominated the podestàs of subject territories, dispatched ambassadors, issued coin, concluded treaties, and received oaths of obedience. The pope, who was then at Perugia, was greatly afflicted by the arrival of this new master, but, despairing of aid from any quarter, was forced to make a virtue of necessity.

The death of Innocent IV. and the election of Alexander IV. (1254-61), who was milder and less shrewd than his predecessor, were favorable events for Brancaleone; but he failed to check the growing discontent of the clergy and the more powerful nobles, who had received deadly injuries at his hands. And when, on the expiration of his three years' term of office, his reelection was proposed, his enemies rose against him, accused him before the *sindacato*, threw him into prison, and vehemently protested against the continuance of "foreign tyranny." His life was only spared on account of the hostages sent to Bologna. The next senator chosen was a Brescian Gueff, Emanuele de Madio, a tool of the nobles, who were now masters of the situation. But soon afterward, in 1257, the guilds rose in revolt, drove the nobles from power, put the pope to

flight, and recalled Brancaleone for another three years' term. He ruled more sternly than before, hung several nobles, and made alliance with Manfred, the representative of the Swabian party in Italy. This rendered him increasingly odious to the pope and procured his excommunication. But, disregarding the thunders of the church, he marched against Anagni, the pope's birthplace, and Alexander was quickly obliged to humiliate himself before the senator of Rome. Brancaleone next set to work to destroy the fortified towers of the nobility, and in razing them to the ground ruined many of the adjacent dwellings. Accordingly, a considerable number of nobles became homeless exiles. In 1258, while engaged on the siege of Corneto, Brancaleone was attacked by a violent fever, and, being carried back to Rome, died on the Capitoline Hill. Thus ended the career of a truly remarkable statesman. He was succeeded by his uncle, Castellano degli Andalò, who, lacking the political genius of his nephew, only retained office until the following spring (1259), in the midst of fierce and perpetual disturbances. Then the people, being bribed by the pope, joined with the nobles and drove him away. His life too was saved by having followed his nephew's shrewd plan of sending hostages to Bologna. Two senators of Roman birth were next elected; and on the death of Alexander IV. a French pope was chosen, Urban IV. (1261-64), thus giving fresh predominance in the church to the anti-Swabian policy. But the internal disturbances of the city soon drove Urban to flight.

After the election of Benedict XII. (1334-42) confusion reached so great a pitch that the Romans named thirteen heads of regions to carry on the government with two senators, while the king still sent vicars as before. The people, for the sake of peace, once more granted the supremacy of the senate to the pope, and he nominated two knights of Gubbio, Giacomo di Cante dei Gabrielli and Bosone Novello dei Gabrielli, who were succeeded by two other senators the following year. But in 1339 the Romans attacked the Capitol, named two senators of their own choice, re-established a democratic government, and sent ambassadors to Florence to ask for the ordinances of justice (*ordinamenti della giustizia*), by which that city had broken the power of the nobles, and also that a few skilled citizens should lend their help in the reconstitution of Rome.

Shortly before this another revolution in Rome had re-established the government of the Thirteen and the two senators. The people, being anxious to show their intention of respecting the papal authority, had dispatched to Avignon as ambassador of the republic, in 1343, a man destined to make much noise in the world. This was Cola di Rienzo, son of a Roman innkeeper, a notary, and an impassioned student of the Bible, the fathers, Livy, Seneca, Cicero, and Valerius Maximus. Thoroughly imbued with a half pagan, half christian spirit, he believed that he had a divinely inspired mission to revive the ancient glories of Rome. Of handsome presence, full of fantastic eloquence, and stirred to enthusiasm by contemplation of the ruined monuments of Rome, he harangued the people with a stilted oratory that enchanted their ears. He hated the nobles, because one of his brothers had been killed by them; he loved the republic, and in its name addressed a stately Latin speech to the astonished pope, and, offering him the supreme power, besought his instant return to Rome. He also begged him to allow the city to celebrate a jubilee every fifty years, and then, as a personal request, asked to be nominated notary to the urban chamber. The pope consented to everything, and Rienzi communicated this good news to Rome in an emphatically worded epistle.

After Easter, in 1344, he returned to Rome, and found to his grief that the city was a prey to the nobles. He immediately began to admonish the latter, and then, draped in a toga adorned with symbols, exhibited and explained allegorical designs to the people, and announced the speedy restoration of the past grandeur of Rome. Finally he and a few burghers and merchants, whom he had secretly inflamed by his discourses, made a solemn vow to overthrow the nobility and consolidate the republic.

The pope, however, was weary of toleration, and, coming to terms with the nobles, incited them to war. They accordingly moved from Palestrina, and on November 30th were encamped before Rome. Rienzi now put forth his energy. He had already called the militia to arms, and a genuine battle took place in which eighty nobles, chiefly of the Colonna clan, were left dead. This was a real catastrophe to them, and the aristocracy never again achieved the rule of the republic. But Rienzi's head was turned by this sudden success. In great need of money, he began to play the tyrant by levying taxes and exacting instant obedience. The papal legate saw his opportunity and seized it, by threatening to bring a charge of heresy against the tribune. Rienzi was dismayed. He declared himself friendly to the pope and willing to respect his authority; and he even sought to conciliate the nobles. At this moment certain Neapolitan and Hungarian captains, after levying soldiers with the tribune's consent, joined the nobles and broke out in revolt. On their proving victorious in a preliminary encounter with some of Rienzi's guards, the tribune suddenly lost heart, resigned the power he had held for seven months, and took refuge with a few trusty adherents in Castle St. Angelo, on December 15, 1347. Thence he presently fled to Naples, vainly hoping to find aid, and afterward disappeared for some time from the scene.

In the meantime Rienzi's popularity was increasing in Rome; without money or arms, the ex-tribune succeeded by his eloquence in winning over the two Provençal leaders, brothers of the famous free captain Fra Monreale; and, seduced by his promises and hopes, they supplied him with funds. Then, profiting by his prestige, the apparent favor of the pope, and the sums received, he was able to collect a band of 500 soldiers of mixed nationalities and returned toward Rome. On Monte Mario he was met by the cavallerotti. On August 1, 1354, he entered the Castello gate, took possession of the government, named Monreale's two brothers his captains, and sent them to lay siege to Palestrina, which was still the headquarters of the Colonna. But then money ran short, and he again lost his head. Inviting Fra Monreale to a banquet, he put him to death for the sake of his wealth, and kept the two brothers in confinement. This act excited general indignation. And when, after his ill-gotten gains were spent, he again resorted to violence to fill his purse, the public discontent was vented in a sudden revolt on October 8th. The people stormed the Capitol with cries of "Death to the traitor." Rienzi presented himself at a window waving the flag of Rome. But the charm was finally broken. Missiles were hurled at him; the palace was fired. He hid himself in the courtyard, shaved his beard, and, disguised as a shepherd with a cloth over his head, slipped into the crowd and joined in their cries against himself. Being recognized, however, by the golden bracelets he had forgotten to remove, he was instantly stabbed. For two days his corpse was left exposed to the insults of the mob, and was then burned. Such was the wretched end of the man who, at one moment, seemed destined to fill the world with his name as the regenerator of Rome and of Italy.

In all the Italian cities the overthrow of the aristocracy had led to military impotence and pressing danger of tyranny. The same thing had happened in Rome when the nobility, weakened by the absence of church and empire, received its death-blow from Rienzi. But, whereas elsewhere tyrants were gradually arising in the citizen class, Rome was always in danger of oppression by the pope. Nor was any aid available from the empire, which had never recovered from its abasement under Louis the Bavarian. In fact, when Charles of Luxembourg came to Rome to be crowned, he was obliged to promise the pope that he would not enter the city. On Easter day, 1355, he received the crown, and departed after counseling the Romans to obey the pope. And the pontiffs had greater need than ever of an established kingdom. Their position in France was much endangered by that country's disorder. New states were being formed on all sides; the mediæval unity was shattered, and the shrunken spiritual authority of the church increased her need of material strength. As Italian affairs stood, it would be easy for the popes to found a kingdom, but their presence was required in Rome before it could be firmly established.

The popes, being no longer in safety at Avignon, really decided to return to Italy. Even Urban V. had to pay ransom to escape from the threatened attacks of the free companies. The Romans implored his return, and he was further urged to it by the Italian *literati* with Petrarch at their head. In April, 1367, he finally quitted Avignon, and, entering Rome on October 16th, was given the lordship of the city.

The Romans retained the conservators, conferring on them the political power of the reformers; they reestablished the *banderesi* with the Florentine title of *executores justitiæ* and the four *antepositi* with that of *consiliarii*. Thus the "Felix Societas Balestrariorum et Pavesatorum Urbis" was restored, and the two councils met as before. The new French pope, Gregory XI. (1370-78), had to be content with obtaining supremacy over the senate and the possession of the Castle St. Angelo.

The next pope, Urban VI. (1378-89), a Neapolitan, was the spirit of discord incarnate. His election was not altogether regular: the French party among the cardinals was against him; and the people were ripe for insurrection. But, regardless of all this, Urban threatened the cardinals in his first consistory, saying that church reform must begin with them; and he used the same tone with the people, reproving them for failing to suppress the *banderesi*. In consequence of this the cardinals of the French party, assembling at Fondi, elected the antipope Clement VII. (1378-94) and started a long and painful schism in the church. Clement resided in Avignon, while Urban in Rome was engaged in opposing Queen Joanna I., of Naples, and favoring Charles of Durazzo, who, on conquering the Neapolitan kingdom, was made gonfalonier of the church and senator of Rome, where he left a vicar as his deputy. Shortly afterward the pope went to Naples, and made fierce war on the king. Then, after many adventures, during which he tortured and put to death several cardinals whom he suspected of hostile intentions, he returned to Rome, where the utmost disorder prevailed. The conservators and the *banderesi* were still at the head of the government, and, the pope speedily falling out with them, a riot ensued, after which he excommunicated the *banderesi*. These at last made submission to him, and Urban VI. became master of Rome before his death in 1389. He was succeeded by Boniface IX. (1389-1404), another Neapolitan, but a man of greater shrewdness and capacity. His first act was to crown Ladislaus king of Naples, and secure

the friendship and protection of this ambitious and powerful prince. In all the principal cities of the state he chose the reigning lords for his vicars. But he allowed Fermo, Ascoli, and Bologna the privilege of assuming their own vicariate for twenty-five years. And, as these different potentates and governments had only to pay him an annual tribute, all parties were satisfied, and the pope was able to bestow at least an appearance of order and unity on his state. But fresh tumults soon arose, partly because the conservators and banderesi sought to govern on their own account, and especially because the pope seems for a time to have omitted naming the senator. Boniface was a prudent man; he saw that events were turning in his favor, now that throughout Italy liberty was tottering to its fall, and bided his time. He was satisfied for the moment by obtaining a recognition of the immunities of the clergy, rendering them solely amenable to ecclesiastical tribunals, and thus distinguishing the powers of the church from those of the state in Rome. The republic also pledged itself neither to molest the prelates nor to levy fresh contributions on them toward repairing the walls, to aid in recovering the estates of the church in Tuscia, and to try to conciliate the baronage. This concordat, concluded with the conservators and banderesi on September 11, 1391, was also confirmed on March 5, 1392, by the heads of the regions, together with a fresh treaty binding both parties to furnish a certain number of armed men to combat the prefect of Vico and the adherents of the antipope at Viterbo. With the exception of this city, Orchi, and Civita Vecchia, all other conquered territory was to belong to the republic. But the Romans soon discovered that they were playing into the hands of the pope, who kept everything for himself, without even paying the troops. Upon this a riot broke out; Boniface fled to Perugia in October, 1392, and resolved to exact better terms when next recalled to Rome. Meanwhile the Romans subdued the prefect, captured Viterbo, and, being already repentant, handed it over to the pope and implored his return. He then proposed his own terms, which were approved, not only by the conservators, banderesi, and four councilors, but also by the special council and by the unanimous vote of a general assembly composed of the above-mentioned authorities, heads of regions, other officials, and a hundred citizens (August 8, 1393). These terms prescribed that the pope was to elect the senator, and that, on his failing so to do, the conservators would carry on the government after swearing fealty to him. The senatorial function was to be neither controlled nor hampered by the banderesi. The immunities of the clergy were to be preserved, and all church property was to be respected by the magistrates. The expenses of the pope's journey were to be paid, and he was to be escorted to Rome in state. Boniface tried to complete his work by abolishing the banderesi, the last bulwarks of freedom; but the people, although weakened and weary, made efforts to preserve them, and, although their fall was inevitable, the struggle went on for some time.

During the spring of 1394 the banderesi provoked an insurrection in which the pope's life was endangered; it was only saved by the arrival of King Ladislaus, who came from Naples with a large force in the early autumn. But for the Neapolitan soldiery Boniface could not have withstood the long series of revolts that continually exposed him to fresh perils and the anxiety caused by the persistent schism of the church. The death of Clement VII. in 1394 was followed by the election of another antipope, Benedict XIII. But a new jubilee was in prospect for the year 1400, and this was always an efficacious means of bending the will of the Romans. De-

pending upon this and the assistance of Ladislaus, Boniface not only demanded full powers to nominate senators (none having recently been elected), but insisted on the suppression of the banderesi. Both requests were granted; but, directly Angelo Alaleoni was made senator, a conspiracy was hatched for the reestablishment of the banderesi. However, the pope felt sure of his strength; the plot was discovered and the conspirators were beheaded on the stairs of the capitol. This proved the end of the banderesi and of the liberties of Rome.

Innocent VII. (1404-6) was the next pope. He, too, was a Neapolitan, and on his election the people again rose in revolt and refused to acknowledge him unless he consented to resign the temporal power. But Ladislaus of Naples hastened to his help, and an agreement was made which, under the cover of apparent concessions, really riveted the people's chains. Rome was recognized as the seat of the temporal and spiritual sovereignty of the pope, and the pope continued to appoint the senator.

Innocent, dying in 1406, was succeeded by Gregory XII., a Venetian, who, as we shall presently see, resigned the chair in 1415. On his accession, finding his state firmly established, he seemed to be seriously bent on putting an end to the Great Schism, and for that purpose arranged a meeting with the antipope Benedict XIII. at the congress of Savona in 1408. But Gregory and Benedict only used the congress as a pretext for making war upon each other, and were urged on by Ladislaus, who hoped by weakening both to gain possession of Rome, where, although opposed by the Orsini, he had the support of the Colonna. Gregory, who had then fled from Rome, made a momentary attempt to win the popular favor by restoring the government of the banderesi; but Ladislaus marched into Rome in June, 1408, and established a senator of his own. Meanwhile the two popes were continuing their shameful struggle, and the council of Pisa (March, 1409), in attempting to check it, only succeeded in raising up a third pontiff, first in the person of Alexander V. (1409-10), and then in the turbulent Baldassare Cossa, who assumed the name of John XXIII. The latter began by sending a large contingent to assist Louis of Anjou against Ladislaus. But the enterprise failed, and, seeing himself deserted by all, Pope John next embraced the cause of his foe by naming him gonfalonier of the church. Thereupon Ladislaus concluded a sham peace, and then, seizing Rome, put it to the sack and established his own government there. Thus John, like the other two popes, became a wanderer in Italy. In August, 1414, Ladislaus died and was succeeded by the scandalous Queen Joanna II. The Roman people promptly expelled the Neapolitans, and Cardinal Isolani, John's legate, succeeding in rousing a reaction in favor of the church, constituted a government of thirteen "conservators" on October 19th.

In November, 1414, the council of Constance assembled, and at last ended the schism by deposing all the popes, and incarcerating John XXIII., the most turbulent of the three. On November 11, 1417, Oddo Colonna was unanimously elected to the papal chair; he was consecrated in the cathedral on the 27th as Pope Martin V., and, being acknowledged by all, hastened without delay to take possession of his see. Meanwhile disorder was at its height in Rome. The cardinal legate Isolani governed as best he could, while Castle St. Angelo remained in the hands of the Neapolitans, who still had a party in the city. In this divided state of affairs Braccio, a daring captain of adventurers, nicknamed Fortebraccio, was inspired with the idea of making himself master of Rome. Overcoming the



feebly resisted, he succeeded in this on June 16, 1416, and assumed the title of "Defensor Urbis." But Joanna of Naples dispatched Sforza, an equally valiant captain, against him, and, without offering battle, Fortebraccio withdrew on August 26th, after having been absolute master of the eternal city for seventy days. Sforza marched in on the 27th, and took possession of the city in the name of Joanna. Martin V. instantly proved himself a good statesman. He confirmed the legate Isolani as his vicar, and Giovanni Savelli as senator. Leaving Constance on May 16, 1418, he reached Milan on the 12th of October, and slowly proceeded on his journey. While in Florence he dispatched his brother and nephew to Naples to make alliance with Joanna, and caused her to be crowned October 28, 1419, by his legate Morosini. Upon this she promised to give up Rome to the pope. Her general, Sforza, then entered the service of Martin V., and compelled Fortebraccio, who was lingering in a threatening attitude at Perugia, to make peace with the pope. The latter intrusted Fortebraccio with the conduct of the campaign against Bologna, and that city was reduced to submission on July 15, 1420. The Romans had already yielded to Martin's brother, the legate, and now earnestly besought the arrival of their pope. Accordingly he left Florence on September 19, 1420, and entered the Vatican on the 28th. Rome was in ruins; nobility and burghers were equally disorganized, the people unable to bear arms and careless of their rights, while the battered walls of the Capitol recorded the fall of two republics.

Martin V. reduced the remains of the free Roman Government to a mere civil municipality. Following the method of other despots of Italy, the old republican institutions were allowed to retain their names and forms, their administrative and some of their judicial attributes, while all their political functions were transferred to the new government. Order was reëstablished and justice rigidly observed. Many rebellious places were subdued by the sword, and many leaders of armed bands were hanged. The pope, however, was forced to lean on his kinsmen the Colonna and again raise them to power by grants of vast fiefs both in his own states and the Neapolitan territory. And, after first supporting Joanna II., who had assisted his entry into Rome, he next sided with her adversary, Louis of Anjou, and then with Alphonso of Aragon, the conqueror of both and the constant friend of the pope, who at last felt safe on his throne. Rome now enjoyed order, peace, and security, but had lost all hope of liberty. And when Martin died (February 20, 1431) these words were inscribed on his tomb: *Temporum suorum felicitas.*

Eugenius IV. (1431-47) leant on the Orsini, and was fiercely opposed by the Colonna, who excited the people against him. Accordingly on May 29, 1434, the Romans rose in revolt to the old cry of "Popolo e popolo," and again constituted the rule of the seven governors of liberty. The pope fled by boat down the Tiber, and, being pursued with stones and shots, narrowly escaped with his life. On reaching Florence, he turned his energies to the recovery of the state. It was necessary to quell the people; but, first of all, the Colonna and the clan of the prefects of Vico, with their renewed princely power, had to be overthrown. The Orsini were still his friends. Eugenius intrusted the campaign to Patriarch (afterward Cardinal) Vitelleschi, a worthy successor of Albornoz, and of greater ferocity if less talent. This leader marched his army toward Rome, and, instantly attacking Giovanni, prefect of Vico, captured and beheaded him. The family was now extinguished; and, its possessions reverting to the

church, the greater part of them were sold or given to Count Everso d'Anguillara, of the house of Orsini. The prefecture, now little more than an honorary title, was bestowed at will by the popes. Eugenius gave it to Francesco, founder of the powerful line of the Gravina-Orsini. The pope at last returned to Rome in 1443, and remained there quietly till his death in 1447.

His successor Nicholas V. (1447-55) was a scholar solely devoted to the patronage of literati and artists. During his reign there was a fresh attempt to restore the republic, but it was rather prompted by literary and classical enthusiasm than by any genuine patriotic ardor. Political passions and interests had ceased to exist. The conspiracy was headed by Stefano Porcari, a man of the people, who claimed to be descended from Cato. He had once been captain of the people in Florence, and was made podestà of Bologna by Eugenius IV. He was a caricature of Cola di Rienzo, and extravagantly proud of his Latin speeches in honor of ancient republican liberty. The admiration of antiquity was then at its height, and Porcari found many enthusiastic hearers. Directly after the death of Eugenius IV. he made a first and unsuccessful attempt to proclaim the republic. Nevertheless Nicholas V., with the same indulgence for scholars that had prompted him to pardon Valla for denying the temporal power of the papacy and laughing to scorn the pretended donation of Constantine, freely pardoned Porcari and named him podestà of Anagni. He filled this office with credit, but on his return to Rome again began to play the agitator, and was banished to Bologna with a pension from the pope. Nicholas V. had conferred all the state offices upon priests and abbots, and had erected numerous fortresses. Hence there were many malcontents in Rome, in communication with Porcari at Bologna, and ready to join in his plot. Arms were collected, and on the day fixed he presented himself to his fellow-conspirators adorned with rich robes and a gold chain, and harangued them in Latin on the duty of freeing their country from the yoke of the priests. His design was to set fire to the Vatican on January 6, 1453, the feast of the Epiphany; he and his followers were to seize the pope, the cardinals, and Castle St. Angelo. But Nicholas received timely warning; the conspirators' house was surrounded; and Porcari himself was seized while trying to escape, confined in Castle St. Angelo, and put to death with nine of his companions on January 9th. Others shortly suffered the same fate.

There was still a senator of Rome, whose nomination was entirely in the hands of the pope, still three conservators, the heads of the rioni, and an elected council of twenty-six citizens. Now and then also a shadowy semblance of a popular assembly was held to cast dust in the eyes of the public, but even this was not for long. All these officials, together with the judges of the Capitol, retained various attributes of different kinds. They administered justice and gave sentence. There were numerous tribunals, all with undefined modes of procedure, so that it was very difficult for the citizens to ascertain in which court justice should be sought. But in last resort there was always the supreme decision of the pope. Thus matters remained to the time of the French Revolution.

For the completion of this system a final blow had to be dealt to the aristocracy, whose power had been increased by nepotism; and it was dealt by bloodshed under the three following popes—Sixtus IV. (1471-84), Innocent VIII. (1484-92), and Alexander VI. (1492-1503)—each of whom was worse than his predecessor.

Nevertheless the republic twice attempted to rise from its grave, and on the second occasion gave proof

of heroism worthy of its past. It was first resuscitated in February, 1798, by the influence of the French Revolution, and the French constitution of the year III was rapidly imitated. Rome had again two councils—the tribunate and the senate, with five consuls constituting the executive power. But in the following year, owing to the military reverses of the French, the government of the popes was restored until 1809, when Napoleon I. annexed to his empire the States of the Church. Rome was then governed by a *consulta straordinaria*—a special commission—with the municipal and provincial institutions of France. In 1814 the papal government was again reinstated, and the old institutions, somewhat modified on the French system, were recalled to life. Pius IX. (1846–77) tried to introduce fresh reforms, and to improve and simplify the old machinery of state; but the advancing tide of the Italian revolution of 1848 drove him from Rome; the republic was once more proclaimed, and had a brief but glorious existence. Its programme was dictated by Joseph Mazzini, who, with Saffi and Armellini, formed the triumvirate at the head of the government. United Italy was to be a republic, with Rome for her capital. The rhetorical idea of Cola di Rienzo became heroic in 1849. The constituent assembly (February 9, 1849) proclaimed the fall of the temporal power of the popes, and the establishment of a republic which was to be not only of Rome but of all Italy. France, although then herself a republic, assumed the unenviable task of reestablishing the temporal power by force of arms. But the gallant defense of Rome by General Garibaldi covered the republic with glory. The enemy was repulsed, and the army of the Neapolitan king, sent to restore the pope, was also driven off. Then, however, France dispatched a fresh and more powerful force; Rome was vigorously besieged, and at last compelled to surrender. With June, 1849, begins the new series of pontifical laws designed to restore the government of Pius IX., whose reign down to 1870 was that of an absolute sovereign. Then the Italian Government entered Rome (September 20, 1870), proclaimed the national constitution (October 9, 1870), and the Eternal City became the capital of Italy. Thus the scheme of national unity, the natural outcome of the history of Rome and of Italy, impossible of accomplishment under the rule of the popes, was finally achieved by the monarchy of Savoy, which, as the true representative and personification of Italian interests, has abolished the temporal power of the papacy and made Rome the seat of government of the united country.

ROME, the capital of Oneida county, N. Y., is one of the most prosperous municipalities in the Mohawk valley. It is handsomely situated on the Mohawk river and Black river canal, 110 miles west-northwest of Albany, 142 miles south of Ogdensburg, 39 miles east of Syracuse, and 15 miles northwest of Utica; and is an important point on the New York Central, and Rome, Watertown and Ogdensburg railroads, besides enjoying close communication with the Erie canal. The city is laid out with considerable regard to beauty of location, and is in all respects attractive. It contains a handsome court-house, thirteen churches, high-school and graded-school buildings, half a dozen hotels, four national and two savings banks, and one private bank, an academy, public library, opera house and other evidences of the enterprise and refinement of the inhabitants. The manufacturing industries embrace locomotive works, iron works, factories for the production of furniture, machinery, hardware, specialties and trimmings, cigars, cement, glue, saddlery, harness, wire, etc., also saw and grist mills, gas works and canning works. It is lighted by

gas, supports one or more papers, and has a population in 1890 of 14,991.

ROME, the capital of Floyd county, Ga., is picturesquely located among the hills that dot the landscape in that portion of the State, at the confluence of Oostenaula and Etowah rivers. The city affords evidences of the taste and public spirit of the citizens, and is considered one of the many promising cities of the Southern States. It is situated on the East Tennessee, Virginia and Georgia, Chattanooga, Rome and Columbus, and Rome and Dalton railroads, and is the western terminus of the Rome railroad, 195 miles northeast of Selma, 71 miles northwest of Atlanta, and 39 miles southwest of Dalton. By the latter road it is placed in direct connection with the Western and Atlantic road. It was incorporated as a city in 1847, and contains a court-house, female seminary, high-school, one private and two national banks, with a total paid-up capital of \$400,000, and \$130,000 surplus; ten churches, one daily and three weekly newspapers, several hotels, an opera house, public hall, with seating capacity of from 500 to 1,000, and a large number of stores. Its manufactures embrace iron, furniture, sash, harness, machinery, nails, and plows; also ice and cotton-seed oil works. In 1870 the population was 2,748; in 1880, 3,877; and in 1890 it was 6,970.

ROMFORD, an old market-town of Essex, England, is situated on the small river Rom, and on the Great Eastern railway about twelve miles east-northeast of London. The ancient church of St. Edward the Confessor was replaced in 1850 by a structure in the Late Decorated style. The large brewery of Ind, Coope & Co., is situated in town, and there are extensive market gardens in the neighborhood. A grant of market was obtained in 1247, and this is still of importance as regards both cattle and corn. The population of the urban sanitary district (area 1,159 acres) in 1871 was 6,512, and in 1891 was 8,408.

ROMILLY, SIR SAMUEL, the great legal reformer who first attempted to relax the barbarity of the English penal code, was the second son of Peter Romilly. Called to the bar in 1783, he went the midland circuit, but was chiefly occupied with chancery practice. Sir Samuel Romilly's efforts made his name famous not only in England but all over Europe, and on July 4, 1818, he had the honor of being returned at the head of the poll for the city of Westminster. He did not long survive his triumph. In October, 1881, Lady Romilly died in the Isle of Wight. Her husband's grief was intense, and he committed suicide in a fit of temporary insanity on November 2d.

ROMNEY, GEORGE, historical and portrait painter, was born at Dalton-le-Furness, Lancashire, on December 26, 1734. Having, at the age of twenty-seven, saved about \$500, he left a portion of the sum with his wife and family, and started to seek his fortune in London, never returning, except for two brief visits, till he came, a broken-down and aged man, to die. In London he rapidly rose into popular favor. In 1764 he paid a brief visit to Paris, where he was befriended by Joseph Vernet; and his portrait of Sir Joseph Yates, painted on his return, bears distinct traces of his study of the works of Rubens then in the Luxembourg Gallery. In 1766 he became a member of the Incorporated Society of Artists, and in the beginning of 1773 he started for Rome with Ozias Humphrey the miniature painter.

In 1775 Romney returned to London, establishing himself in Cavendish Square, and resuming his extensive and lucrative employment as a portrait painter. About 1783 Romney was introduced to Emma Hart, afterward celebrated as Lady Hamilton, and she be

came the model from whom he worked incessantly. But her fascinations seem to have been too much for the more than middle-aged painter, and they had their own share in aggravating that nervous restlessness and instability, inherent in his nature, which finally ruined both health and mind. He died November 15, 1802.

ROMNY, a district town of Russia, on the Sula river, 112 miles to the northwest of Poltava, and in the government of that name. It acquired commercial importance during the last century, especially on account of its fairs. Of the local industries, the manufacture of agricultural implements is the only one worthy of mention, but the petty trades, both in town and district, are of considerable importance. The population in 1881 was 12,300, and in 1890 (estimated) was 13,500.

ROMULUS, the mythical eponym founder and first king of Rome, is represented in legend as the son of Mars. His mother, the Vestal Silvia or Ilia, was the daughter of Numitor, who had been dispossessed of the throne of Alba by his younger brother Amullus; Silvia's twin sons, Romulus and Remus, were placed in a trough and cast into the Tiber by their cruel granduncle. The trough grounded in the marshes where Rome afterward stood, under the wild fig-tree (*filus ruminalis*). The babes were suckled by a she-wolf and fed by a woodpecker, and then fostered by Acca Laurentia, wife of the shepherd Faustulus. Growing up they became leaders of a warlike band of shepherds, and in course of time were recognized by their grandfather, whom they restored to his throne, slaying the usurper Amulius. They now proposed to found a city on the site where they had been nurtured; but a quarrel broke out between the brothers, and Remus was slain. The story goes on to tell how Romulus strengthened his band by receiving outlaws, found wives for them by capture, and waged war with the indignant parents. The most formidable foe was Titus Tatius, king of the Sabines, but after an obstinate struggle he and Romulus united their forces and reigned side by side till Tatius fell in a bloody feud with Laurentum. Romulus now reigned alone till he suddenly one day disappeared from earth in darkness and storm, and was thereafter worshiped as a god under the name of Quirinus, which, however, is really a Sabine form of Mars.

ROMULUS AUGUSTULUS. See ODOACER, and ROME, *supra*.

RONDA, a town of Spain, in the province of Malaga, and about forty-three miles to the west of that city. The old part of the town has a Moorish aspect, with narrow, steep, and crooked lanes, and still retains some Moorish towers and other buildings. The Ronda bull-ring is one of the finest in Spain, and can accommodate 10,000 spectators. Ronda is the seat of a considerable trade in leather, saddlery, and horses, and has an important fair (May 20th). The population within the limits of the municipality was 19,181 in 1877, and 21,500 (estimated) in 1890.

RONDEAU or RONDEL (Ital. *Rondo*). In poetry the rondeau is a short metrical structure which in its perfect form is divided into three strophes of unequal length, knit together by rapidly recurrent rhymes and a refrain. In music the "rondo" seeks much the same effect as in poetry, the melodic emphasis of the refrain. The Italian composer Buononcini seems to have been the inventor of the rondo as thus understood.

RONSARD, PIERRE DE, "Prince of Poets," was born at the Château de la Poissonnière, near the village of Couture in the province of Vendômois (department of Loir-et-Cher) on September 11, 1524. He was first intended for the diplomatic service, but becoming deaf turned his attention to literature.

In 1550 the *Odes* of Pierre de Ronsard were published.

This was followed in 1552 by the publication of his *Amours* with the fifth book of *Odes*. These books excited a violent literary quarrel. He published his *Hymns*, dedicated to Marguerite de Savoie, in 1555, the conclusion of the *Amours* in 1556, and then a collection of *Œuvres Complètes* said to be due to the invitation of Mary Stuart, queen of Francis II., in 1560.

His last years were saddened not merely by the death of many of his most intimate friends, but by constant and increasing ill health. Toward the end of 1585 his condition of health grew worse and worse, and he seems to have moved restlessly from one of his houses to another for some months. When the end came, which, though in great pain, he met in a resolute and religious manner, he was at his priory of Saint Cosme at Tours, and he was buried in the church of that name on Friday, December 27, 1585.

The character and fortunes of Ronsard's works are among the most remarkable in literary history, and supply in themselves a kind of illustration of the progress of French literature during the last three centuries.

RONSDORF, a town in northwestern Prussia, on the Morsbach, a small affluent of the Rhine, eighteen miles west of Düsseldorf, contains considerable iron and brass works, foundries, and wire-works, besides carrying on extensive manufactures of ribbons, trimming, and similar goods. The population in 1889 was 10,100.

Founded in 1737 by the followers of Elias Eller, a religious enthusiast, Ronsdorf received town-rights in 1745. The Ronsdorf sect, the members of which called themselves Zionites, is now extinct.

ROOF. See BUILDING and DOME.

ROOK (Anglo-Saxon *Hróc*, Icelandic *Hrókr*, Swedish *Raka*, Dutch *Roek*, Gaelic *Rocas*), the *Corvus frugilegus* of ornithology, and throughout a great part of Europe the commonest and best known of the Crow-tribe. In a general way the least-known part of the Rook's mode of life is facts relating to its migration and geographical distribution. Though the great majority of Rooks in Britain are sedentary or only change their abode to a very limited extent, it is now certain that a very considerable number visit this country in or toward autumn, not necessarily to abide here, but merely to pass onward, like most other kinds of birds, to winter further southward. As a species the Rook on the European continent only resides during the whole year throughout the middle tract of its ordinary range. Further to the northward, as in Sweden and northern Russia, it is a regular summer immigrant, while further to the southward, as in southern France, Spain, and most parts of Italy, it is, on the contrary, a regular winter immigrant. The same is found to be the case in Asia, where it extends eastward as far as the Upper Irtysh and the Ob. It breeds throughout Turkestan, in the cold weather visiting Afghanistan, Cashmere, and the Punjab, and Sir Oliver St. John found a rookery of considerable size at Casbin in Persia. In Palestine and in Lower Egypt it is only a winter visitant, and Canon Tristram noticed that it congregates in great numbers about the mosque of Omar in Jerusalem.

ROOKE, SIR GEORGE, naval commander, was born near Canterbury, England, in 1650. Entering the navy as a volunteer, he became post-captain in 1680, and vice-admiral in 1692. In May of this year he greatly distinguished himself in a night attack on the French fleet off Cape La Hogue, when he succeeded in burning six of their ships. In 1702 he commanded the expedition against Cadiz, and on the passage home captured the Plate fleet off Vigo. Along with Sir Cloudesley Shovel

he took part in the capture of Gibraltar, July 21, 1704. He died January 24, 1709.

**ROPE.** All varieties of cordage having a circumference of an inch or more are known by the general name of rope. Twisted cordages of smaller dimensions are called cords, twines, and lines, and when the dimensions are still smaller the article becomes thread or doubled yarn.

Vegetable fibers fit for rope-making are numerous, but ordinarily not many are employed. Speaking generally, for the prime requisites of strength, suppleness, flexibility, and durability, none can compete with the common hemp (*q.v.*), which consequently is the staple of the rope-maker. **MANILA HEMP** (*q.v.*) is a fiber of the most remarkable tenacity, of unapproached value for heavy cordage, but too stiff and woody for small cords and twines. After these in utility come sisal hemp of South America (*Agave sisalana*), phormium hemp of New Zealand (*Phormium tenax*) and the sunn hemp of the East Indies (*Crotalaria juncea*)—all fibers of great strength, and largely used by rope-makers. Among fibers more rarely seen in rope-works are Jubbulpore hemp (*Crotalaria tenuifolia*), bowstring hemp (*Sansevieria zeylanica*), and other "hemp" of the East Indies, and plantain fiber (*Musa paradisiaca*) and agave fiber (*Agave americana*) of America. Ropes and twine of cotton are extensively made, especially for driving-bands for machinery. **JUTE** (*q.v.*) is now in considerable use by rope-makers, on account of its cheapness, but it is very deficient in strength and durability. **COIR** is also largely employed, and many other fibers are used, principally in the localities of their production.

A rope is composed of a certain number of "strands," the strand being itself made up of many "yarns." Three strands laid or twisted together form a "hawser-laid" rope, and three such hawsers similarly laid make a "cable-laid rope" or "cable." A "shroud-laid" rope consists of four strands laid around a central strand or core.

The primary object of twisting fibers together in a rope is that by mutual friction they may be held together when a strain is applied to the whole. Hard twisting has the further advantage of compacting the fibers and preventing the penetration of moisture when the ropes are exposed to water. The proper degree of twist is a matter of considerable importance, as all twisting injuriously affects the strength of the individual fibers, and indeed it is possible to twist a cord so hard that it will break under the action. The degree of twist given to ropes is generally such that the rope is from three-fourths to two-thirds the length of the yarn composing it, and the lighter the twist the greater in proportion is the strength of the rope.

To prevent the decay of ropes which are frequently exposed to water, the yarns of which they are composed are soaked in hot Archangel tar before they are formed into strands. M. Duhamel, from a series of investigations made in 1741-46, came to the conclusion that, apart from exposure to wet, untarred cordage in constant service was about one-third more durable than tarred, that it retained its strength for a longer period when kept in store, and that it resisted the ordinary influences of the weather better than when it was tarred. Subsequent experience has fully borne out these conclusions, and now that Manila hemp, which withstands the influence of water well, is so extensively used for heavy cordage, tarring is no longer so generally practiced in rope-making as was at one time the case.

The sequence of operations in ropewalk spinning is:—(1) heckling the fiber; (2) spinning the yarn; (3) tarring the yarn (when necessary); (4) forming the strands; (5) laying the strands into ropes.

The earliest practical attempt to introduce machine rope-spinning was made by Cartwright, the famous inventor of the power loom, who, in 1892, obtained a patent for a machine called by him a "Cordelier." Numerous modifications and improved combinations have been introduced, but the principle on which they are worked is essentially the same. A complete set of rope and twine making machinery includes heckling machines, spreading and drawing frames for line yarns, and carding engines and drawing frames for tow. These machines do not differ from the ordinary preparing machinery in flax manufactures, nor is there any essential difference in the spinning frames for the smaller counts of yarns. The heavier yarns for rope-making are spun upon a gill-spinning frame, such as Goode's automatic spinner, which is fitted with a self-feeding motion by which when the sliver is presented in large quantity the rate of motion and spinning is proportionately increased; when the sliver becomes attenuated the motion is correspondingly slow, and when the sliver is broken the spinner stops. Thus a yarn well laid and uniform in thickness is secured by automatic machinery. For spinning heckled yarn, such as is used in the ropewalk, a machine of simple construction, Ronald's patent, is now extensively used. The yarn in this machine has the advantage of being hand-spun, as the spinner draws out, compresses, and feeds the fiber from a supply round his or her waist, just as on the ropewalk. In this way the strength, evenness, and other good qualities of hand-spun yarn are secured.

The making of twines and small cords forms a distinct branch of the rope trade, the whole of the operations being carried out on a series of machines in which a large number of twines and cords are twisted and otherwise prepared simultaneously, while in rope-making the machines deal only in general with the material of one rope at a time. Common twines are twisted from prepared yarns on a twine-twisting frame; the same in principle as the doubling spindle frames of the ordinary textile trade. The bobbins of yarn are placed on pegs in the creel above the twisting spindles, from two to five bobbins being placed over each spindle according to the number of yarns which go to make up the twine. These yarns are passed round a pair of rollers, which pull them off the bobbins and deliver them evenly and with regularity to the flyer of the spindle, by which they are twisted and wound on the bobbin round which they rotate. By a recent improvement the required number of yarns, instead of being drawn from separate bobbins, are first wound together upon one bobbin in a "doubling winding frame." A series of bobbins so filled are placed on spindles in a twisting frame and twisted by inverted flyers; the twisted twine is drawn off by pairs of conical grooved twist rollers round which it passes, and is wound on taking-up bobbins. Cord or cable laid twine is prepared on cabling machines. At the back of the machine the yarns receive their first twist as above described, and thence the strands from three spindles are drawn off together over a pair of cone rollers, by which they are laid, and thence they pass to the front of the machine, where there is a range of powerful flyers and spindles by which they are twisted and wound upon a large bobbin. From the bobbins they are unwound and passed through a trough of hot water, thence in parallel order over the surface of a set of rubbing rollers covered with strong card cloth revolving at high speed in a contrary direction to that in which the twine is traveling. The friction of the strong card wires shaves and smooths the twine, which then passes through the sizing trough containing a hot paste, usually of potato farina. The superfluous paste is

squeezed out by passing the twine between rollers, and it is next passed over rollers covered with rough coir which presses in all fibers yet protruding from the twine, and finally it is dried by passing round a range of steam-heated cylinders, running parallel with which are coir-covered polishing rollers which smooth the twine while it is being dried. The finished twine is wound into balls of a definite weight on a balling machine.

The machines required for making ropes from spun yarn consist of a forming flyer for forming the strands and a laying machine for twisting the strands into rope. A cabling machine for uniting three-strand hawsers into a cable is only a second laying machine of larger and heavier dimensions; but it is still a common practice to lay the heavy cable on the ropewalk. The two operations of forming strands and laying rope may be performed on one combined machine, especially in dealing with light ropes composed of a few yarns; but as a rule separate machines are preferred for each operation.

Ropes made of wire have only come into use in the course of the present century, but now their employment is very extensive, and they play an important part in connection with traction railways, mines, collieries, hoists, steam plowing, and many other modern developments of industry.

Wire ropes are stranded and laid or closed in machines which do not differ in essential features from the ordinary rope-making machinery. Both vertical and horizontal forms of revolving machines are used; but, as the rope-closing machine has sometimes to carry as many as nine bobbins of strand, each with about two tons of wire, a vertical machine is best for enormous weights. An ingenious wire-rope machine has been invented by Mr. Archibald Smith, in which the bobbins of wire are suspended, and only the framework around them and the wire drawn off are rotated for the forming and laying operations, and thus the necessity for rotating these enormous weights at a high speed is obviated.

The number of wires in a wire-rope strand are few—generally from six to nine, and never more than eighteen. They are lightly twisted in the stranding machine, and they receive no foretwist in the rope-closing apparatus. The strands, on the other hand, which go to form a rope are numerous—from six to nine and upward; and they are always wound round a core, which is generally of hemp, but sometimes a wire core is used. A wire rope thus forms a series of gentle spirals arranged continuously round a core. A large importation of the wire is galvanized to protect it from rusting.

RORQUAL. See WHALE.

ROSA, SALVATOR, a renowned painter of the Neapolitan school, was born in Arenella, in the outskirts of Naples, in 1615; the precise day is given as June 20th, and also as July 21st. The first person to discover that Rosa's work was not as trumpery as it was cheap, was the painter Lanfranco, who bought some of the paintings, and advised the youth to go to Rome. Hither in 1635, at the age of twenty, Rosa betook himself; he studied with enthusiasm, but, catching fever, he returned to Naples and Falcone, and for a while painted nothing but battle-pieces, and these without exciting any attention. This class of work was succeeded by the landscape art peculiarly characteristic of him. He then revisited Rome, and painted for the Chiesa della Morte a large and noticeable picture of the *Incredulity of Thomas*—the first work of sacred art which we find recorded from his hand. He then returned to Naples. Here the monopolizing triumvirate—Ribera, Caracciolo, and Corenzio—were still powerful. Rosa was as yet too obscure to suffer from their machinations; but, having painted a picture of *Tityus*

*Torn by the Vulture*, which went to Rome and there produced a great sensation, he found it politic to follow in the footsteps of his fame, and once more, in 1638, resought the papal city.

In 1646 he returned to Naples, and is said to have taken an active part in the insurrection of Masaniello. His actual share in the insurrection is, however, dubious. He painted a portrait of Masaniello—probably from reminiscence rather than from life; indeed it is said that he painted him several times over in less than life size. On the approach of Don John of Austria Rosa escaped, or at any rate returned to Rome. Here he painted some important subjects, showing the uncommon bent of his mind as it passed from landscape into history—*Democritus amid Tombs*, *The Death of Socrates*, *Regulus in the Spiked Cask* (these two are now in England), *Justice Quitting the Earth*, and *The Wheel of Fortune*.

Cardinal Giancarlo de' Medici now invited the painter to leave Rome—which had indeed become too hot to hold him—for Florence. Salvator gladly assented, and remained in the Tuscan capital for the better part of nine years, introducing there the new style of landscape. Finally he reverted once more to Rome, and hardly left that city again. Among the pictures of his closing years were the admired *Battlepiece* now in the Louvre, painted in the short space of forty days, full of long-drawn carnage, with ships burning in the offing; *Pythagoras and the Fishermen*; *The Oath of Catiline* (Pitti Gallery); and the very celebrated *Saul and the Witch of Endor* (Louvre), which is perhaps his latest work. He undertook a series of satirical portraits, to be closed by one of himself, but while occupied with this project he was assailed by dropsy, which, after lasting fully half a year, brought his life to a close on March 15, 1673.

Rosa was indisputably a great leader in that modern tendency of fine art toward the romantic and picturesque which, developing in various directions and by diversified processes, has at last almost totally differentiated modern from olden art. He saw appearances with a new eye, and presented new images of them on his canvases, and deserves therefore all the credit due to a vigorous innovator, even if we contest the absolute value of his product. He himself courted reputation for his historical works, laying comparatively little stress on his landscapes; in portraits he was forcible. In chiaroscuro he is simple and effective; his design has energy and a certain grandeur, without any high type of form or any superior measure of correctness. His color is too constantly of a sandy or yellowish-gray tone. Among his pictures not already mentioned we may name, in the London National Gallery, *Mercury and the Dishonest Woodman*, and two others; in Raynham Hall, *Belisarius*; in the Grosvenor Gallery, *Diogenes*; in the Pitti Gallery, a grand portrait of a man in armor, and the *Temptation of St. Anthony*, which contains his own portrait. This last subject appears in St. Petersburg, and in the Berlin Gallery.

The satires of Salvator Rosa deserve more attention than they have generally received. Though considerably spread abroad during his lifetime, they were not published until 1719. They are all in terza rima, written without much literary correctness, but remarkably spirited, pointed, and even brilliant. They are slashingly denunciatory, and from this point of view too monotonous in treatment.

ROSAMOND, FAIR. Rosamond Clifford, mistress of Henry II., was the daughter of Sir Walter Clifford, a Berkshire knight. She appears to have died in or about the year 1177, and was buried in the nunnery at Godstow. At the command of St. Hugh, bishop of

Lincoln, her body was removed from the church in which it had been buried, and was interred again outside the church. Such are all the facts that are known about Fair Rosamond. She is said to have been the mother of William Longsword, and of Geoffrey, archbishop of York. But this is impossible, for both William and Geoffrey were born before 1155, and Rosamond was still a girl at the time of her death. The story of the labyrinth or maze built by Henry to conceal her from Queen Eleanor occurs first in Brompton (end of twelfth century). The legend of her death at Queen Eleanor's hand is variously related, but does not appear to be traceable beyond the first half of the fourteenth century. It can hardly be true in any form, for Eleanor was in confinement during the last fifteen years of Henry's reign.

ROSARIO, a river-port on the Paraná, and the chief town in a department in the province of Santa Fé in the Argentine Republic, 186 miles by river from Buenos Ayres, now ranks in commercial importance as the second city in the republic, being the center of almost the entire trade of the eleven provinces lying between the Paraná and the Andes, and the terminus of the great railways which since 1863 have gradually been pushed further north and west. The population had been increased to 21,000 by 1870 and to 55,000 in 1887, while the imports have since reached the value of \$23,800,000 and the exports \$19,940,000.

Rosario stands about sixty-five feet above the level of the river. It is laid out chess-board fashion; and the streets are paved and lighted with gas (introduced in 1869). The area, 145 acres in 1870, is now about 2,000 acres. Brick is the principal building material, and the houses are mostly of one story. The industrial establishments are extensive foundries, a large number of brick kilns, a jam and fruit-preserving factory, breweries, tanneries, soap-works, saw-mills, and flour-mills.

The prosperity of the town dates from 1854, when it was made a port of entry by General Urquiza. In 1867 and 1868 it suffered from a severe cholera plague. The proposal to make Rosario the capital of the republic instead of Buenos Ayres has more than once nearly been carried in the legislature.

ROSARY (*Rosarium*, Germ., Rosenkranz) is defined in the Roman *Breviary* as a series of 150 repetitions of the "Ave Maria," with a "Pater Noster" interpolated after each decade, the whole exercise being accompanied with pious meditation on the mysteries of redemption. The word "rosary" or "chaplet" (*capellina*) is also employed to denote the string of beads of larger and smaller size by the use of which in repeating the rosary the faithful secure the due alternation of Ave Marias with Pater Nosters. In strict language the word chaplet is applied only to the "lesser" rosary, consisting of but fifty Aves and five Pater Nosters.

ROSAS, JUAN MANUEL DE, born at Buenos Ayres, March 30, 1793, died in England March 14, 1877. (See ARGENTINE REPUBLIC.)

ROSCOLLINUS (also written ROUSSELIN and RUCELINUS), often called the founder of nominalism (see SCHOLASTICISM), was born in Armorica or Lower Brittany somewhere about the middle of the eleventh century. He is heard of as late as 1121 when he came forward to oppose Abelard's views on the trinity.

ROSCOE, WILLIAM, historian and miscellaneous writer, was born March 8, 1753, at Liverpool, England. At fifteen it was necessary to decide upon a path in life. A month's trial of bookselling sufficed to disgust him, and, in 1769, he was articled to a solicitor. Although a diligent student of law, he did not bid farewell to the Muses, but continued to read the classics, and made that acquaintance with the language and literature of

Italy which became the instrument of his distinction in after life.

Meanwhile he had steadily pursued his Italian studies, and had made extensive collections relating to the great ruler of Florence. The result was his *Life of Lorenzo de' Medici, called the Magnificent*, which appeared in 1796, and at once placed him in the front rank of contemporary historians. His translation of Tansillo's *Nurse* appeared in 1798, and went through several editions. *The Life and Pontificate of Leo the Tenth* appeared in 1805, and was a natural sequel to that by which he had made his reputation. The work, while it maintained the author's fame, did not, on the whole, meet with so favorable a reception as the *Life of Lorenzo*. It has been frequently reprinted, and the insertion of the Italian translation in the *Index* did not prevent its circulation even in the papal states. Roscoe was elected member of Parliament for Liverpool in 1806, but the House of Commons was not a congenial place, and at the dissolution in the following year he declined to be again a candidate. The commercial troubles of 1816 brought into difficulties the banking house with which he was connected, and forced the sale of his collection of books and pictures. In 1822 he issued an appendix of illustrations to his *Lorenzo*, and also a *Memoir of Richard Robert Jones of Aberadron*, a remarkable self-taught linguist. The year 1824 was memorable for the publication of his edition of the works of Pope, which involved him in a controversy with Bowles. He died June 30, 1831.

Roscoe's character was a fine one. Under circumstances uncongenial and discouraging, he steadfastly maintained the ideal of the intellectual life. Sensitive and conscientious, he sacrificed his possessions to a punctilious sense of duty. He had the courage of unpopular opinions, and, while promoting every good object in his native town, did not hesitate to speak out where plain dealing, as in the matter of slavery, was required. Nor was his public life more meritorious than his private career, for he was a sincere friend and exemplary in his domestic relations.

ROSCOMMON, an inland county of Ireland, in the province of Connaught, is bounded northeast by Leitrim, northwest by Sligo, west by Mayo, west and south by Galway, east by Longford, and east and south by Westmeath and King's county. The total area is 607,691 acres or nearly 950 square miles. The greater part of the county belongs to the great limestone plain, and is either flat or very slightly undulating. In the northeast, on the Leitrim border, the Braulieve Mountains attain an elevation at their highest point of 1,377 feet; and in the northwest the Curlew Mountains rise abruptly to a height of over 800 feet. In the east the Slievebawn range, formed of sandstone, have a somewhat similar elevation. The Connaught coal field, which embraces the mountainous district round Lough Allen, touches on Roscommon, but the mineral is not much wrought within the limits of the county. Ironstone is also found in the same district, but mining is no longer prosecuted. The Shannon with its expansions forms nearly the whole eastern boundary of the county, and on the west the Suck from Mayo forms for over fifty miles the boundary with Galway till it unites with the Shannon at Shannon Bridge. The other tributaries of the Shannon within the county are the Arigna, the Feorish, and the Boyle. The lakes formed by expansions of the Shannon on the borders of Roscommon are Loughs Allen, Boderg, Boffin, Forbes, and Ree. Of the numerous other lakes within the county the most important are Lough Key in the north, very picturesquely situated with finely wooded banks, and Lough Gara in the west.

The subsoil is principally limestone, but there is some light sandy soil in the south. In the level parts the land when drained and properly cultivated is very fertile, especially in the district known as the plains of Boyle, which includes some of the richest grazing land in Ireland. Along the banks of the Suck and Shannon there is, however, a large extent of bog and marsh.

A branch of the Midland Great Western railway traverses the northeastern boundary of the county to Sligo, and another the southwestern boundary to Westport, while a third crosses the southern corner to Galway.

The county is divided into 10 baronies, and contains 53 parishes, 7 parts of parishes, and 1,995 townlands. The population in 1881 was 132,490—a decrease of nearly one-half since 1841, when it was 253,591. In 1891 the population had diminished to 114,894.

The district was granted by Henry III. to Richard de Burgo, but remained almost wholly in the possession of the native septs. Until the time of Elizabeth Connaught was included in the two districts of Roscommon and Clare, and when these were subdivided Roscommon was assigned its present limits. It takes its name (Irish *Ros-Comain*, Comain's wood) from the county town, at which a monastery was founded by St. Coman in the sixth century.

ROSCOMMON, WENTWORTH DILLON, EARL OF, one of the pioneers of the so-called "classical" school in English poetry, owed his burial in Westminster Abbey more to his rank than to his achievements in poetry. He was born in 1634 and died during 1684.

Roscommon, a nephew of the great earl of Strafford, was born in Ireland, and educated partly under a tutor at his uncle's seat in Yorkshire, partly at Caen in Normandy, and partly at Rome. He published a translation of Horace's *Art of Poetry* in 1680.

ROSE (*Rosa*). The rose gives its name to the order *Rosaceæ*, of which it may be considered the type. The genus consists of species varying in number according to the diverse opinions of botanists of opposite schools, from 30 to 180, or even 250, exclusive of the many hundreds of mere garden varieties. The species are natives of all parts of the northern hemisphere, but are scantily represented in the tropics unless at considerable elevation. They are erect or climbing shrubs, never herbs or trees, generally more or less copiously provided with thorns of various shapes and with glandular hairs, as in the sweet brier or in the moss rose of gardens. The thorns serve the purpose of enabling the shrub to sustain itself amid other vegetation, and perhaps in some sort serve as a protection against marauders. The viscid hairs which are especially frequent on the flower stalks or in the neighborhood of the flower serve to arrest the progress of undesirable visitants, while the perfume emitted by the glands in question may coöperate with the fragrance and color of the flower to attract those insects whose presence is desirable. The leaves are invariably alternate, provided with stipules, and unequally pinnate, the stipules themselves being in this case perhaps merely the lowest pair of "pinnæ" or leaflets less perfectly developed than the others. The flowers are solitary or in loose cymes (cluster-roses) produced on the ends of the shoots. The flower-stalk expands into a vase or urn-shaped dilatation, called the receptacle or receptacular tube, which ultimately becomes fleshy and incloses in its cavity the numerous carpels or fruits. From the edge of the urn or "hip" proceed five sepals, often more or less compounded like the leaves and overlapping in the bud. Within the sepals are five petals generally broad or roundish in outline, with a very short stalk or none at all, and of all hues except blue. The very numerous stamens originate from about the same spot as the sepals and petals;

each has a slender filament and a small two-celed anther. The inner portion of the receptacular tube whence the stamens spring is thick and fleshy, and is occasionally spoken of as the "disk;" but, as in this case it does not represent any separate organ, it is better to avoid the use of the term. The carpels are very numerous, ultimately hard in texture, covered with hairs, and each provided with a long style and button-like stigma. The carpels are concealed within the receptacular tube, and only the stigmas as a rule protrude from its mouth. Each carpel contains one ovule without perisperm. The so-called fruit is merely the receptacular tube, which, as previously mentioned, becomes fleshy and brightly colored as an attraction to birds, which devour the hips and thus secure the dispersion of the seed. The stamens are in whorls, and, according to Payer, they originate in pairs one on each side of the base of each petal (parapetalous), so that there are ten in each row, a second row of ten alternates with the first, a third with the second, and so on. By repeated radial and tangential branching a vast number of stamens are ultimately produced, and when these stamens assume a petaloid aspect we have as a consequence the double flowers which are so much admired. The carpels are much less subject to this petaloid change, and, as it generally happens in the most double of roses that some few at least of the anthers are formed with pollen, the production of seed and the possibility of cross-breeding become intelligible. Under natural circumstances rose flowers do not secrete honey, the attraction for insects being provided, according to Müller, by the color and perfume and the abundance of pollen for food. The stigmas and anthers come to maturity at the same time, and thus, while cross-fertilization by insect agency is doubtless most common, close fertilization is not prevented.

Rose water is chiefly produced in Europe from the Provence or cabbage rose, *R. centifolia*, grown for the purpose at Mitcham and much more abundantly in the south of France. Conserve of roses and infusion of roses, two medicinal preparations retained for their agreeable qualities rather than for any special virtue, are prepared from the petals of *Rosa gallica*, one variety of which was formerly grown for the purpose near the town of Provins. Conserve of dog rose is made from the ripe hips of the dog rose, *Rosa cansina*. Its only use is in the manufacture of pills.

The name ROSE OF JERICO is popularly applied to a small Cruciferous weed, *Anastatica hierochuntina*, a native of the desert regions of Egypt, Arabia, Palestine, and Persia.

ROSELLINI, IPPOLITO, a native of Pisa and subsequently professor there of Oriental languages, in which Mezzofanti was his teacher, is best known as the associate of J. F. CHAMPOLLION (*q.v.*), whose studies he shared and whom he accompanied in his Egyptian explorations (1828). On the death of Champollion the publication of the results of their expedition fell to Rosellini, (*Monumenti dell' Egitto e della Nubia*, Florence, 1832-1840, ten vols. fol.) He died in 1843 where he was born in 1800.

ROSEMARY (*Rosmarinus*) a well-known Labiate plant, the only representative of the genus and a native of the Mediterranean region. It is a low shrub with linear leaves, dark green above, white beneath, and with margins rolled back onto the under surface. The flowers are in small axillary clusters. Each has a two-lipped calyx, from which projects a bluish two-lipped corolla inclosing two stamens, the other two being deficient. Rosemary is used on account of its fragrance and medicinal value, and is considered as a token of remembrance.

**ROSETTA** (see EGYPT). The celebrated Rosetta Stone, a basalt stele containing a decree of Ptolemy V. Epiphanes in hieroglyphics, demotic, and Greek, which supplied the key for the decipherment of the ancient monuments of Egypt, was found near Fort St. Julien, four miles north of the town, in 1799, by Boussard, a French officer. It is now in the British Museum.

**ROSEWOOD.** Under this name several distinct kinds of ornamental timber are more or less known. That, however, so called in the United Kingdom is Brazilian rosewood, the *palissandre* of the French, the finest qualities of which, coming from the provinces of Rio de Janeiro and Bahia, are believed to be the produce principally of *Dalbergia nigra*, a Leguminous tree of large dimensions, called *cabiuna* and *jacaranda* by the Brazilians. The same name, jacaranda, is applied to several species of *Macharium*. Rosewood comes to the United Kingdom from Rio, Bahia, Jamaica, and Honduras. The heartwood attains large dimensions, but as it begins to decay before the tree arrives at maturity it is always faulty and hollow in the center. Rosewood has a deep ruddy brown color, richly streaked and grained with black resinous layers. It takes a fine polish, but on account of its resinous nature it is somewhat difficult to work.

**ROSH**, also **HAROSH** (ר' אש, ר' אה, *i. e.*, "chief," "the chief"), stands by contraction for Rabbenu Asher, or Harab Rabbenu Asher (b. Yehiel), chief rabbi of all Castile. He was born in Germany about the middle of the thirteenth century and died at Toledo on October 25, 1327.

Rosh enjoys a sixfold celebrity. (1) He was a descendant of a long line of distinguished ancestors, among them **RABAN** (*q. v.*). (2) He was "the distinguished of the most distinguished disciples" of the foremost rabbi of his age in Germany, viz., Rabbenu Meir b. Barukh, better known under the name of R. Meir of Rothenburg. (3) He was the father of eight great Rabbinic scholars. (4) He was in his own right, after 1293 in Germany and after 1310 everywhere, the greatest Talmudist. (5) He was the first rabbi of the Ashkenazic school who possessed powers of systematization. (6) He was a man not merely of the deepest piety but of the sternest and, if we may say so, the most savage morality.

**ROSICRUCIANS** (**ROSENKREUZER**) a celebrated but entirely fabulous secret society that flourished during the seventeenth century. It was said to have been founded two hundred years before by a certain Christian Rosenkreuz, who had acquired on a pilgrimage the hidden wisdom of the East. The society, according to this account, possessed many secret gifts of knowledge, of which goldmaking was one of the least. Its character was Christian and of Protestant type; its chief aim was the gratuitous healing of the sick. It finally came to be seen that the society was fabulous and the name and fable of the Rosicrucians have from time to time been made use of by such impostors as Cagliostro.

**ROSIN**, or **COLOPHONY**, is the resinous constituent of the oleo-resin exuded by various species of pine, known in commerce as crude turpentine (see **TURPENTINE**). The separation of the oleo-resin into the essential oil-spirit of turpentine and common rosin is effected by distillation in large copper stills. The essential oil is carried off at a heat of between 212° and 316°, leaving fluid rosin, which is run off through a tap at the bottom of the still, purified by passing through a straining wadding, and received into a vat, whence it is ladled into barrels ready for the market. Rosin varies in color, according to the age of the tree whence the turpentine is drawn and the amount of heat applied in distillation, from an opaque almost pitchy black substance

through grades of brown and yellow to an almost perfectly transparent colorless glassy mass. The commercial grades are numerous, ranging by letters from A, the darkest, to N, extra pale—superior to which are W, "window glass," and WW, "water white" varieties, the latter having about three times the value of the common qualities. Rosin is a very brittle and friable resin, with a faint piny odor, softening at about 176° and melting completely at the temperature of boiling water. It dissolves freely in ether, benzol, and chloroform, and to some extent in alcohol and fatty oils. When exposed to the action of hot dilute alcohol or when boiled with alkaline solutions it takes up a molecule of water and becomes converted into abietic acid, a change which also takes place slowly in the air when the resin is yet mixed with the essential oil as it flows from the trees. Rosin is thus regarded as an anhydride of abietic acid, and its use in yellow soaps is due to the fact that this acid itself combines with caustic alkalies to form a kind of soap. In addition to its extensive use in soap-making, rosin is largely employed in making inferior varnishes, sealing wax, and various cements. It is also used for preparing shoemaker's wax, for soldering metals, for pitching lager beer casks, for rosinning the bows of musical instruments, and numerous minor purposes. In pharmacy it forms an ingredient in several plasters and ointments. On a large scale it is treated by destructive distillation for the production of an oily complex hydrocarbon, having a tarry odor and a whitish opalescent color, which under the name of rosin oil is used as a lubricant. Rosin oil also enters extensively into the common kinds of fatty oils as an adulterant.

The chief region of rosin production is the southern coast states of the United States—the ports of Wilmington, Charleston, Savannah, and Brunswick being the principal centers of the trade. American rosin is obtained from the turpentine of the swamp pine, *Pinus australis*, and of the loblolly pine, *P. Teda*. The main source of supply in Europe is the "landes" of the departments of Gironde and Landes in France, where the sea pine *P. maritima*, is exclusively cultivated. In the north of Europe rosin is obtained from the Scotch fir, *P. sylvestris*, and throughout European countries local supplies are obtained from other species of pine.

**ROSMINI-SERBATI**, **ANTONIO**, perhaps the most important figure in modern Italian philosophy, was born at Rovereto, in the Italian Tyrol, in 1797, and died in 1855. He became the founder of a new religious order, named the Institute of Charity, but known in Italy generally as the Rosminians. The members may be priests or laymen. All are prepared to do any works of charity—corporal, intellectual, or spiritual—to which they may be directed by divine providence, under obedience to their superior, to the bishops, and to the pope. They have branches in Italy, England, Ireland, France, and America. In London they are attached to the ancient church of St. Etheldreda, Ely Place, Holborn, where the English translations of Rosmini's works are edited. Rosmini's *Sistema Filosofico* set forth the conception of a complete encyclopædia of the human knowable, synthetically conjoined, according to the order of ideas, in a perfectly harmonious whole. This conception Rosmini developed in more than forty volumes.

**ROSS**, a county in the north of Scotland. **CROMARTY** (*q. v.*) consists of detached portions, scattered throughout Ross, and, for most administrative purposes, the two counties are regarded as one. The united area of their mainland portion lies between 57° 8' and 58° 6' N. latitude, and 3° 47' and 5° 52' W. longitude, and is bounded north by the Dornoch Firth and Sutherlandshire, east by the Moray Firth, south by Inverness-



shire, and west by the Atlantic. It comprehends 2,003,065 acres, of which only about 220,280 acres are included in Cromarty. Its length from east to west is 67 miles, and from north to south 58 miles. The area of the islands is 437,221 acres. Ross includes the northern part of Lewis, and other ten islands of the Hebrides, of which eight only were inhabited in 1881. The outline of Ross and Cromarty is very irregular, and both east and west coasts are much indented by bays and inland lochs, but, except in the more inland recesses of these inlets, the coast scenery is tame and uninteresting.

In the northwest of Ross the Archæan series of rocks, consisting of gneisses, schists, and other crystalline rocks, are well developed. Above them rest unconformably red conglomerates and sandstones of Cambrian age, rising into the picturesque mountains which form such a striking feature of the scenery of western Ross. Farther east they are overlaid unconformably by the quartzites and limestones belonging to the Lower Silurian division. Over these, by enormous terrestrial displacement, the Archæan and Cambrian rocks have been pushed, sometimes for a horizontal distance of ten miles. Along the east coast they are unconformably covered by the Old Red Sandstone formation. Rocks of Jurassic (Oolitic) age fringe the eastern shores. In the Black Isle peninsula they include a thin coal seam. Near the Sutors of Cromarty they abound in ammonites, belemnites, and other shells, and in the remains of various woods and ferns. Ironstone, chiefly in the form of bog iron ore, is found in considerable quantities. Of the various mineral springs the best known is that of Strathpeffer, characterized chiefly by sulphuretted hydrogen gas and various salts. The surface consists principally of lofty mountain groups intersected by comparatively narrow valleys, occupied partly by lakes and rivers; but in the east there is considerable extent of comparatively level ground. A large number of the mountains are over 3,000 feet in height. The principal rivers are the Oykel, which, rising in Sutherland, forms for about twenty miles the boundary with Ross, from which near its mouth it receives the Carron; the Conan, falling into Cromarty Firth; and the Carron, flowing southwest into Loch Carron. The most fertile part of the counties is the eastern district, especially that included in the peninsulas of the Black Isle and Eastern Ross, the soil varying from a light sandy gravel to a rich deep loam. In this district agriculture is quite as advanced as in any other part of Scotland. In the valleys and along the shores of the western coast there are many patches of good soil, but, partly on account of the excessive rainfall, tillage is not prosecuted with the same enterprise as in the eastern districts. On the higher grounds there is a large extent of good pasturage for sheep. According to the agricultural statistics for 1885 the total area in Ross and Cromarty under crops, bare fallow, and grass, was 134,399 acres, of which 47,639 acres were under grain crops, 26,496 under green crops, 40,819 rotation grasses, 19,075 permanent pasture, and 370 fallow.

Horses, principally half-breeds between the old "garrons" and Clydesdales, numbered 7,365 in 1885, of which 5,874 were used solely for purposes of agriculture; cattle numbered 42,976, of which 17,811 were cows and heifers in milk or in calf, and 17,561 under two years old. They are principally the native highland breed or crosses. Sheep in 1885 numbered 309,590, of which 213,522 were one year old and above. Besides black-faced, crosses with Leicesters and crosses between Leicesters and Cheviots are not uncommon. There is still in Ross and Cromarty a considerable extent of native woodland, the trees being principally firs, oaks, ash, and alder. The area under woods in 1881 was 43,201 acres.

The red and roe deer have free scope on the extensive mountain regions, the area under deer forests being 719,305 acres. Foxes, badgers, wild-cats, alpine hares, and other wild animals abound. The usual varieties of winged game are plentiful. The golden eagle and osprey are both common, as well as many other birds of prey. Waterfowl of all kinds abound in the extensive sea lochs, and the rivers and inland lochs are specially abundant in trout and salmon. The pearl mussel is found in the bed of the river Conan.

According to the latest Landowners' Return, 2,043 proprietors possessed 1,971,682 acres in the county of Ross, of a gross annual value of \$1,346,710. The owners of less than one acre numbered 1,719. For Cromarty separately the return gives 231 owners, possessing 18,206 acres, of \$59,825 annual value.

With the exception of distillation, there are no important manufactures within the counties, although home-made woolen cloth is woven in the country districts. The counties depend chiefly on their agriculture and their fishing, which within recent years has greatly developed through improved means of communication with the south. Stornoway and the west coast have regular communication by steamers with Glasgow, and on the east coast a steamer leaves Cromarty and Invergordon for Aberdeen and Leith once a week. Fish, cattle, and sheep, are the principal exports. The Highland railway skirts the Firth of Cromarty by Dingwall and Tain to Bonar Bridge, a branch passing from Dingwall southwestward to Strome Ferry, whence there is communication with Skye by steamer. Salmon fishing is extensively carried on in the bays and the mouths of the rivers, and the deep-sea fishings for herring, and for cod and other large fish, are among the most important in Scotland.

ROSS, SIR JAMES CLARK, arctic voyager, was born in London, England, April 15, 1800. He entered the navy in 1812 under his uncle Sir John Ross, whom he accompanied in his first voyage in search of a northwest passage. From 1819 to 1825, and again in 1827, he was engaged with Captain Parry in his voyages (see POLAR REGIONS). He commanded the *Erebus* and *Terror* to the Antarctic seas from 1839 to 1843, and after his return he received in 1844 the honor of knighthood. In 1847 he published *A Narrative of a Voyage in the Antarctic Regions*, 2 vols. His last expedition was in 1848 in the *Enterprise*, to Baffin's Bay in search of Sir John Franklin. He died at Aylesbury, April 3, 1862.

ROSS, SIR JOHN, arctic voyager, was the fourth son of the Rev. Andrew Ross, minister of Inch, Wigtonshire, where he was born in 1777. He entered the navy in 1786. In 1818 he sailed in command of an Arctic expedition (see POLAR REGIONS), an account of which he published, under the title *Voyage of Discovery for the Purpose of Exploring Baffin's Bay*, in 1819. In 1829 he was able to undertake a second expedition. In accordance with a promise to Sir John Franklin, he undertook a third expedition in 1850 and remained one winter on the ice, but accomplished nothing. He died August 31, 1856.

ROSSANO, a city of Italy, in the province of Cosenza, most picturesquely situated on a precipitous spur of the great mountain mass of Sila (geologically the oldest part of Italy) overlooking the Gulf of Taranto. The railway station, ninety-three miles from Taranto, is about an hour from the town. Rossano is the seat of an archbishop and the center of a circondario; marble and alabaster quarries are worked in the neighborhood; the inhabitants numbered 14,688 in 1881, and 16,156 in 1889 (19,000 in the commune).

ROSSE, WILLIAM PARSONS, THIRD EARL OF, the distinguished constructor of reflecting telescopes, was

born at York, England, on June 17, 1800, a son of the second earl, who, as Sir Lawrence Parsons, Bart., had been a prominent member of the Irish Parliament. From 1827 he devoted himself to the improvement of reflecting telescopes; in 1839 he mounted a telescope of three feet aperture at his seat, Birr Castle, Parsonstown; and in 1845 his celebrated six-foot reflector was finished. Owing to the famine and the disturbed state of the country, which demanded his attention as a large landowner and lieutenant of King's county, the instrument remained unused for nearly three years, but since 1848 it has been in constant use, chiefly for observations of nebulae, for which it was particularly suited on account of its immense optical power. Lord Rosse died on October 31, 1867.

ROSSELLI, COSIMO, a Florentine painter, was born in 1439. According to Vasari, Rosselli died in 1484, but this is evidently a mistake, as his will still exists dated November 25, 1506.

ROSSELLINO, ANTONIO, one of the most skillful of Florentine sculptors, was the son of Matteo di Domenico Gamberelli, and had four brothers, who all practiced some branch of the fine arts. He was born in 1427 and died in 1479. Almost nothing is known about the life of Antonio, but many of his works still exist, and are of the highest beauty, full of strong religious sentiment, and executed with the utmost delicacy of touch and technical skill.

ROSSELLINO, BERNARDO, born 1409, died in 1464, was no less able as a sculptor than his younger brother, and was also a very distinguished architect.

ROSSETTI, DANTE GABRIEL, poet and painter, whose full baptismal name was Gabriel Charles Dante, was born May 12, 1828, at 38 Charlotte street, Portland Place, London, England. He was the first of the two sons and the second of the four children of Gabriele Rossetti, the Italian poet and patriot.

Of the artistic education of foreign travel Rossetti had very little. But in early life he made a short tour in Belgium, where he was indubitably much impressed and influenced by the works of Van Eyck at Ghent and Memling at Bruges. In the spring of 1848 he took an active part in forming the so-called pre-Raphaelite brotherhood, the members of which believed that the time had come for the artist to confront again Nature herself.

But Rossetti's genius absorbed from pre-Raphaelitism all that it had to give, and then passed on its way toward its own special goal.

It was as early as 1849 that Rossetti exhibited in the so-called Free Exhibition the *Girlhood of the Virgin*, one of the most beautiful and characteristic of all his works. He scarcely ever exhibited again in London, though just before his death his largest and most ambitious picture, *Dante's Dream*, was exhibited at Liverpool. Then came, in 1850, *The Germ*, that short-lived magazine of four numbers upon which so much has of late been written. If *The Germ* was really "an official manifesto or apologia of pre-Raphaelitism," all that it had to preach was the noble doctrine of the sacredness, the saving grace, of conscience in art. In it appeared Rossetti's poem the *Blessed Damozel*, the prose poem *Hand and Soul*. The artist who had had the strongest influence upon Rossetti's early tastes was Madox Brown, whose genius, dramatic and historic, has at length obtained universal recognition through the magnificent frescoes at Manchester. He became Brown's pupil; but only once or twice, as in *Found* and *Doctor Johnson at the Mitre*, did Rossetti try his hand at such realistic subjects as Brown loved. *Found*, begun in 1853, still remains unfinished.

Many circumstances—for instance, the beginning of

such grand designs as *Magdalene at the Door of Simon the Pharisee*, *Aspectâ Medusâ*, the *Boat of Love*, etc. —interfered with the completion of *Found*. With the exception of the *Boat of Love*, *Dante's Dream* (1870) was perhaps Rossetti's most ambitious design in purely imaginative art. From the painting of this picture to his death, Rossetti never satisfactorily completed a large and elaborate design. The truth is that he wanted to write more poetry; and those wonderful half-lengths of women, for which, late in life, he became so famous, were not only beautiful and satisfying, but comparatively easy of achievement. Among those half-lengths, however, will be found some of his greatest works. Chief among them (if it is not *Proserpine*) is the marvellous crayon design *Pandora*.

But we must turn to his poetry. *The Blessed Damozel* was written as early as 1848. *Sister Helen* was produced in its original form in 1850 or 1851. The translations from the early Italian poets also began as far back as 1845 or 1846, and may have been mainly completed by 1849. The poet who should go beyond Rossetti would pass out of the realm of poetry into pure mysticism, as certain of his sonnets show. Fine as are these sonnets, it is in his romantic ballads that Rossetti (notwithstanding a certain ruggedness of movement) shows his greatest strength. In this opinion (which is not the general one) we agree with Doctor Hueffer. *Sister Helen*, *The Blessed Damozel*, *Staff and Scrip*, *Eden Bower*, *Troy Town*, *Rose Mary*, as representing the modern revival of the true romantic spirit, take a place quite apart from the other poetry of our time.

In all matters of taste Rossetti's influence has been immense. The purely decorative arts he may be said to have rejuvenated directly or indirectly. And it is doubtful whether any other Victorian poet has left so deep an impression upon the poetic methods of his time. One of the most wonderful of Rossetti's endowments, however, was neither of a literary nor an artistic kind: it was that of a rare and most winning personality which attracted toward itself, as if by an unconscious magnetism, the love of all his friends, the love, indeed, of all who knew him.

ROSSINI, GIOACHINO ANTONIO, Italian dramatic composer, was born at Pesaro, February 29, 1792. Rossini's first opera, *La Cambiale di Matrimonio*, was produced with success at the Teatro San Mosè at Venice in 1810. In 1811 he produced *L'Equivoco stravagante*, at Bologna; but his first real triumph was achieved at Venice in 1812, in *L'Inganno felice*, a work in which his genius unmistakably asserted itself. In the same year he produced *La Pietra del Paragone*, with equal applause, at Milan, besides four other operas in other places. These pieces were all successful, but *Tancredi*, written for the Teatro San Fenice at Venice, in 1813, produced a veritable *furor*. The name of the young *maestro* was now famous; yet, strange to say, his greatest comic opera was hissed on its first performance at Rome in 1816. This delightful inspiration, first entitled *Almaviva*, but now known as *Il Barbiere di Siviglia*, was founded on a libretto which Paisiello had already treated with success, and hence the refusal of the Roman audience to tolerate it. But the beauty of the music overcame the scruples of the most prejudiced listeners, and, by the time the *Barbiere* reached its third representation, Rossini was openly accepted as the greatest dramatic composer in Italy. Between 1815 and 1823 Rossini composed no less than twenty operas, including his masterpieces *Elisabetta* (1815), *Il Barbiere* (1816), *Otello* (1816), *La Cenerentola* (1817), *La Gazza Ladra* (1817), *Mosè in Egitto* (1818), *Le Donna del Lago* (1819), and *Semiramide* (1823), the last of which has lately been

revived, with so great success, by Madame Adelina Patti.

Rossini in 1824 accepted an engagement as musical director of the Théâtre Italien in Paris, where, in 1829, he produced his last great masterpiece, *Guillaume Tell*. After completing this beautiful work he composed no more until 1832, when he wrote the first six movements of the *Stabat Mater* for private performance only. He completed this lovely composition in 1839, and it was first publicly performed at the Salle Ventadour in 1842. In 1855 he settled permanently in Paris, at 2 Rue Chaussée d'Antin, where he composed his last work, the *Petite Messe Solennelle*. After his final return to Paris he spent a part of every year in a suburban villa in the Avenue Ingres, at Passy, and here he died of a very painful illness, November 13, 1868.

Rossini effected a complete revolution in the style of Italian opera. His accompaniments were richer than any that had ever been previously heard in Italy, and in their masterly instrumentation rivaled some of the most notable achievements of German art.

ROSTOCK, the largest town of Mecklenburg-Schwerin, and one of the most important commercial cities on the Baltic, is situated on the left bank of the estuary of the Warnow, about eight miles from the sea. It lies 177 miles northwest of Berlin by railway, 80 miles northeast of Lübeck, and 106 miles south of Copenhagen. Rostock is the seat of the supreme court for both the duchies of Mecklenburg, and is well equipped with schools, hospitals, and other institutions. The population in 1810 was 10,979; in 1880 it was 36,967, of whom only 224 were Roman Catholics, and only 221 were Jews; in 1885 it was 39,212, and in 1889, 42,000.

Although the population, commerce, and wealth of Rostock have all declined since its palmy days as a flourishing Hanse town in the Middle Ages, it has still a very considerable trade, and no Baltic port possesses so large a merchant fleet. In 1882, 314 ships, with a total burden of 97,447 tons, were registered as belonging to Rostock. Ships of more than 200 tons burden must discharge part of their cargo at Warnemünde, at the mouth of the Warnow, the port of Rostock, a fishing village and watering place with 1,766 inhabitants, who are distinguished by a peculiar dialect and costume. By far the most important export of Rostock is grain, which goes almost entirely to British ports; but wool, flax, and cattle are also shipped. The chief imports are coal from Great Britain, herrings from Sweden, petroleum from America, timber, wine, and colonial goods. The industries of the town are varied. One of the chief is shipbuilding, which, however, has declined of late years. Cotton, straw hats, tobacco, carpets, soap, cards, chocolate, and dye-stuffs are among the manufactures of the town, which also contains distilleries, saw-mills, oil mills, tanneries, and breweries.

ROSTOFF, on the Don, is one of those modern towns which have grown up with such remarkable rapidity in South Russia since the definite occupation by the Russians of the Black Sea coast.

The Don, which here has a breadth of no more than 230 to 250 yards, with a hardly perceptible current, offers an excellent roadstead. The navigation, however, is considerably impeded by the shallowness of the branches of the river which are thirty in number at its entrance to the sea, but of which only three (Mertvyi Donets, Kolontcha, and the Don proper) are navigable. During the east winds, however, there is only four feet depth of water on the delta; and ships formerly were often compelled to stay outside for several weeks, waiting for a southwest wind. Recent dredging operations have but partially remedied this evil, and the goods have to be

carried on lighters to Taganrog and Mariupol, where they are shipped. In 1882 only forty-seven ships of small size coming from foreign countries under the Russian and Turkish flags entered the port, but no fewer than 3,175 vessels (349,500 tons) engaged in cabotage or lighter traffic, left the roadstead. The export of corn, oil-seeds, wool, tallow, butter, iron, hides, ropes, coarse linen, pitch, etc., from 12,311,000 rubles in 1865, had risen to 41,634,252 rubles in 1882, while the imports were valued at only 886,120 rubles. The agricultural produce thus exported is drawn from the entire basin of the Don in central Russia, while ores and metals are brought from the Urals. The commercial importance of Rostoff is further increased by its position on the great highway from Kharkoff and Voronezh to Caucasus, on which traffic has greatly increased since Rostoff became connected by rail with Kharkoff and Voronezh on the one side and Vladikavkaz on the other. Rostoff has also excellent fisheries, and in summer it becomes the gathering place of many thousands of laborers on their way to assist in harvesting operations in the provinces of the Don and in northern Caucasia. The population was 70,700 in 1881 and 76,000 (estimated) in 1890.

ROSTOFF, on Lake Nero, a district town of Russia in the government of Yaroslavl, and thirty-five miles by rail southwest of Yaroslavl, is probably the oldest town of northeastern Russia. The specialty of Rostoff is the production of a variety of kitchen-garden produce and apothecary's herbs. Chicory and dried sweet peas are the principal objects of trade. Another industry formerly developed in consequence of the great influx of pilgrims—that of painting sacred pictures on a kind of enamel—still continues to flourish. The saddlery and linen manufactures, and the fishing, may likewise be mentioned. The population of Rostoff in 1883 was 12,500; in 1890 it approximated 14,000.

ROSWITHA. See HROSVITHA.

ROTHER, RICHARD, theologian, was born at Posen, January 28, 1799. Rothe was one of the most if not the most profound and influential of modern German theologians next to Schleiermacher. Like the latter he combined with the keenest logical faculty an intensely religious spirit, while his philosophical tendencies were rather in sympathy with Hegel than Schleiermacher, and theosophic mysticism was more congenial to him than the abstractions of Spinoza, to whom Schleiermacher owed so much. He died in 1867.

ROTHERHAM, a market-town and municipal borough in the West Riding of Yorkshire, England, is situated at the junction of the Rother with the Don navigation, on several railway lines, five miles northeast of Sheffield. The population of the municipal borough (area 5,995 acres) in 1891 was 42,050.

ROTHESAY, a royal burgh, and the principal town of the county of Bute, Scotland, is situated in the island of Bute, at the head of a well-sheltered and spacious bay in the Firth of Clyde, forty miles west of Glasgow and eighteen southwest of Greenock. The population of the royal burgh in 1871 was 8,027, and in 1891 it was 9,034.

ROTHSCHILD, the name of a Jewish family which has acquired an unexampled position from the magnitude of its financial transactions. The original name was Bauer, the founder of the house being MAYER ANSELM (1743-1812), the son of Anselm Moses Bauer, a small Jewish merchant of Frankfort-on-the-Main. His father wished him to become a rabbi, but he preferred business, and ultimately set up as a money lender at the sign of the "Red Shield" (*Rothschild*) in the Frankfort Judengasse. He had already acquired some standing as a banker when his numismatic tastes

obtained for him the friendship of William, ninth landgrave and afterward elector of Hesse-Cassel, who in 1801 made him his agent. In the following year Rothschild negotiated his first great government loan, ten million thalers for the Danish Government. He died at Frankfort September 19, 1812, leaving ten children, five sons and five daughters. Branches of the business were established at Vienna, London, Paris, and Naples, each being in charge of one of the sons, the chief of the firm always residing at Frankfort. Each of the brothers received in 1815 from Austria the privilege of hereditary landowners, and in 1822 they were created barons by the same country. The charge of the Frankfort house devolved on the eldest, ANSELM MAYER, born June 12, 1773, who was chosen a member of the royal Prussian privy council of commerce, and, in 1820, Bavarian consul and court banker. The Vienna branch was undertaken by SOLOMON, born December 9, 1774, who entered into intimate relations with Prince Metternich, which contributed in no small degree to bring about the connection of the firm with the allied powers. The third brother, NATHAN MAYER, born September 16, 1777, has, however, generally been regarded as the financial genius of the family, and the chief originator of the transactions which have created for the house its unexampled position in the financial world. He went to Manchester, England, about 1800 to act as a purchaser for his father of manufactured goods; but at the end of five years he removed to London, where he found full scope for his financial genius. He died July 28, 1836, and was succeeded in the management of the London house by his son LIONEL, born November 22, 1808, whose name will always be associated with the removal of the civil disabilities of the Jews. He continued to represent the city of London till 1874. JACOB, the youngest of the original brothers, was intrusted with the important mission of starting the business in Paris after the restoration of the Bourbons, for whom he negotiated large loans. He died November 15, 1868. The Naples branch was superintended by another of the brothers, KARL (1780-1855). It was always the least important of the five, and after the annexation of Naples to Italy in 1860 it was discontinued.

ROTHWELL, an urban sanitary district in the West Riding of Yorkshire, England, situated in a pleasant valley four miles south of Leeds. The population of the urban sanitary district (area 3,302 acres) in 1871 was 3,733, and in 1881 it was 5,105.

ROTIFERA. The *Rotifera* (or *Rotatoria*) form a small, in many respects well-defined, but somewhat isolated class of the animal kingdom.

They are multicellular animals of microscopic size which present a coelom. They are bilaterally symmetrical and present no true metameric segmentation. A head region is generally well marked, and most forms present a definite tail region. This tail region has been termed the "pseudopodium." It varies very much in the extent to which it is developed. It attains its highest development in forms like *Philodina*, which affect a leech-like method of progression and use it as a means of attachment. We may pass from this through a series of forms where it becomes less and less highly developed. In such forms as *Brachionus* it serves as a directive organ in swimming, while in a large number of other forms it is only represented by a pair of terminal styles or flaps. In the sessile forms it becomes a contractile pedicle with a suckorial extremity. A pseudopodium is entirely absent in *Asplanchna*, *Triarthra*, *Polyarthra*, and a few other genera. The pseudopodium, when well developed, is a very muscular organ, and it may contain a pair of glands which secrete an adhesive material.

The *Rotifera* are distributed all over the earth's surface, inhabiting both fresh and salt water. The greater number of species inhabit fresh water, occurring in pools, ditches, and streams. A few species will appear in countless numbers in infusions of leaves, etc., but their appearance is generally delayed until the putrefaction is nearly over. Species of *Rotifer* and *Philodina* appear in this way. A few marine forms only have been described—*Brachionus mülleri*, *B. heptatonus*, *Synchaeta baltica*, and others.

A few forms are parasitic. *Albertia* lives in the intestine of the earthworm; a form has been described as occurring in the body-cavity of *Synapta*; a small form was also observed to constantly occur in the velar and radial canals of the fresh water jelly-fish, *Limnocodium*. *Notommata parasitica* leads a parasitic existence within the hollow spheres of *Volvox globator*, sufficient oxygen being given off by the *Volvox* for its respiration.

ROUROU, JEAN DE, the greatest tragic poet of France before Corneille, was born on August 21, 1609, at Dreux, in Normandy, and died of the plague at the same place on June 28, 1650.

ROTTERDAM, a city of the Netherlands in the province of South Holland, situated in 51° 55' 19" N. latitude and 4° 29' 7" E. longitude, on the right bank of the Nieuwe Maas at the point where it is joined by the Rotte, a small stream rising near Moerkapelle. By rail it is fourteen and a half miles southeast of The Hague and forty-four and a half south of Amsterdam. The population of the commune of Rotterdam, which did not much exceed 20,000 in 1632, was 53,212 in 1796, 72,294 in 1830, 88,812 in 1850, 105,858 in 1860, 132,054 in 1876, and 148,102 in 1879-80. In 1870 the city contained 111,256 inhabitants, the suburbs 3,341, and the ships 2,478, and in 1890 the total, exclusive of the shipping, was 203,472.

Rotterdam probably owes its origin to the castles of Wena and Bulgerstein, of which the former was laid in ruins by the Hoek party in 1426. In 1299 Count John I. granted the "good people of Rotterdam" the same rights as the burghers of Beverwijk, and freedom from toll in all his lands. In 1597 a sixth extension of the town's area took place, and a seventh followed in 1609. Francis of Brederode seized the place in 1488, but had to surrender it to the emperor Maximilian in 1489. The Spaniards were in possession from April 9 to July 31, 1572, having gained entrance partly by treachery and partly by force, (*Dutch Republic*, ii.) It was at a meeting of the states held at Rotterdam in June, 1574, that the relief of Leyden was determined on, though it was not till 1580 that the town obtained a vote in the assembly.

ROUBAIX, a manufacturing town of France, the second in population in the department of Nord, lies to the northeast of Lille on the Ghent Railway and on the canal connecting the lower Deule with Scheldt by the Marq and Espierre. The population of Roubaix, which in 1891 was 115,000 (the commune 121,000), is almost entirely manufacturing, and the trading firms of the town gave employment besides to an equally large number of hands in the vicinity.

ROUBILLAC, LOUIS FRANCOIS, an able French sculptor. Born at Lyons in 1695, he became a pupil of Balthasar of Dresden and of N. Coustou. About the year 1720 he settled in London, and soon became the most popular sculptor of the time in England. He died on January 11, 1762, and was buried in the church of St. Martin-in-the-Fields.

ROUCHER, JEAN ANTOINE, a French poet, to whom a melancholy fate and some descriptive verse equal to anything written during the last three-quarters of a century by any of his countrymen except André





**Chénier**, gave some reputation, was born on February 17, 1745, at Montpellier, and perished by the guillotine at Paris on July 25, 1794.

**ROUEN**, a city of France, the ancient capital of Normandy, and now the administrative center of the department of Seine Inférieure, the seat of an archbishopric and court of appeal, and the headquarters of the third corps d'armée, stands on a level site on the right bank of the Seine in 49° 26' N. latitude and 1° 6' E. longitude, at the point where it is joined by the Aubette and the small Rivière de Robec. The population of the six cantons of Rouen in 1886 was 107,120, but if the suburbs are included the figure may be stated at about 150,000.

Cotton spinning and weaving are carried on in the town, and especially the manufacture of *rouenneries* (cotton fabrics woven with dyed yarn).

Ratuma or Ratumacos, the original name of Rouen, was modified by the Romans into Rotomagus, and by the writers of mediæval Latin into Rodomum, of which the present name is a corruption.

Philip Augustus built a castle at Rouen, but it was rather a fortress than a palace, and the kings of France never treated it as a residence; a round keep called Joan of Arc's Tower still stands. On the other hand, nothing remains of the castle erected by Henry V. of England when he took possession of Rouen in 1418 after a sanguinary siege; he proposed making it one of his continental residences, but it was never completed. It was in Philip Augustus' castle that Joan of Arc was imprisoned and tried, and one of the public squares was the place where she was burned alive in 1431. During the Franco-German War the city was occupied by the invaders from December 5, 1870, to July 22, 1871, and had to submit to heavy requisitions. Among the famous men born at Rouen are the brothers Corneille, Fontenelle, the journalists Armand Carrel and De Villemessant, the composer Boieldieu, the painters Jouvenet, Restout, and Géricault, the architect Blondel, Dulong the physicist, and La Salle the American explorer.

**ROUGE**. This name is applied to various coloring substances of a brilliant carmine tint, especially when used as cosmetics. The least harmful of these preparations are such as have for their basis carthamine, obtained from the safflower (*Carthamus tinctorius*). The Chinese prepare a rouge, said to be from safflower, which, spread on the cards on which it is sold, has a brilliant metallic green luster, but when moistened and applied to the skin assumes a delicate carmine tint. Jeweler's rouge for polishing gold and silver plate is a fine red oxide of iron prepared by calcination from sulphate of iron (green vitriol).

**ROUGET DE LISLE**, **CLAUDE JOSEPH**, one of the most noteworthy of those authors whom a single short piece of work has made famous, was born on May 10, 1760, at Lons-le-Saunier. He entered the army as an engineer and attained the rank of captain. The song which has immortalized him, the *Marseillaise*, was composed at Strasburg, where Rouget de Lisle was quartered in April, 1792, and he is said to have composed both the words and the music in a fit of patriotic excitement after a public dinner. The piece was at first called *Chant de l'armée du Rhin*, and only received its name of *Marseillaise* from its adoption by the Provençal volunteers whom Barbaroux introduced into Paris, and who were prominent in the storming of the Tuileries. The author himself was unfavorably effected by that very event. He was a moderate republican, and was cashiered and thrown into prison; but the counter-revolution set him at liberty. Little is recorded of his latter years, and he received no pension

or other mark of favor till the accession of Louis Philippe. He died at Choisy on June 26, 1836.

**ROULERS**, or **ROUSSELAERE**, a town of Belgium, in the province of West Flanders, on the Mandelbeke, a tributary of the Lys, twenty-two and one-half miles south of Ostend on the railway to Courtrai. From time immemorial it has been the seat of a great weaving industry, which now produces both cotton, union, and linen goods; and it also manufactures in various other departments. The population was 16,345 in 1874, and 19,735 in 1887.

**ROOM** (**RÚM**) is the name by which the Arabs call the Romans, *i.e.*, all subjects of the Roman power. *Bilád al-Rúm*, "the lands of the Romans," accordingly means the Roman empire. The parts of the old empire conquered by the Arabs were regarded as having ceased to be Roman, but the Western Christian lands were still called lands of the Rúm, without reference to the fact that they had in great part ceased to pay any allegiance to the "king of Rúm," *i.e.*, the Byzantine emperor.

**ROUMANIA**, a kingdom in the southeast of Europe between the Carpathians, the Pruth, the Black Sea, and the Danube. The Pruth and the Kilia mouth of the Danube now form the frontier with Russia. West of Silistria the Danube is the boundary between Roumania and Bulgaria, while to the east of that point the boundary is formed by an irregular line passing east by south to the coast about ten miles to the south of Mangalia. The territory thus shut off between the Danube and the Black Sea is known as the **DOBRUDJA** (*q.v.*), and differs in its physical features and products from the rest of the kingdom. It was given to Roumania at the close of the last Russo-Turkish War as a compensation for the territory of Bessarabia, east of the Pruth, which was then restored to Russia. The area of the kingdom is estimated at about 49,250 square miles, which is rather less than that of England without Wales. The greatest length of the kingdom is from east to west near the parallel of 45°, along which the length is about 350 miles. The line stretching from northwest to southeast between the extreme points of the kingdom is about fifteen miles shorter.

Of the rivers of Roumania by far the most important is the Danube, which is navigable for large vessels throughout its Roumanian reach, the first obstruction to navigation, the celebrated Iron Gates, occurring just where it enters Roumanian territory.

The climate of Roumania is one of extremes as regards temperature. Winter and summer are almost equally trying. In the former season the thermometer may sink to -15° Fahr., while in the latter it may rise to from 90° to 95°. The mean temperature of spring at Bucharest is 53°, summer 72½°, autumn 65°, winter 27½°. Spring, however, scarcely exists except in name, the interval between the cold winter and hot summer being very short.

Three-fourths of the population are dependent upon agriculture. The plains covered by loess and black soil are admirably adapted for the growth of cereals, and of these the most important are maize, wheat, and barley. The methods of cultivation are to a large extent primitive and imperfect, but great improvements are taking place through the application of foreign capital to the development of the native resources.

Besides forming a valuable article of export maize furnishes the chief food of the people. The great body of Roumanians seldom eat meat except on feast days, and the favorite food is a dish called *mamaliga*, made by boiling maize-meal and flavoring it with a little salt. It thus resembles the hominy of the Americans. In addition to cereals many kinds of vegetables, including

garlic, melons, and cucumbers, are grown. Hemp and colza are also important products, and tobacco furnished a considerable article of export until it was made a monopoly of the state in 1872. The rearing of domestic animals is likewise an important industry, but it has not advanced so much of late years as the growth of cereals.

About one-sixth of the total surface of Roumania is estimated to be covered with forest producing valuable timber trees. Oaks, firs, and beeches are said to be met with having a diameter of more than eight feet at the height of thirty-three feet above the ground.

The mineral wealth on the Roumanian side of the Carpathians is considerable, but at present there are only three minerals that have any great industrial importance. These are rock-salt, petroleum, and lignite. The salt mines are a state monopoly, and two of them, at Ocna-Mare and Telega, are partly worked by convicts. The depth from which the salt is extracted nowhere exceeds 300 feet. The average quantity of salt sold annually is about 62,000 tons. Coal is also found, in some places even at the surface, but, though one or two mines have been opened, the total production is insignificant. Ozocerite, or fossil wax, is frequently found in association with lignite, but is used only in small quantity by the peasantry. Among other minerals are anthracite, iron, gold, copper, lead, sulphur, cobalt, and arsenic; and there is little doubt that some of these at least might be made economically valuable if the resources of the country were adequately developed.

So far the manufacturing industries of Roumania are hardly worthy of mention. There are petroleum refineries, one or two sugar refineries, numerous steam-mills for grinding flour, besides large numbers of floating maize-mills on the Danube; but in addition to these there are only a few manufactories at Galatz.

The first Roumanian railway was that from Giurgevo to Bucharest, opened in 1869. In 1890 there were about 1,200 miles of railway in the kingdom. The internal trade of Roumania is almost entirely in the hands of the Jews. It is greatly hampered by the existence of the octroi in all the large towns, almost all the necessaries of life as well as luxuries being taxed when introduced within the municipal boundaries.

The estimated population of the country is 5,376,000, including about 400,000 Jews and 200,000 Gipsies. About 4,500,000 of the population belong to the Roumanian branch of the Orthodox Greek Church, and there are 114,000 Roman Catholics and 13,800 Protestants.

Of the larger cities Bucharest (Bucurest) numbered in 1888 225,805 inhabitants, Jassy 93,125, and Galatz 86,763.

The peace strength of the permanent army consists of 1,200 officers and 18,532 men, with 180 guns. Besides this, there are the territorial army, consisting of 120,000 men and eighty-four guns; the militia, consisting of thirty-two regiments of infantry; and finally the *levée en masse*. Every Roumanian, from his twenty-first to his forty-sixth year, is obliged to serve his time in one of the above categories. The total of the Roumanian forces, exclusive of the *levée en masse*, amounts to about 150,000 men and 288 guns.

In 1865 a conflict broke out between the government and the people in Bucharest, and in February, 1866, Prince Cuza, whose personal vices had rendered him detestable, was forced to abdicate. The chambers chose first as his successor the count of Flanders, but on his declining the office proceeded to elect Prince Charles of Hohenzollern-Sigmaringen, who was proclaimed hospodar or *Domnu* of Roumania, April 29,

1866. A new constitution was at the same time introduced. Its provisions secure the universal suffrage of tax-paying citizens, ministerial responsibility, trial by jury, freedom of meeting and petition, of speech and of the press (except as regards breaches of the criminal code), gratuitous and compulsory primary education, and the right of asylum for political exiles. Legislative power is shared between the prince and chambers, but bills relating to the budget and army must originate with the chamber of deputies. There are two chambers—the senate and the chamber of deputies. Both houses are elective, and the election is carried out by means of electoral colleges classified according to property and professional qualifications. For the house of deputies each constituency is divided in this way into four colleges, each of which elects a member. The two highest of these colleges also elect the senators, each senator being elected for a term of eight years. The senate also includes *ex officio* certain high officials and ecclesiastics, and members for the universities. The senate consists at present of 120 members, the chamber of deputies of 178. The sovereign has a right of veto reserved to him on all measures. The judicial system is based on the *Code Napoléon*, with some modifications.

On the outbreak of the Russo-Turkish war in 1877 Roumania found herself between hammer and anvil. Yielding to *force majeure* the government of Prince Charles consented to the passage of Russian troops across Roumanian territory, on the understanding that the scene of hostilities was as far as possible to be removed outside the limits of the principality. The Porte, however, refusing to recognize that Roumania had acted under constraint, proclaimed the Roumanians rebels, and the prince's government accordingly resolved to offer active assistance to the Russians. A Roumanian division of 32,000 men under General Cernat, took part in the siege of Plevna, and the Roumanian soldiers distinguished themselves in the opinion of the most competent judges alike for their heroism and endurance. The successful assault by the Roumanian troops on the "indomitable redoubt" of Grivitzza formed in fact the turning point of the siege and of the war. In the peace of St. Stefano, however, Russia insisted on the retrocession of the strip of Bessarabia that had been restored to Moldavia by the treaty of Paris, giving Roumania "in exchange" the islands of the Danubian delta, and the Dobrudja, which had been ceded by the sultan. This territorial readjustment was ratified by the treaty of Berlin (1878). The high contracting powers at the same time consented by art. xliii. to recognize the independence of the principality subject to the provision (art. xlv.) that all the inhabitants should enjoy complete religious freedom, a clause inserted on account of the Jewish persecutions that had previously taken place, and that foreigners in the country should be treated on a footing of perfect equality. All Danubian fortresses were to be razed, and the jurisdiction of the European commission to regulate the Danubian navigation, on which Roumania now acquired the right of representation, was extended from the mouth to the Iron Gates. The coping-stone to Roumanian independence was set by proclamation on March 26, 1881, of Prince Charles as king of Roumania, and on May 22 of the same year his coronation took place with the European sanction. The crown placed on King Carol's head was made from the captured cannon of the Plevna redoubts.

ROUMANIAN LITERATURE. See VLACHS.

ROUMELIA. The name of Roumili, "the land of the Romans," was applied from the fifteenth century downward to all that portion of the Balkan peninsula



westward from the Black Sea which was subject to Turkey. More precisely it was the country bounded north by Bulgaria, west by Albania, and south by the Morea, or in other words the ancient provinces, including Constantinople and Salonica, of Thrace, Thessaly, and Macedonia. The name was ultimately applied more especially to an eyalet or province composed of Central Albania and Western Macedonia, having Monastir for its chief town, and including Kesrie (Castoria), Ocrida (Ochrida), and the Scodra (Scutari); and at length it disappeared altogether in the administrative alterations effected between 1870 and 1875. Eastern Roumania was constituted an autonomous province of the Turkish empire by the Berlin treaty of 1878, to be governed by a Christian governor-general appointed by the sultan for a term of five years. In 1879, in obedience to an international commission, it was divided into six departments and twenty-eight cantons, the departments being Philippopolis (187,095), Tatarbazarjik (117,063), Hassköi (134,268), Eski-Zagra (158,905), Kazanlik, Slivno or Sliven (130,136), and Burgas (88,046). The whole area is estimated at 14,858 square miles, and the population, in 1880, was 815,513, of whom 573,231 were Bulgarians, 176,759 Turks, 42,526 Greeks, 19,524 Gipsies, 4,177 Jews, and 1,306 Armenians.

**ROUND TOWERS.** A peculiar class of round tower exists scattered throughout Ireland; about one hundred and twenty examples once existed; most of these are ruined, but eighteen or twenty are almost perfect. These towers were built either near or adjoining a church; they are of various dates from, perhaps, the eighth to the thirteenth century; though varying in size and detail, they have many characteristics which are common to all. They are built with walls slightly battering inward, so that the tower tapers toward the top. The lower part is formed of solid masonry, the one doorway being raised from six to twenty feet above the ground, and so only accessible by means of a ladder. The towers, within, are divided into several stories by two or more floors, usually of wood, but in some cases, as at Keneith, of stone slightly arched. The access from floor to floor was by ladders, no stone staircase being provided. The windows, which are always high up, are single lights, mostly arched or with a flat stone lintel.

Much has been written as to the use of these towers, and the most conflicting theories as to their origin have been propounded. It is, however, fairly certain that they were constructed by Christian builders, both from the fact that they always are, or once were, near to a church, and also because crosses and other Christian emblems frequently occur among the sculptured decorations of their doors and windows. The original purpose of these towers was probably for places of refuge, for which the solid base and the door high above the ground seem especially adapted.

Round towers wider and lower in proportion than those of Ireland appear to have been built by many prehistoric races at different parts of Europe. Many examples exist in Scotland, and in the islands of Corsica and Sardinia. The most magnificent example of a round tower is the well-known leaning tower of Pisa, begun in the year 1174. It is richly decorated with tiers of open marble arcades, supported on free columns. The circular plan was much used by Moslem races for their minarets. The finest of these is the thirteenth century minar of Kootub at Old Delhi, built of limestone, with bands of marble. It is richly fluted on plan, and when complete was at least 250 feet high.

**ROUNDEL.** See **RONDEAU.**

**ROUS, or ROUSE, FRANCIS,** born 1579, died 1659.

known by his translation of the Psalms. His works appeared at London in 1657.

**ROUSSEAU, JACQUES,** painter, a member of a Huguenot family, was born at Paris in 1630. Besides being a painter in oil and fresco, Rousseau was an etcher of some ability; many etchings by his hand from the works of the Caracci and from his own designs still exist; they are vigorous, though too coarse in execution. He spent the latter part of his life in London, where he died in 1693.

**ROUSSEAU, JEAN-BAPTISTE,** a poet of some merit and a wit of considerable dexterity, was born at Paris on April 10, 1670; he died at Brussels on March 17, 1741.

**ROUSSEAU, JEAN JACQUES,** was born at Geneva, on June 28, 1712. In 1724 he was taken into the house of his uncle Bernard, by whom he was shortly afterward apprenticed to a notary. His master, however, found or thought him quite incapable and sent him back. After a short time (April 25, 1725) he was apprenticed afresh, this time to an engraver. He did not dislike the work, but was or thought himself cruelly treated by his master. At last, in 1728, when he was sixteen, he ran away, the truancy being by his own account unintentional in the first instance, and due to the fact of the city gates being shut earlier than usual. Then began a very extraordinary series of wanderings and adventures, for much of which there is no authority but his own.

Up to his thirty-third year Rousseau's life, though continuously described by himself, was of the kind called subterranean, and the account of it must be taken with considerable allowances. There are, to say the least, grave improbabilities in it; there are some chronological difficulties; and in one or two instances his accounts have been flatly denied by persons more or less entitled to be heard. He had written nothing, and if he was known at all it was as an eccentric vagabond. From this time, however, he is more or less in view.

It was not, however, till 1749 that Rousseau made his mark. The academy of Dijon offered a prize for an essay on the effect of the progress of civilization on morals. Rousseau took up the subject, developed his famous paradox of the superiority of the savage state, won the prize, and, publishing his essay next year, became famous. In 1752 he brought out at Fontainebleau an operetta, the *Devin du Village*, which was very successful. He received a hundred louis for it, and he was ordered to come to court next day. This meant the certainty of a pension. But Rousseau's shyness or his perversity (as before, probably both) made him disobey the command. His comedy *Narcisse*, written long before, was also acted, but unsuccessfully. In the same year, however, a letter *Sur la Musique Française* again had a great vogue. Finally, for this was an important year with him, the Dijon academy, which had founded his fame, announced the subject of "The Origin of Inequality," on which he wrote a discourse which was unsuccessful, but at least equal to the former in merit. During a visit to Geneva in 1754 Rousseau saw his old friend and love Madame de Warens. He spent little more than a year at the "Hermitage" near Montmorency, but it was a very important year. Here he wrote *La Nouvelle Héloïse*; here he indulged in the passion which that novel partly represents, his love for Madame d'Houdetot, sister-in-law of Madame d'Epinay, a lady still young and extremely amiable but very plain, who had a husband and a lover (St. Lambert), and whom Rousseau's burning devotion seems to have partly pleased and partly annoyed. Here too arose the incomprehensible triangular quarrel between Diderot, Rousseau, and Grimm which ended Rousseau's sojourn at the Hermitage.

Hitherto Rousseau's behavior had frequently made him enemies, but his writings had for the most part made him friends. The quarrel with Madamed'Épinay, with Diderot, and through them with the philosophe party, reversed this. In 1758 appeared his *Lettre à d'Alembert contre les Spectacles*, written in the winter of the previous year at Montlouis. This was at once an attack on Voltaire, who was giving theatrical representations at Les Délices, on D'Alembert, who had condemned the prejudice against the stage in the *Encyclopédie*, and on one of the favorite amusements of the society of the day. Diderot personally would have been forgiving enough. But Voltaire's strong point was not forgiveness, and, though Rousseau no doubt exaggerated the efforts of his "enemies," he was certainly henceforward as obnoxious to the philosophe coterie as to the orthodox party. In 1662 appeared the *Contrat Social* at Amsterdam, and *Émile*, which was published both in the Low Countries and at Paris. For the latter the author received 6,000 livres, for the *Contrat* 1,000.

Rousseau's reputation was now higher than ever, but the term of the comparative prosperity which he had enjoyed for nearly ten years was at hand. The *Contrat Social* was obviously anti-monarchic; the *Nouvelle Héloïse* was said to be immoral; the sentimental deism of the "Profession du vicaire Savoyard" in *Émile* irritated equally the philosophe party and the church. On June 11, 1662, *Émile* was condemned by the parlement of Paris, and two days previously Madame de Luxembourg and the Prince de Conti gave the author information that he would be arrested if he did not fly. They also furnished him with means of flight, and he made for Yverdun in the territory of Bern, whence he transferred himself to Motiers in Neuchâtel, which then belonged to Prussia. Frederick II. was not indisposed to protect the persecuted when it cost him nothing and might bring him fame, and in Marshal Keith, the governor of Neuchâtel, Rousseau found a true and firm friend. He was, however, unable to be quiet or to practice any of those more or less pious frauds which were customary at the time with the unorthodox. The archbishop of Paris had published a pastoral against him, and Rousseau did not let the year pass without a *Lettre à M. de Beaumont*. The council of Geneva had joined the condemnation of *Émile*, and Rousseau first solemnly renounced his citizenship, and then, in the *Lettres de la Montagne* (1763), attacked the council and the Genevan constitution unsparingly. All this excited public opinion against him, and gradually he grew unpopular in his own neighborhood.

He was for some time uncertain where to go, and thought of Corsica (to join Paoli) and Berlin. But finally David Hume offered him, late in 1765, an asylum in England, and he accepted. He passed through Paris, where his presence was tolerated for a time, and landed in England on January 13, 1766. He was lionized in London to his heart's content and discontent, for it may truly be said of Rousseau that he was equally indignant at neglect and intolerant of attention. When, after not a few displays of his strange humor, he professed himself tired of the capital, Hume procured him a country abode in the house of Mr. Davenport at Wootton in Derbyshire. Finally he quarreled with Hume because the latter would not acknowledge all his own friends and Rousseau's supposed enemies of the philosophe circles to be rascals. He remained, however, at Wootton during the year and through the winter. In May, 1767, he fled to France. In the summer of 1770 he returned to Paris, resumed music copying, and was on the whole happier than he had been since he had to leave Montlouis. He

had by this time married Thérèse le Vassrur, or had at least gone through some form of marriage with her.

Many of the best-known stories of Rousseau's life date from this last time, when he was tolerably accessible to visitors, though clearly half-insane. He finished his *Confessions*, wrote his *Dialogues* (the interest of which is not quite equal to the promise of their curious sub-title *Rousseau juge de Jean Jacques*), and began his *Rêveries du Promeneur Solitaire*, intended as a sequel and complement to the *Confessions*, and one of the best of all his books. It should be said that besides these, which complete the list of his principal works, he has left a very large number of minor works and a considerable correspondence. During this time he lived in the Rue Platière, which is now named after him. But his suspicions of secret enemies grew stronger rather than weaker, and at the beginning of 1778 he was glad to accept the offer of M. de Girardin, a rich financier, and occupy a cottage at Ermenonville. The country was beautiful; but his old terrors revived, and his woes were complicated by the alleged inclination of Thérèse for one of M. de Girardin's stable boys. On July 2d he died in a manner which has been much discussed, suspicions of suicide having at the time and since been frequent. On the whole the theory of a natural death due to a fit of apoplexy and perhaps to injuries inflicted accidentally during that fit seems most probable. He had always suffered from internal and constitutional ailments not unlikely to bring about such an end.

ROUSSEAU, THÉODORE, a distinguished landscape painter, was born at Paris in 1812, and studied in the École des Beaux-Arts, after which he spent some time in traveling and making studies of landscape and sky effects. He first exhibited at the Salon in 1834, obtained gold medals in 1849 and 1854, and in 1852 received the Legion of Honor. His fame has increased rather than diminished since his death in 1867.

ROUSSILLON, a province of France, which now forms the greater part of the department of PYRÉNÉES ORIENTALES, (*q.v.*) It was bounded on the south by the Pyrenees, on the west by the county of Foix, on the north by Languedoc, and on the east by the Mediterranean. The province derived its name from a small bourg near Perpignan, the capital, called Ruscino (Rosceliona, Castel Rossello), where the Gallic chieftains met to consider Hannibal's request for a conference.

ROVEREDO (in German sometimes *Rofreit*), one of the chief industrial cities in South Tyrol, and, after Trent, the chief seat of the Tyrolese silk industry, is situated on the left bank of the Adige (Etsch), in the fertile Val Lagarina, thirty-five miles north of Verona and 100 miles south of Innsbruck. The population is 8,864.

ROVIGNO, a city of Austria, in the province of Istria, is picturesquely situated on the coast of the Adriatic, about twelve miles south of Parenzo, and ten miles by rail from Canfanaro, a junction of the railway between Divazza (Trieste) and Pola. It has two harbors, with ship-building yards; and it carries on several industries and a good export trade, especially in olive-oil and a cement manufactured in the little island of Saint' Andrea. The population was 9,564 in 1869 and 9,522 in 1880.

ROVIGO, a city of Italy, the chief town of a province, and the seat of the bishop of Adria, lies between the Po and the Adige, and is traversed by the Adigetto, a navigable branch of the Adige. By rail it is twenty-seven miles southwest of Padua. The population of the city proper was 7,452 in 1871 and 7,272 in 1881; the commune in 1881 had 11,460 inhabitants.

ROVIGO, DUKE OF. See SAVARY.

ROWE, NICHOLAS, English playwright, the descendant of a family long resident at Lamerton in Devon, was born at Little Barford in Bedfordshire, England, June 30, 1674. Rowe's tragedies were marked by passionate feeling set off by a graceful diction, and were well adapted for stage effect. If *The Fair Penitent* and *Jane Shore* have been expelled from the stage, their historic reputation and their style will repay perusal. Among Rowe's other literary efforts may be mentioned an edition of the works of Shakespeare. At the time of his death he had also finished a translation of Lucan's *Pharsalia*, a work then much praised and not yet superseded by any competitor. Rowe's minor poems were beneath the level of his age. He died in 1718.

ROWING is the act of driving forward or propelling a boat along the surface of the water by means of oars. It is remarkable how scanty, until quite recent times, are the records of this art, which at certain epochs has played no insignificant part in the world's history. It was the oar that brought Phœnician letters and civilization to Greece; it was the oar that propelled the Hellenic fleet to Troy; it was the oar that saved Europe from Persian despotism; it was the skillful use of the oar by free citizens which was the glory of Athens in her prime. It is to be regretted that so little is known of the details connected with it, or of the disposal of the rowers on board the splendid fleet which started in its pride for Sicily, when 17,000 oars at a given signal smote the brine, and 100 long ships raced as far as Ægina. The vessels of the ancient Greeks and Romans—the biremes, quadriemes, quinquiremes, and hexiremes—owed their pace to the exertions of men who plied the oar rather than to the sails with which they were fitted, and which were only used when the wind was favorable. Professor Gardner has shown that boat-racing was not uncommon among the Greeks; and that it was practiced among the Romans Virgil testifies in the well-known passage in the fifth book of the *Æneid*. And the Venetian galleys which were subsequently used on the shores of the Mediterranean in mediæval times were only a modified form of the older kind of craft. These were for the most part manned by slaves and criminals, and were in constant employment in most European countries.

Rowing was understood by the ancient Britons, as they trusted themselves to the mercy of the waves in coracles composed of wicker-work covered with leather, similar no doubt in many respects to those now used in Wales; but these frail vessels were propelled by paddles and not by oars. The Saxons seem to have been expert in the management of the oar, as well as the Danes and Norwegians, as it is recorded that the highest nobles in the land devoted themselves to it. Alfred the Great introduced long galleys from the Mediterranean, which were propelled by forty or sixty oars on each side, and for some time these vessels were used for war purposes. It is stated by William of Malmesbury that Edgar the Peaceable was rowed in state on the river Dee from his palace, in the city of West Chester, to the church of St. John and back again, by eight tributary kings, himself acting as coxswain.

Apart from the reference already made to the ancients, we do not find any records of boat-racing before the establishment in England of the coat and badge, instituted by the celebrated comedian, Thomas Doggett, in 1715, in honor of the house of Hanover, to commemorate the anniversary of "King George I.'s happy accession to the throne of Great Britain." The prize was a red coat with a large silver badge on the arm, bearing the white horse of Hanover, and the race had to be rowed on August 1st, annually on the Thames, by six

young watermen who were not to have exceeded the time of their apprenticeship by twelve months.

The first record of public-school racing in England which can now be seen is the Water Ledger of Westminster School, which commences in the year 1813 with a list of the crew of the six-oared *Fly*. This craft continued for some time to be the only boat of the school, and in 1816 beat the Temple six-oar in a race from Johnson's Dock to Westminster Bridge by half a length. Eton possessed a fleet of boats in 1811, if not at an earlier date, consisting of a ten-oar and three boats with eight oars. In those days some of the crews had a waterman to pull stroke and drill the crew, but this practice was abolished in 1828, as the waterman frequently rowed a bad stroke, and the crew were obliged to subscribe for his day's pay, beer, and clothes; thenceforward the captain of each crew rowed the stroke-oar. The earliest record of a race at Eton is when Mr. Carter's four rowed against the watermen and beat them in 1817; but the professionals had a boat too small for them. In 1818 Eton challenged Westminster School to row from Westminster to Kew Bridge against the tide, but the match was stopped by the authorities; and it was not until 1829 that the first contest between the two schools was brought to an issue.

Rowing appears to have commenced at the universities soon after the beginning of the century, but earlier at Oxford than at Cambridge. There were college boats on the river for some time before there were any races. Those first recorded at Oxford were in 1815, said to be college eights, but the boats used are more likely to have been fours, when Brasenose was "head of the river" and Jesus their chief opponent.

*Boat-Racing in America.*—This pastime can be traced back to the beginning of the present century. The earliest important affair was in 1811, a sectional match, New York city against all Long Island, four-oared barges, with coxswains, from Harsimus, N. J., to the flag-staff on the Battery. New York won easily, and such was the popular enthusiasm over the race that its boat, the *Knickerbocker*, was suspended in a public museum, where it remained for fifty-four years, a constant recipient of public admiration until destroyed by fire in July, 1865. Since this historic contest no year has been without boat races. At that time the words amateur and professional were unknown on the water; the Castle Garden Amateur Boat Club Association—America's first avowedly amateur club—was founded in 1834.

There had been informal clubs and desultory racing at Yale College as early as 1833, but the first regular organization was in March, 1843. Harvard followed in September, 1844, and Yale and Harvard first met on the water at Lake Winnepiseogee, New Hampshire, August 3, 1852; since 1878 they have met annually at New London, Conn. In 1865 Harvard, Yale, Trinity, and Brown formed the Union College Regatta Association, which lasted three years. The Racing Association of American Colleges, which at one time included sixteen colleges, died in 1876. In 1883 Bowdoin, Columbia, Cornell, Princeton, Rutgers University of Pennsylvania, and Wesleyan formed the Intercollegiate Racing Association, which still flourishes and gives annual regattas.

The control of amateur racing in America belongs to the National Association of Amateur Oarsmen, founded in 1873, whose membership includes all the better class of amateur boat clubs. Its management is vested in an executive committee of nine members, three of whom are elected at each annual meeting of the association. The rulings of this committee are subject to review, approval, or reversal, at each annual meeting of the full association. This association gives an annual open

amateur regatta, similar to the Royal Henley Regatta in being the chief aquatic event of the year, but unlike it in not being rowed always on the same course, but moving about from year to year—having, since 1873, been rowed at Philadelphia, Newark, Troy, and Watkins (N. Y.), Detroit, Washington, and Boston. There are in the United States eleven regularly organized amateur rowing associations, formed by the union of amateur rowing clubs and giving each year one or more regattas. These associations are the National Association of Amateur Oarsmen, the North-Western Amateur Rowing Association, the Mississippi Valley Amateur Rowing Association, the Passaic River Amateur Rowing Association, the Intercollegiate Rowing Association, the Harlem Regatta Association, the Louisiana State Amateur Rowing Association, the Virginia State Rowing Association, the Schuylkill Navy, the Upper Hudson Navy, and the Kill von Kull Regatta Association. At English regattas it is usual to start three boats in a heat, sometimes four, five being the utmost limit, whereas at Saratoga, in the great regattas of 1874 and 1875, there were started abreast, in four separate races, eleven singles (twice), thirteen coxswainless fours, and thirteen coxswainless sixes.

The sliding seat is now superseded by various styles of rolling seats, in which the actual seat travels backward and forward on frictionless wheels or balls. The best of these devices run more easily, are cleaner, and less liable to accident than the ordinary sliding seat. English oarsmen use the sliding seat as a means of making their old accustomed stroke longer and more powerful. American oarsmen hold that what is needed by an oarsman is not the addition of the long slide to the old-fashioned long swing, but the almost total substitution of slide for swing, the transfer of the labor from back to legs—in fact a totally new style.

The primary division of American racing craft is into (a) lapstreaks or clinkers, built of wood in narrow streaks with overlapping edges at each joint, and (b) smooth bottoms, made of wood or paper, and having a fair surface, without projecting joint or seam. Lapstreak boats are, however, now rarely used save in barge races. Then follows the subdivision into barges, which are open inrigged boats, gigs, which are open outrigged boats, and shells, which are covered outrigged boats. These three classes of boats are further subdivided, in accordance with the means of propulsion, into single, double, and quadruple sculling boats, and pair-, four-, six-, and eight-oared boats. In America the double-scul is more frequent than the pair, and the six-oar much more common than the eight-oar.

ROWLANDSON, THOMAS, caricaturist, was born in Old Jewry, London, in July, 1756, the son of a tradesman or city merchant. He died in London, after a prolonged illness, April 22, 1827.

ROWLEY, WILLIAM, actor and dramatist, collaborated with several of the celebrated dramatists of the Elizabethan period—Dekker, Middleton, Heywood, Fletcher, Webster, Massinger, and Ford. Nothing is known of his life except that he was an actor in various companies, and married in 1637. There was another Rowley, an actor and playwright in the same generation, Samuel, and probably a third, Ralph. Four plays by W. Rowley are extant—*A Woman never Vext* (printed 1632), *A Match at Midnight* (1633), *All's Lost by Lust* (1633) and *A Shoemaker a Gentleman* (1638).

ROWLEY REGIS, an urban sanitary district of Staffordshire, England, is situated on the Birmingham canal, and on the Stourbridge branch of the Great Western railway, six miles west of Birmingham. The population of the urban sanitary district (area 3,670 acres) in 1871 was 23,534, and in 1881 it was 27,385.

ROXANA, or ROXANE, daughter of the Bactrian Oxyartes and wife of Alexander the Great (see ALEXANDER, and MACEDONIAN EMPIRE).

ROXBURGH, a border county of Scotland, occupying the greater part of the border line with England, is bounded east and southeast by Northumberland, southeast by Cumberland, southwest by Dumfriesshire, west by Selkirkshire, northwest by Midlothian, and northeast by Berwickshire. It lies between  $55^{\circ} 6' 38''$  and  $55^{\circ} 42' 30''$  N. latitude, between  $2^{\circ} 10'$  and  $3^{\circ} 7'$  W. longitude. Its greatest length from north to south is forty-three miles, and its greatest breadth about thirty miles. The area is 428,464 acres, or about 670 square miles.

*Climate and Agriculture.*—The mean annual temperature approximates to that of Scotland generally, but it is much warmer in the low and arable portions, where also the rainfall is much less than in the hilly regions. The soil varies much in different districts, being chiefly loam in the low and level tracts along the banks of the river, where it is also very fertile. In other parts a mixture of clay and gravel prevails, but there is also a considerable extent of mossy land. The hilly district is everywhere covered by a thick green pasturage admirably suited for sheep. Both in the pastoral and in the arable districts agriculture is in a very advanced condition. The chief attention is devoted to cattle and sheep rearing.

*Manufactures.*—Though essentially an agricultural county, Roxburghshire possesses woollen manufactures of some importance, including tweeds, blankets, shawls, and hosiery, the principal seats being Hawick, Jedburgh, and Kelso.

*Railways.*—The county is intersected by one of the lines of railway from Edinburgh to London (the "Waverley" route), which passes Melrose and Hawick. At Riccarton a branch passes southeastward to Newcastle. The northern district is crossed by the border railway from St. Boswells to Kelso, Coldstream, and Berwick, a branch passing south from near Kelso to Jedburgh.

*Population.*—Between 1831 and 1881 the population increased from 43,663 to 53,442 (25,436 males, 28,006 females), but from 1861 to 1871 there was a decrease from 54,119 to 49,407. The town population numbered 24,273 in 1881, the village 6,627, and the rural 22,542.

ROXBURY, formerly a city of Norfolk county, Mass., now incorporated in BOSTON, (*q.v.*)

ROY, RÉMMOHUN. Rájá Rámmohun Roy (or Ráy), the founder of the Bráhmia Samáj or Theistic church of India, was born at Rádhánagar, Bengal, in May, 1772, of an ancient and honorable Brahman family. He visited France, and wished to visit America, but died unexpectedly of brain fever at Bristol, England, September 27, 1833.

ROY, WILLIAM, a famous English geodesist, was born in 1726, and died in 1790.

ROYAL HOUSEHOLD. In all the mediæval monarchies of western Europe the general system of government sprang from, and centered in, the royal household. The sovereign's domestics were his officers of state, and the leading dignitaries of the palace were the principal administrators of the kingdom. The royal household itself had, in its turn, grown out of an earlier and more primitive institution. It took its rise in the *comitatus*, described by Tacitus, the chosen band of *comites* or companions who, when the Roman historian wrote, constituted the personal following, in peace as well as in war, of the Teutonic *princeps* or chieftain. In England before the Conquest the *comitatus* had developed or degenerated into the thegnhood, and among the most eminent and powerful of the king's thegns

were his dishthegn, his bowerthegn, and his horsethegn or staller. In Normandy at the time of the Conquest a similar arrangement, imitated from the French court, had long been established, and the Norman dukes, like their overlords the kings of France, had their seneschal or steward, their chamberlain and their constable. After the Conquest the ducal household of Normandy was reproduced in the royal household of England; and since, in obedience to the spirit of feudalism, the great offices of the first had been made hereditary, the great offices of the second were made hereditary also, and were thenceforth held by the grantees and their descendants as grand-serjeanties of the crown. The consequence was that they passed out of immediate relation to the practical conduct of affairs either in both state and court, or in the one or the other of them. The steward and chamberlain of England were superseded in their political functions by the justiciar and treasurer of England, and in their domestic functions by the steward and chamberlain of the household. The marshal of England took the place of the constable of England in the royal palace, and was associated with him in the command of the royal armies. In due course, however, the marshalship as well as the constableness became hereditary, and, although the constable and marshal of England retained their military authority until a comparatively late period, the duties that they successively performed about the palace had been long before transferred to the master of the horse. Under these circumstances the holders of the original great offices of state and the household ceased to attend the court except on occasions of extraordinary ceremony, and their representatives either by inheritance or by special appointment have ever since continued to appear at coronations and some other public solemnities, such as the opening of the parliament or trials by the House of Lords.

ROYAL SOCIETY, THE, or, more fully, The Royal Society of London for Improving Natural Knowledge, is an association of men interested in the advancement of mathematical and physical science. It is the oldest scientific society in Great Britain, and one of the oldest in Europe. The Royal Society is usually considered to have been founded in the year 1660, but a nucleus had in fact been in existence for some years before that date. Wallis informs us that as early as the year 1645 weekly meetings were held of "divers worthy persons, inquisitive into natural philosophy, and other parts of human learning, and particularly of what hath been called the *New Philosophy* or *Experimental Philosophy*," and there can be little doubt that this gathering of philosophers is identical with the "Invisible College" of which Boyle speaks in sundry letters written in 1646 and 1647. These weekly meetings, according to Wallis, were first suggested by Theodore Haak, "a German of the Palatinate then resident in London," and they were held sometimes in Doctor Goddard's lodgings in Wood street, sometimes at the Bull-Head Tavern in Cheapside, but more often at Gresham College.

On November 28, 1660, the first journal book of the society was opened. It was agreed at this meeting that the company should continue to assemble on Wednesdays at 3 o'clock; an admission fee of ten shillings with a subscription of one shilling a week was instituted; Doctor Wilkins was appointed chairman; and a list of forty-one persons judged likely and fit to join the design was drawn up. On the following Wednesday Sir Robert Moray brought word that the king (Charles II.) approved the design of the meetings; a form of obligation was framed, and was signed by all the persons enumerated in the memorandum of November 28th, and by seventy-three others. On December 12th another

meeting was held at which fifty-five was fixed as the number of the society—persons of the degree of baron, fellows of the College of Physicians, and public professors of mathematics, physic, and natural philosophy of both universities being supernumeraries.

Gresham College was now appointed to be the regular meeting-place of the society. Sir Robert Moray was chosen president (March 6, 1661), and continued in that office until the incorporation of the society, when he was succeeded by Lord Brouncker. In October, 1661, the king offered to be entered one of the society, and next year the society was incorporated under the name of "The Royal Society," the charter of incorporation passing the great seal on July 15, 1662, to be modified, however, by a second charter in the following year. The council of the Royal Society met for the first time on May 13, 1663, when resolutions were passed that debate concerning those to be admitted should be secret, and that fellows should pay one shilling a week to defray expenses.

After the Great Fire of London, in September, 1666, the apartments of the Royal Society in Gresham College were required for the use of the city authorities, and the society were therefore invited by Henry Howard, of Norfolk, to meet in Arundel House. At the same time he presented them with the library purchased by his grandfather Thomas, earl of Arundel, and thus the foundation was laid of the magnificent collection of scientific works, probably not far short of 45,000 volumes, which the society at the present time possesses. Of the Arundel MSS. the bulk was sold to the trustees of the British Museum in 1830 for the sum of £3,559, the proceeds being devoted to the purchase of scientific books. These MSS. are still kept in the museum as a separate collection.

Under date December 21, 1671, the journal-book records that "the lord bishop of Sarum proposed for candidate Mr. Isaac Newton, professor of the mathematicks at Cambridge." Newton was elected a fellow January 11, 1671-2, and in 1703 he was appointed president, a post which he held till his death, 1727. During his presidency the society moved to Crane Court, their first meeting in the new quarters being held November 8, 1710. In the same year they were appointed visitors and directors of the Royal Observatory at Greenwich, a function which they continued to perform until the accession of William IV., when by the new warrant then issued the president and six of the fellows of the Royal Astronomical Society were added to the list of visitors.

In 1780, under the presidency of Sir Joseph Banks, the Royal Society removed from Crane Court to the apartments assigned to them by the government in the new Somerset House, where they remained until they removed to Burlington House in 1857. The policy of Sir Joseph Banks was to render the fellowship more difficult of attainment than it had been, and the measures which he took for this purpose, combined with other circumstances, led to the rise of a faction headed by Dr. Horsley. Throughout the years 1783 and 1784 feeling ran exceedingly high, but in the end the president was supported by the majority of the society. An account of the controversy will be found in a tract entitled *An Authentic Narrative of the Dissensions and Debates in the Royal Society*. In connection with this policy of Sir Joseph Banks may be mentioned a further step in the same direction taken in the year 1847, when the number of candidates recommended for election by the council was limited to fifteen, and the election was made annual. Concurrently, however, with this gradual narrowing of the Royal Society's boundaries was the successive establishment of other scientific bodies. The

founding of the Linnean Society in 1788 under the auspices of several fellows of the Royal Society was the first instance of the establishment of a distinct scientific association under royal charter. The Geological Society followed in 1807, and the Royal Astronomical Society in 1820. The Chemical, the Royal Geographical, and the Entomological are the remaining chartered scientific societies existing in London at the present time. The Royal Society continues, however, to hold the foremost place among the scientific bodies of England, not only from the number of eminent men included in its fellowship, but also from its close official connection with the government.

ROYAN, a town of France, in the department of Charente Inférieure, is situated on the right bank of the Gironde, where it joins the ocean; a branch line of five and a half miles connects it with Saujon, on the Seudre Railway, which joins the Bordeaux-Nantes line at Pons. Royan, which in 1881 had a population of only 4,573 (5,445 as a commune), is one of the most frequented bathing resorts on the Atlantic seaboard, the visitors numbering about 80,000 annually.

ROYER-COLLARD, PIERRE PAUL, French statesman and philosopher, was born on June 21, 1763, at Sompuis near Vitry-le-Français. He died on September 2, 1845.

ROYLE, JOHN FORBES, a distinguished botanist and teacher of materia medica. His reputation is especially founded upon the results of personal investigations in the Himalaya Mountains and in other parts of Hindustan. He was born in Cawnpore in 1800. In 1851 he superintended the Indian department of the Great Exhibition. He died at Acton near London on January 2, 1858.

RSHEFF. See RZHEFF.

RUBBER. See INDIA-RUBBER.

RUBENS, PETER PAUL (1577-1640), the most eminent representative of Flemish art, and one of the greatest painters of any school, was born very probably at Siegen, in Westphalia, on June 29, 1577.

Rubens went to Antwerp with his mother when he was scarcely ten years of age. Part of his boyhood he spent as a page in the household of the countess of Lalaing, in Brussels; but, tradition adds, and we may well believe, the youth's disposition was such as to induce his mother to allow him to follow his proper vocation, choosing as his master Tobias Verhaecht, who was in some way connected with the family. Not the slightest trace of this first master's influence can be detected in Rubens' works. Not so with Adam Van Noort, to whom the young man was next apprenticed. Van Noort, whose aspect of energy is well known through Van Dyck's beautiful etching, was the highly esteemed master of numerous painters—among them Van Balen, Sebastian Vrancx, and Jordaens, later his son-in-law. His pictures are almost exclusively to be found in Antwerp churches.

Rubens remained with Van Noort for the usual period of four years, thereafter studying under Otto Vœnius or Van Veen, a gentleman by birth, a most distinguished Latin scholar, and a painter of very high repute.

In 1598, Adam Van Noort acting as dean of the Antwerp guild of painters, Rubens was officially recognized as "master"—that is, was allowed to work independently and receive pupils.

From 1600 to the latter part of 1608 Rubens belonged to the household of Vincenzo Gonzaga, duke of Mantua. The influence of the master's stay at Mantua was of extreme importance, and cannot be too constantly kept in view in the study of his later works.

Sent to Rome in 1601 to take copies from Raphael for his master, he was also commissioned to paint

several pictures for the church of Santa Croce, by the archduke Albert of Austria, sovereign of the Spanish Netherlands, and once, when he was a cardinal, the titular of that see. A copy of *Mercury and Psyche* after Raphael is preserved in the museum at Pesth. The religious paintings—the *Invention of the Cross*, the *Crowning with Thorns*, and the *Crucifixion*—are to be found in the hospital at Grasse in Provence.

At the beginning of 1603 "The Fleming," as he was termed at Mantua, was sent to Spain with a variety of presents for Philip III. and his minister the duke of Lerma, and thus had opportunity to spend a whole year at Madrid and become acquainted with some of Titian's masterpieces. Two of his own works, known to belong to the same period, are in the Madrid Gallery, *Heraculus* and *Democritus*.

While employed at Rome, in 1608, Rubens received most alarming news as to the state of his mother's health. The duke of Gonzaga was then absent from Italy, but the dutiful son, without awaiting his return, at once set out for the Netherlands, though with the full intention of shortly resuming his post at court, as we gather from a letter to Annibale Chieppio, the Mantuan minister. When he arrived in Antwerp his mother was no more. However strong his wish might now be to return to Italy, his purpose was overruled by the express desire of his sovereigns, Albert and Isabella, to see him take up a permanent residence in the Belgian provinces. On August 3, 1609, Rubens was named painter in ordinary to their highnesses, with a salary of 500 livres, and "the rights, honors, privileges, exemptions," etc., belonging to persons of the royal household, not to speak of the gift of a gold chain.

Although so recently returned to his native land, Rubens seems to have been, with one accord, accepted by his countrymen as the head of their school, and the municipality was foremost in giving him the means of proving his acquirements. The first in date among the numerous repetitions of the *Adoration of the Magi* is a picture in the Madrid Gallery, measuring twelve feet by seventeen, and containing no fewer than eight-and-twenty life-size figures, many in gorgeous attire, warriors in steel armor, horsemen, slaves, camels, etc.

Apart from the success of his works, another powerful motive had helped to detain the master in Antwerp—his marriage with Isabella Brant (October, 1609). Pictures have made us familiar with the graceful young woman who was, for seventeen years, to share the master's destinies. We meet her at the Hague, St. Petersburg, Florence, at Grosvenor House, but more especially at Munich, where Rubens and his wife are depicted at full length on the same canvas.

Rubens delighted in undertakings of the vastest kind. "The large size of a picture," he writes to W. Trumbull in 1621, "gives us painters more courage to represent our ideas with the utmost freedom and semblance of reality. \* \* \* I confess myself to be, by a natural instinct, better fitted to execute works of the largest size." The correctness of this appreciation he was very soon called upon to demonstrate most strikingly by a series of twenty-four pictures, illustrating the life of Mary de' Medici, queen-mother of France. The gallery at the Luxembourg Palace, which these paintings once adorned, has long since disappeared, and the complete work is now exhibited in the Louvre. On May 13, 1625, Rubens writes from Paris to his friend Peiresc that both the queen and her son are highly satisfied with his paintings, and that Louis XIII. came on purpose to the Luxembourg, "where he has never set foot since the palace was begun, sixteen or eighteen years ago."

No painter in Europe could now pretend to equal

Rubens either in talent or in renown, Month after month productions of amazing size left the Antwerp studio.

Of the numerous creations of his pencil, none, perhaps, will more thoroughly disclose to us his comprehension of religious decorative art than the *Assumption of the Virgin* at the high altar of the Antwerp cathedral, finished in 1625.

Able to rely so greatly on his power as a colorist, Rubens is not a mere decorator. He penetrates into the spirit of his subjects more deeply than, at first sight, seems consistent with his prodigious facility in execution. The *Massacre of the Innocents*, in the Munich Gallery, is a composition that can leave no person unmoved.

In the midst of the rarest activity as a painter, Rubens was now called upon to give proofs of a very different kind of ability. The truce concluded between Spain and the Netherlands in 1609 ended in 1621; archduke Albert died the same year. His widow sincerely wished to prolong the arrangement, still hoping to see the United Provinces return to the Spanish dominion, and in her eyes Rubens was the fittest person to bring about this conclusion. The painter's comings and goings, however, did not remain unheeded, for the French ambassador writes from Brussels in 1624—"Rubens is here to take the likeness of the prince of Poland, by order of the Infanta. I am persuaded he will succeed better in this than in his negotiations for the truce." But, if Rubens was to fail in his efforts to bring about an arrangement with the Netherlands, other events enabled him to render great service to the state.

Rubens and Buckingham met in Paris in 1625; a correspondence of some importance had been going on between the painter and the Brussels court, and before long it was proposed that he should endeavor to bring about a final arrangement between the crowns of England and Spain.

Through a letter to Peiresc we hear of the familiar intercourse kept up between the painter and the king. Philip delighted to see Rubens at work in the studio prepared for him in the palace, where he not only left many original pictures, but copied for his own pleasure and profit the best of Titian's.

Great as was the king's admiration of Rubens as a painter, it seems to have been scarcely above the value attached to his political services. Far from looking upon Rubens as a man of inferior calling, unworthy to meddle with matters of state, he now commissioned the painter to go to London as bearer of his views to Charles I. Giving up his long cherished hope of revisiting Italy on his return from Spain, Rubens, honored with the title of secretary of the king's privy council in the Netherlands, started at once on his new mission. His popularity must have been very great, for on September 23, 1629, the university of Cambridge conferred upon him the honorary degree of master of arts, and on February 21, 1630, he was knighted, the king presenting him with the sword used at the ceremony, which is still preserved by the descendants of the artist.

Although, it seems, less actively employed as an artist in England than in Spain, Rubens, besides his sketches for the decoration of the Banqueting House at Whitehall, painted the admirable picture of the *Blessings of Peace*, now in the National Gallery.

Rubens was now fifty-three years of age; he had been four years a widower, and before the end of the year (December, 1630) he entered into a second marriage with the beautiful girl of sixteen, named Helena Fourment, with whom his pictures have made the world so well acquainted.

Although the long months of absence could not be

termed blanks in Rubens' artistic career, his return was followed by an almost incredible activity. Inspired more than ever by the glorious works of Titian, he now produced some of his best creations.

Isabella died in 1633, and we know that to the end Rubens remained in high favor with her, alike as an artist and as political agent.

Spain and the Netherlands went to war again, the king never ceasing to look upon the Dutch as rebels.

Ferdinand of Austria, the cardinal-infant of Spain, was called to the government of the Netherlands on the death of his aunt. He was the king's younger brother, and arrived at Antwerp in May, 1635. The streets had been decorated with triumphal arches and "spectacula," arranged by Rubens, and certainly never equalled by any other works of the kind. Several of the paintings detached from the arches were offered as presents to the new governor-general, a scarcely known fact, which accounts for the presence of many of these works in public galleries (Vienna, Dresden, Brussels, etc). Rubens was at the time laid up with gout, but Prince Ferdinand was desirous of expressing his satisfaction, and called upon the painter, remaining a long time at his house. Rubens and Ferdinand had met at Madrid, and only a short time elapsed before the painter was confirmed in his official standing—a matter of small importance, if we consider that the last years of his life were almost exclusively employed in working much more for the king than for his brother. About 120 paintings of considerable size left Antwerp for Madrid in 1637, 1638, and 1639; they were intended to decorate the pavilion erected at the Pardo, and known under the name of Torre de la Parada. Another series had been begun, when Ferdinand wrote to Madrid that the painter was no more, and Jordeans would finish the work. Rubens breathed his last on May 30, 1640.

RUBIDIUM. See POTASSIUM METALS.

RUBRUQUIS, the name which has most commonly been given to William of Rubruk, a Franciscan friar and the author of a remarkable narrative of Asiatic travel in the thirteenth century. Nothing is known of him save what can be gathered from his own narrative, with the exception of a word from the pen of Roger Bacon, his contemporary and brother Franciscan, indicating personal acquaintance.

RUBY. This name is applied by lapidaries and jewelers to two distinct minerals, which may be distinguished as the true or Oriental ruby and the spinel ruby. The former is a red variety of corundum or native alumina, of great rarity and value, while the latter is an aluminate of magnesium, inferior to the true ruby in hardness and much less esteemed as a gem stone. With ancient writers the confusion was even greater, for they appear to have classed together under a common name, such as the *carbunculus* of Pliny or the *ἀνθράξ* of Greek writers, not only our two kinds of ruby, but also garnets and other inferior stones of a brilliant fiery color. By modern mineralogists it has come to be understood that when the word ruby is used without any qualifying prefix the true or Oriental stone is invariably indicated.

RÜCKERT, FRIEDRICH, an eminent German poet, was born at Schweinfurt on May 16, 1788. Rückert, who was master of thirty languages, made his mark chiefly as a translator of Oriental poetry, and as a writer of poems conceived in the spirit of Oriental masters. As a master of poetical style he ranks with German writers of the highest class. There are hardly any lyrical forms which are not represented among his works, and in all of them, the simplest and the most complex, he wrote with equal ease and grace. He died in 1866.

RÚDAGÍ. Hakím Mohammed Faríd-eddí 'Abdal-

láh, the first great genius of modern Persia, was born in Rúdag, a village in Transoxiana, about 870-900, and died in 954.

RUDD, or RED-EYE (*Leuciscus erythrophthalmus*), a fish of the family of Carps, generally spread over Europe, north and south of the Alps, also found in Asia Minor, and extremely common in suitable localities, viz., still and deep waters with muddy bottom. When adult, it is readily recognized by its deep, short body, golden-coppery tint of the whole surface, red eyes, and scarlet lower fins. The rudd is a fine fish, but little esteemed for food, and very rarely exceeds a length of twelve inches or a weight of two pounds. It feeds on small fresh-water animals and soft vegetable matter, and spawns in April or May. It readily crosses with the white bream, more rarely with the roach and bleak.

RUDDIMAN, THOMAS, an eminent Scottish scholar, was born in October, 1674, at Raggal, in the parish of Boyndie, Banffshire, Scotland. He died at Edinburgh, January 19, 1758, and was interred in Greyfriars churchyard, where in 1806 a tablet was erected to his memory.

RUDE, FRANÇOIS, a French sculptor of great natural talent and force of character. He was born at Dijon, January 4, 1784. He worked all his life with the most extraordinary energy and gave himself no rest in spite of the signs of failing health, and at last, on November 3, 1855, he died suddenly with scarcely time to cry out. One of his noblest works, and easily accessible, is the tomb of Cavaignac, on which he placed beside his own the name of his favorite pupil Christophe.

RUDE STONE MONUMENTS. The raising of commemorative monuments of such an enduring material as stone is a practice that may be traced in all countries to the remotest times. The highly sculptured statues, obelisks, and other monumental erections of modern civilization are but the lineal representatives of the unhewn monoliths, dolmens, cromlechs, etc., of prehistoric times. Judging from the large number of the latter that have still survived the destructive agencies (notably those of man himself) to which they have been exposed during so many ages, it would seem that the ideas which led to their erection had as great a hold on humanity in its earlier stages of development as at the present time. In giving some idea of these rude monuments in Britain and elsewhere, it will be convenient to classify them as follows: (1) Isolated pillars or monoliths of unhewn stones raised on the end are called *Memphirs* (*maen*, a stone, and *hir*, long). (2) When these monoliths are arranged in lines they become *Alignments*. (3) But if their linear arrangement is such as to form an inclosure (*enceinte*), whether circular, oval, or irregular, the group is designated by the name of *Cromlech* (see CROMLECH). (4) Instead of the monoliths remaining separate, they are sometimes placed together and covered over by one or more capstones so as to form a rude chamber; in this case the monument is called a *Dolmen* (*daul*, a table, and *maen*, a stone). This megalithic chamber is sometimes partially or wholly imbedded in a mound of earth or stones so as to form a tumulus or cairn. As, however, there are many tumuli and cairns which do not contain megalithic chambers, we have only partially to deal with them under the category of rude stone monuments.

RUDOLPH I., German king, eldest son of Albert IV., count of Hapsburg, was born on May 1, 1218. He died at Germersheim on July 15, 1291.

RUDOLPH II., Holy Roman emperor, was the son of the emperor Maximilian II., and was born on July 18, 1552. In 1572 he obtained the crown of Hungary, in 1575 that of Bohemia, with the title "King of the

Romans;" and in 1576, after his father's death, he became emperor. He surrendered himself absolutely to the control of the Jesuits, under whose influence he had been brought up at the gloomy court of Spain; and in his hereditary lands they labored assiduously to destroy Protestantism. The Protestants were deprived of the right of public worship in Vienna and other towns; their schools were closed, and many of their preachers banished. Almost all public offices, too, were placed in the hands of Roman Catholics. Trouble followed, and in 1611 the emperor surrendered the hereditary territories to Mathias, his elder brother. Rudolph died on January 20, 1612.

RUDOLSTADT, capital of the German principality of Schwarzburg-Rudolstadt, and chief residence of the prince, is situated on the left bank of the Saale, eighteen miles due south of Weimar, in one of the most beautiful districts of Thuringia. The picturesque little town is a favorite summer watering-place, with pine baths, as well as a frequented tourist resort. Besides containing the government buildings of the little principality, Rudolstadt is fairly well provided with schools and other institutions, including a library of 60,000 volumes. The industries of the district include the manufacture of porcelain and of dyestuffs, wool-spinning, and bell-founding. The population (4,100 in 1817) was 8,747 in 1880, and 9,621 (estimated) in 1890.

RUEDA, LOPE DE. See DRAMA.

RUFF, a bird so called from the very beautiful and remarkable frill of elongated feathers that, just before the breeding-season, grow thickly round the neck of the male, who is considerably larger than the female, known as the Reeve. In many respects this species, the *Tringa pugnax* of Linnæus and the *Machetes pugnax* of the majority of modern ornithologists, is one of the most singular in existence, and yet its singularities have been very ill appreciated by zoölogical writers in general.

The cock-bird, when out of his nuptial attire, or, to use the fenman's expression, when he has not "his show on," and the hen at all seasons offer no very remarkable deviation from ordinary Sandpipers, and outwardly there is nothing, except the unequal size of the two sexes, to rouse suspicion of any abnormal peculiarity. But when spring comes all is changed. In a surprisingly short time the feathers clothing the face of the male are shed, and their place is taken by *papillæ* or small caruncles of bright yellow or pale pink. From each side of his head sprouts a tuft of stiff-curved feathers, giving the appearance of long ears, while the feathers of the throat change color, and beneath and around it sprouts the frill or ruff already mentioned as giving the bird his name. The colors range from deep black to pure white, passing through chestnut or bay, and many tints of brown or ashy-gray, while often the feathers are more closely barred with some darker shade, and the black is very frequently glossed with violet, blue, or green—or, in addition, spangled with white, gray, or gold-color. The white, on the other hand, is not rarely freckled, streaked, or barred with gray, rufous-brown, or black. In some examples the barring is most regularly concentric, in others more or less broken-up or undulating, and the latter may be said of the streaks.

That all this wonderful "show" is the consequence of the polygamous habit of the Ruff can scarcely be doubted. Both Montagu and Graves, to say nothing of other writers, state that the Ruffs, in England, were far more numerous than the Reeves; and their testimony can hardly be doubted; though in Germany Naumann (*Vög. Deutschland's*, vii. p. 544) considers that this is only the case in the earlier part of the season, and that later the females greatly outnumber the males.



Its breeding-grounds extend from Great Britain across northern Europe and Asia; but the birds become less numerous toward the east. They winter in India, reaching even Ceylon, and Africa as far as the Cape of Good Hope. The Ruff also occasionally visits Iceland, and there are several well-authenticated records of its occurrence on the eastern coast of the United States, while an example is stated to have been received from the northern part of South America.

RUFINUS, TYRANNIUS (TURRANIUS, TORANUS), the well-known contemporary of Jerome, was born at or near Aquileia about the year 345. In Sicily he was engaged in translating the *Homilies* of Origen when he died in 410.

RUGBY, a market-town of Warwickshire, England, is finely situated on a table-land rising from the southern bank of the Avon, at the junction of several railway lines, and near the Grand Junction canal, thirty miles east-southeast of Birmingham, and twenty south-southwest of Leicester. It owes its importance to the grammar school, built and endowed by Laurence Sheriff, a merchant grocer and servant to Queen Elizabeth, and a native of the neighboring village of Brownsover. The endowment was obtained in 1653. At the tercentenary of the school in 1867 subscriptions were set on foot for founding scholarships, building additional schoolrooms, rebuilding or enlarging the chapel, and other objects. There are a number of charities, including Laurence Sheriff's almshouses (founded 1567), Elborow's almshouses (1707), Miss Butlin's almshouses (1851), and the hospital of St. Cross, opened in 1884, at a cost of \$100,000. A public recreation ground was provided by the local government board in 1877. The town has an important cattle market. The population of the urban sanitary district (area 1,617 acres) in 1871 was 8,385, and in 1881 it was 9,891.

RUGE, ARNOLD, German philosophical and political writer, was born at Bergen, in the island of Rügen, on September 13, 1803. In his last years he received from the German Government a pension of 3,000 marks. He died on December 31, 1880.

In 1846-48 his *Gesammelte Schriften* were published in ten volumes. After this time he wrote, among other books, *Unser System*, *Revolutionsnovellen*, *Die Loge des Humanismus*, and *Aus früherer Zeit* (his memoirs). He also wrote many poems, and several dramas and romances, and translated into German various English works, including the *Letters of Junius* and Buckle's *History of Civilization*.

RÜGEN, the largest island belonging to Germany, is situated in the Baltic Sea, immediately opposite the town of Stralsund, one and one-half miles off the north-west coast of Pomerania in Prussia, from which it is separated by the narrow Strelasund. Its shape is exceedingly irregular, and its coast-line is broken by very numerous bays and peninsulas, sometimes of considerable size. The greatest length of Rügen from north to south is 32 miles; its greatest breadth is 25½ miles; and its area is 377 square miles. The surface gradually rises toward the west to Rugard (335 feet), the "eye of Rügen," near Bergen, but the highest point is the Herthaburg (505 feet) in Jasmund. Erratic blocks are scattered throughout the island, and the roads are made with granite. Though much of Rügen is flat and sandy, the fine beech-woods which cover great part of it and the northern coast scenery combine with the convenient sea-bathing offered by the various villages round the coast to attract large numbers of visitors annually.

The official capital of the island is Bergen (3,662 inhabitants), connected since 1883 with Stralsund by a railway and ferry. The other chief places are Garz

(2,014), Sagard (1,447), Gingst (1,285), and Putbus (1,752). Ecclesiastically, Rügen is divided into twenty-seven parishes, in which the pastoral succession is said to be almost hereditary. The inhabitants are distinguished from those of the mainland by peculiarities of dialect, costume, and habits; and even the various peninsulas differ from each other in these particulars. The inhabitants rear some cattle, and Rügen has long been famous for its geese; but the only really considerable industry is fishing—the herring-fishery being especially important. Rügen, with the neighboring islands, forms a governmental department, with a population (1880) of 46,115, and of 50,600 in 1890.

RUHNKEN, DAVID, one of the most illustrious scholars of the Netherlands, was of German origin, having been born in Pomerania in 1723, and died 1798.

Ruhnken's principal works are editions of (1) Timæus' *Lexicon of Platonic Words*, (2) Thalelæus and other Greek commentators on Roman law, (3) Rutilius Lupus and other grammarians, (4) Velleius Paterculus, (5) the works of Muretus. He also occupied himself much with the history of Greek literature, particularly the oratorical literature, with the Homeric hymns, the scholia on Plato, and the Greek and Roman grammarians and rhetoricians.

RUHRORT, a busy trading town in Prussia, is situated at the junction of the Ruhr and Rhine, in the midst of a productive coal district, fifteen miles north of Düsseldorf. Ruhrort has the largest river harbor in Germany, with very extensive quays; and most of the one and one-half million tons of coal which are annually exported from the neighborhood are dispatched in the fleet of steam-tugs and barges which belong to the port. About one-half of the coal goes to Holland, and the rest to towns on the upper Rhine. Grain and timber are also exported. The industries of the town include active shipbuilding, iron and tin working, and the making of cordage and machinery. The inhabitants numbered 1,443 in 1816, 9,130 in 1880, and in 1890, 15,000.

RULHIÈRE, or RULHIÈRES, CLAUDE CARLOMAN DE, poet and historian, was born at Bondy in 1735, and died at Paris in 1791. At twenty-five he accompanied Breteuil to St. Petersburg as secretary of legation. Here he actually saw the revolution which seated Catherine II. on the throne, and thus obtained the facts of his best-known and best work, the short sketch called *Anecdotes sur la Revolution de Russie en 1762*. It was not published till after the empress' death. The later years of Rulhière's life were spent either in Paris, where he held an appointment in the foreign office and went much into society, or else in traveling over Germany and Poland. The distracted affairs of this latter country gave him the subject of his longest work, *Histoire de l'Anarchie de Pologne* (1807), which was never finished, and which the patriotism of its latest editor, M. Ostrowski, has rather unjustifiably rebaptized *Révolutions de Pologne*.

RUM is a spirituous liquor, prepared from molasses, skimmings of the boiling house, and other saccharine by-products, and the refuse juice of the cane-sugar manufacture. Its distillation, which is a simple process, may be conducted in connection with any cane-sugar establishment, but the rum which comes to the American and European markets is chiefly the produce of the West India Islands and Guiana. Rum varies very considerably in quality, the finest being known as Jamaica rum, whether it is the product of that island or not. An inferior quality of rum is known among the French as *tafia*; and the lowest quality, into the wash for which debris of sugar cane enters, is called negro rum, and is mostly consumed by the colored workers in the sugar houses and distilleries. The spirit prepared from

molasses of beet-sugar factories cannot be classed with rum. The product has a highly disagreeable odor and taste, and it can only be rendered fit for consumption by repeated distillation and concentration to a high degree of strength, whereby the spirit is rendered "silent," or has only a faint rum flavor. In this condition it is used for mixing with strongly flavored rum, and for the preparation of a fictitious rum, the flavor of which is due to "rum essence," a mixture of artificial ether, birch bark oil, and other substances. Cane-sugar molasses enters largely into the materials from which ARRACK (*q.v.*), the spirit of Java and the Indian Archipelago, is prepared, but its flavor depends more on palm-tree toddy, which also is a constituent of the wash.

RUMFORD, COUNT. See THOMPSON, SIR BENJAMIN.

RÚMÍ. Mohammed b. Mohammed b. Husain albalkhí, better known as Mauláná Jalál-uddín Rúmí, the greatest Súfic poet of Persia, was born September 30, 1207. He died December 17, 1273.

RUMINANTS. See MAMMALIA.

RÜMKER, CARL LUDWIG CHRISTIAN, German astronomer, was born in Mecklenburg on May 28, 1788. He served in the British navy for some years until 1817; in 1821 he went to New South Wales as astronomer at the observatory built at Parramatta by Sir Thomas Brisbane (see OBSERVATORY). He returned to Europe in 1831, and took charge of the school of navigation at Hamburg and the observatory attached to it. His principal work is a *Catalogue* of 12,000 fixed stars from meridian observations made at Hamburg, published in 1843. In 1857 he retired and went to reside in Lisbon, where he died on December 21, 1862.

RUNCIMAN, ALEXANDER, historical painter, was born in Edinburgh in 1736. He studied at the Foulis' Academy, Glasgow, and at the age of thirty proceeded to Rome. He died in Edinburgh on October 4, 1785. His works, while they show high intention and considerable imagination, are frequently defective in form and extravagant in gesture.

RUNCIMAN, JOHN, historical painter, a younger brother of the above, accompanied him to Rome, and died at Naples in 1766. He was an artist of great promise. His *Flight into Egypt*, in the National Gallery of Scotland, is remarkable for the precision of its execution and the mellow richness of its coloring.

RUNCORN, a market-town and seaport of Cheshire, England, is pleasantly situated on the south side of the Mersey and near the terminus in that river of the Bridgewater, the Mersey and Irwell, and the Trent and Mersey canals, fifteen miles southeast of Liverpool and fifteen northeast of Chester. The Mersey, which here contracts to 400 yards at high water, is crossed by a wrought-iron railway bridge 1,500 feet in length. The town was made an independent landing port in 1847, and within recent years large additions have been made to the docks and warehouses. The town possesses ship-building yards, iron foundries, rope works, tanneries, and soap and alkali works. The population of the urban sanitary district (area 1,490 acres) in 1871 was 12,443, in 1881 it was 15,126, and 25,000 in 1890.

RUNE. See ALPHABET, and SCANDINAVIAN LANGUAGES.

RUNEBERG, JOHAN LUDWIG, Swedish poet, was born at Jakobstad, in Finland, February 5, 1804, and died at Borga, May 6, 1877.

The poems of Runeberg show the influence of the Greeks and of Goethe upon his mind; but he possesses a great originality. In an age of conventionality he was boldly realistic, yet never to the sacrifice of artistic beauty. Less known to the rest of Europe than Teg-

ner, he yet is now generally considered to excel him as a poet, and to mark the highest attainment hitherto reached by imaginative literature in Sweden.

RUNNING. In this mode of progression the step is lighter and gait more rapid than in walking, from which it differs in consisting of a succession of springs from toe to toe, instead of a series of steps from toe to heel. In modern times it has been developed almost into a science by the Anglo-Saxon race in Great Britain and North America, till the distances recently covered appear almost fabulous compared with the performances up to the end of the first half of the century.

Running is usually thus classified:—(1) sprinting includes all distances up to 400 yards; (2) medium distances range from one quarter to three quarters of a mile; (3) long distances are those of one mile and upward. A first-class sprinter when at full speed will clear from eight to nine feet in each stride, and his toes leave the ground with inconceivable rapidity. When in good condition he will run 100 yards at top speed in one breath, and probably 150 yards without drawing a second one.

Of medium distances the quarter mile race is by far the most difficult to run, as a combination of speed and endurance is requisite. In fact a runner should be able to sprint the whole way. Six hundred yards and half a mile are the other chief distances in this class of running. The stride is slower than in sprinting, and a man cannot maintain the same speed throughout as is possible up to 300 yards.

Light wiry men are best fitted for long distance running, where stamina and wind are more useful than speed. The strides must be long and light. After some miles a runner is unable to keep the weight of the body on his toes any longer owing to fatigue, and puts his heels down, and runs flat-footed.

A runner's dress should be as light as possible, and consist merely of a thin jersey, a pair of drawers covering the waist and loins and extending downward to the top of the knee caps, and heelless running shoes with a few short spikes in the soles just under the tread of the foot. The spikes are longer for sprinting. Chamois leather socks for the toes and ball of the foot may be added, since they diminish concussion as each foot reaches the ground.

RUPERT (HRODBERT), ST., a kinsman of the Merovingian house, and bishop of Worms, was invited (696) to Regensburg (Ratisbon) by Theodo of Bavaria, but finally settled in Salzburg, the bishopric of which was his foundation. He is regarded as the apostle of the Bavarians—not that the land was, up to that time, altogether heathen, but because of his services in the promotion and consolidation of its Christianity.

RUPERT, prince of Bavaria, the third son of Frederick V., elector palatine and king of Bohemia, and of Elizabeth, sister of Charles I. of England, was born at Prague on December 18, 1619. In 1630 he was placed at the university of Leyden, where he showed particular readiness in languages and in military discipline. In December, 1635, he was at the English court, and was named as leader of the proposed expedition to Madagascar. In 1636 he visited Oxford, when he was made master of arts. Returning to The Hague in 1638, he made the first display of his reckless bravery at the siege of Breda, and shortly afterward was taken prisoner by the Austrians in the battle before Lemgo. For three years he was confined at Linz, where he withstood the endeavors made to induce him to change his religion and to take service with the emperor. Upon his release in 1642 he returned to The Hague, and from thence went to Dover, but, the Civil War not having yet begun, he returned immediately to Holland. Charles now named

Rupert general of the horse, and he joined the king at Leicester in August, 1642, being present at the raising of the standard at Nottingham. He was also made a knight of the Garter. He at once displayed the most astonishing activity, fought his first action with success at Worcester in September, and was at Edgehill on October 23d. At Aylesbury and Windsor, on the march to London, he received severe checks, but after desperate fighting took Brentford. In 1643 he captured Cirencester, but failed before Gloucester, and in the beginning of 1644 he was rewarded by being made earl of Holderness, duke of Cumberland, and president of Wales. At Marston Moor he charged and routed the Scots, but was in turn completely beaten by Cromwell's Ironsides. He escaped to York, and thence to Richmond, and finally by great skill reached Shrewsbury on July 20th. On November 21st he was repulsed at Abingdon, and on November 23d entered Oxford with Charles. In May, 1645, he took Newark by storm. His advice to march northward was overruled, and on June 14th the experiences of Marston Moor were repeated at Naseby.

On June 24th Rupert was taken prisoner by Fairfax at Oxford, and on July 5th, at the demand of the parliament, sailed from Dover for France. He was immediately made a marshal in the French service, with the command of the English there. He received a wound in the head at Armentières during 1647. The greater part of the English fleet having adhered to Charles, and having sailed to Holland, Rupert went with the prince of Wales to The Hague, where the charge of it was put into his hands. He immediately set out in January, 1649, upon an expedition of organized piracy. In February, after passing without molestation through the Parliamentary ships, he was at Kinsale, of which he took the fort. He relieved John Grenville at the Scilly Isles, and practically crippled the English trade. Attacked by Blake, he sailed to Portugal, and was received with kindness by the king; Blake, however, blockaded him in the Tagus, and demanded his surrender. Rupert broke through the blockade and sailed to the Mediterranean, landing at Barbary, and refitting at Toulon; thence he proceeded to Madeira, the Canaries (in 1652), the Azores, Cape de Verd, and the West Indies, sweeping the ocean between the latter places for a considerable time. Finding it impossible, however, to escape the indefatigable pursuit of Blake, he returned to France in 1653. He was now invited to Paris by Louis XIV., who made him master of the horse; he had also an offer from the emperor to command his forces.

At the end of September, 1660, Rupert returned to England. In August, 1664, he was appointed to command the Guinea fleet against the Dutch, and set sail in October. On June 5, 1665, he gained with Monk a great victory over the Dutch, and on his return had his portrait painted by Lely along with the other admirals present at the battle. He again put to sea in May, 1666, to hinder the junction of the Dutch and French, and returned in the beginning of June after a heavy defeat, his ship having stuck on the Galloper Sands during the fight. He was obliged to justify himself before the council. On October 22, 1667, he received with Monk the thanks of the House of Commons for his exertions against the Dutch at Chatham, and he was again at sea in April, 1668. In 1673 he was appointed lord high admiral, and fought two battles with the Dutch fleet on May 28th and August 11th, but could do little through the backwardness of the French in coming to his assistance. Till his death, on November 29, 1682, he lived in retirement at Windsor.

RUPERT'S LAND. See HUDSON'S BAY COMPANY and NORTHWEST TERRITORY.

RUPTURE. See HERNIA.

RUSH. Under the name of rush or rushes, the stalks or fistular stem-like leaves of several plants have minor industrial applications. The common rushes (species of *Juncus*) are used in many parts of the world for chair-bottoms, mats, and basket work, and the pith they contain serves as wicks in open oil-lamps and for tallow-candles—whence rushlight. The bulrush, *Typha elephantina*, is used in Sindh for mats and baskets. Under the name of rushes, species of *Scirpus* and other *Cyperaceæ* are used for chair-bottoms, mats, and thatch. The elegant rush mats of Madras are made from *Papyrus pangorei*. The sweet rush, yielding essential oil, is *Andropogon Schananthus*, known also as the lemon grass.

RUSH, BENJAMIN, the Sydenham of America, was born near Bristol (twelve miles from Philadelphia), in 1745, on a homestead founded by his grandfather, who had followed Penn from England in 1683, being of the Quaker persuasion, and a gunsmith by trade. After a careful education at school and college, and an apprenticeship of six years with a doctor in Philadelphia, Rush went for two years to Edinburgh, where he attached himself chiefly to Cullen. He took his M.D. degree there in 1768, spent a year more in the hospitals of London and Paris, and began practice in Philadelphia at the age of twenty-four. He at once became a leading spirit in the political and social movements of the day. He was a friend of Franklin, a member of Congress for the State of Pennsylvania in 1776, and one of those who signed the Declaration of Independence the same year. In 1774 he started, along with James Pemberton, the first anti-slavery society in America, and was its secretary for many years. When the political crisis ended in 1787 with the convention for drawing up a federal constitution, of which he was a member, he retired from public life, and gave himself up wholly to medical practice. He gained great credit when the yellow fever devastated Philadelphia in 1793, by his assiduity in visiting the sick (as many as 120 in a day), and by his bold and apparently successful treatment of the disease by bloodletting. When he began to prosper in practice he gave a seventh part of his income in charity. He died in 1813, after a five days' illness from typhus fever.

Rush's writings cover an immense range of subjects, including language, the study of Latin and Greek, the moral faculty, capital punishment, medicine among the American Indians, maple sugar, the blackness of the negro, the cause of animal life, tobacco smoking, spirit drinking, as well as a long list of more strictly professional topics. His last work was an elaborate treatise on the *Diseases of the Mind* (1812). He is best known now by the five volumes of *Medical Inquiries and Observations*, which he brought out at intervals from 1789 to 1798 (two later editions revised by the author). Epidemiology, and yellow fever in particular, was the subject on which he wrote to most purpose.

RUSHWORTH, JOHN, the compiler of the *Historical Collections* commonly described by his name, was born in Northumberland about the year 1607. In 1684 he was arrested for debt, and cast into the King's Bench prison, where he died, after lingering for some time in a condition of mental infirmity, the result of excessive drinking, in 1690.

RUSSELL, JOHN RUSSELL, EARL, a statesman who for nearly half a century faithfully represented the traditions of Whig politics, was the third son of John, sixth duke of Bedford, and was born in Hertford Street, Mayfair, London, August 18, 1792. Following in the footsteps of Lord Henry Petty, Brougham, and Horner, he went to the university of Edinburgh. On leaving

the university, he determined upon taking a foreign tour. On May 4, 1813, ere he was of age, he was returned for the ducal borough of Tavistock, and in this he resembled Lord Chesterfield and other aristocratic legislators, who were intrusted with the duty of law-making before they had arrived at years of discretion. In foreign politics Lord John Russell's oratorical talents were especially shown in his struggles to prevent the union of Norway and Sweden. In domestic questions he cast in his lot with those who opposed the repressive measures of 1817, and protested that the causes of the discontent at home should be removed by remedial legislation. During the first parliament (1820-26) of George IV. the county of Huntingdon accepted Lord John Russell's services as its representative, but he paid the penalty for his advocacy of Catholic emancipation with the loss in 1826 of his seat for Huntingdon county, though he found a shelter in the Irish borough of Bandon Bridge. He led the attack against the Test Acts in February, 1828, and when Lord Grey's Reform ministry was formed, Lord John Russell accepted the office of paymaster-general, though, strange to say, he was not admitted into the sacred precincts of the cabinet. This exclusion from the official hierarchy was rendered the more remarkable by the circumstance that he was selected (March 1, 1831) to explain the provisions of the Reform Bill, to which the cabinet had given its formal sanction. After many a period of doubt and defeat, "the bill, the whole bill, and nothing but the bill" passed into law, and Lord John stood forth in the mind of the people as its champion. Although it was not till some years later that he became the leader of the Liberal party, the height of his fame was attained in 1832.

In Lord Melbourne's administration Lord John Russell became home secretary and leader of the House of Commons, but on his seeking a renewal of confidence from the electors of South Devon, he was defeated and driven to Stroud. On Sir Robert Peel's resignation (1846) the task of forming an administration was intrusted to Lord John Russell, and he remained at the head of affairs from 1846 to 1852, but his tenure of office was not marked by any great legislative enactments. During Lord Aberdeen's administration Lord John Russell led the Lower House, at first as foreign secretary, then without portfolio, and lastly as president of the council. In 1854 he brought in a Reform Bill, but in consequence of the war with Russia the bill was allowed to drop, much to its author's mortification. His popularity was diminished by this failure, and although he resigned in January, 1855, on Mr. Roebuck's Crimea motion, he did not regain his old position in the country. At the Vienna conference (1855) Lord John Russell was England's representative, and immediately on his return he became secretary of the colonies; but the errors in his negotiations at the Austrian capital followed him and forced him to retire. For some years after this he was the "stormy petrel" of politics. He was the chief instrument in defeating Lord Palmerston in 1857. He led the attack on the Tory Reform Bill of 1859. A reconciliation was then effected between the rival Whig leaders, and Lord John Russell consented to become foreign secretary in Lord Palmerston's ministry, and to accept an earldom. During the American War Earl Russell's sympathies with the North restrained his country from embarking in the contest, but he was not equally successful in preventing the spoliation of Denmark. On Lord Palmerston's death (October, 1865) Earl Russell was once more summoned to form a cabinet, but the defeat of his ministry in the following June, on the Reform Bill which they had introduced, was followed by his retirement from

public life. Earl Russell died at Pembroke Lodge, Richmond Park, May 28, 1878.

RUSSELL, WILLIAM RUSSELL, LORD, the third son of Lord Russell, afterward fifth earl and still later first duke of Bedford, and Lady Anne Carr, daughter of the infamous countess of Somerset, was born September 29, 1639. It was not until the formation of the "country party," in opposition to the policy of the Cabal and Charles' French-Catholic plots, that Russell began to take an active part in affairs. He then joined Cavendish, Birch, Hampden, Powell, Lyttleton, and others in vehement antagonism to the court. In April, 1679, Russell was one of the council formed by Charles, but in January, 1680, Russell, along with Cavendish, Capell, Powell, Essex, and Lyttleton, tendered his resignation to the king, which was received by Charles "with all my heart." On June 16th he accompanied Shaftesbury, when the latter indicted James at Westminster as a Popish recusant; and on October 26th he took the extreme step of moving "how to suppress Popery, and prevent a Popish successor;" while on November 2d, now at the height of his influence, he went still further by seconding the motion for exclusion in its most emphatic shape, and on November 19th carried the bill to the House of Lords for their concurrence. On March 26, 1681, in the parliament held at Oxford, Russell again seconded the Exclusion Bill. Upon the dissolution he retired into privacy at his country seat of Stratton in Hampshire.

On the breaking out of the Rye Plot, of which neither he, Essex, nor Sidney had the slightest knowledge, he was accused by informers of promising his assistance to raise an insurrection and compass the death of the king. Before a committee of the council Russell, on June 28th, acknowledged his presence at the meeting, but denied all knowledge of the proposed insurrection. On July 19th he was tried at the Old Bailey, his wife assisting him in his defense. Evidence was given by an informer that, while at Shaftesbury's hiding-place in Wapping, Russell had joined in the proposal to seize the king's guard, a charge indignantly denied by him in his farewell paper, and that he was one of the committee of six appointed to prepare the scheme for an insurrection. Howard, too, expressly declared that Russell had urged the entering into communications with Argyll in Scotland.

Russell was sentenced to die. Many attempts were made to save his life. The old earl of Bedford, Monmouth, Legge, Lady Ranelagh, and Rochester added their intercessions. Russell himself, in petitions to Charles and James, offered to live abroad if his life were spared, and never again to meddle in the affairs of England. He refused, however, to yield to the influence of Burnett and Tillotson, who endeavored to make him grant the unlawfulness of resistance, although it is more than probable that compliance in this would have saved his life. He went to the place of execution in Lincoln's Inn Fields with perfect calmness, which was preserved to the last. He died on July 21, 1683, in the forty-fourth year of his age.

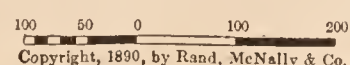
RUSSELL, JOHN SCOTT, was born in 1808 near Glasgow, Scotland. He attended in succession the universities of St. Andrews, Edinburgh, and Glasgow—taking his degree in the last-named at the age of sixteen. After spending a couple of years in workshops, he settled in Edinburgh as a lecturer on science, and soon collected large classes. His observations led him to propose and experiment on a new system of shaping vessels, which is known as the *wave system*. This culminated in the building of the enormous and unique *Great Eastern*, of which it has been recently remarked by a competent authority that "it is probable that, if a new *Great*





# EUROPEAN RUSSIA.

SCALE OF MILES.



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Longitude East from Greenwich. 45°

60° RAND, MCNALLY & CO.

*Eastern* were now to be built, the system of construction employed by Mr. Scott Russell would be followed exactly."

Though his fame will rest chiefly on the great ship mentioned, Scott Russell's activity and ingenuity displayed themselves in many other fields—steam-coaches for roads, improvements in boilers and in marine engines, the immense iron dome of the Vienna exhibition, cellular double bottoms for iron ships, etc. Along with Mr. Stafford Northcote (since Lord Iddesleigh), he was joint secretary of the Great Exhibition of 1851; and he was one of the chief founders of the Institution of Naval Architects. He died at Ventnor, June 8, 1882.

**RUSSIA.** The Russian empire is a very extensive territory in eastern Europe and northern Asia, with an area exceeding 8,500,000 square miles, or one sixth of the land surface of the globe (one twenty-third of its whole superficies). It is, however, but thinly peopled on the average, including only one-fourteenth of the inhabitants of the earth. It is almost entirely confined to the cold and temperate zones. In Nova Zembla (Novaya Zemlya) and the Taimyr peninsula, it projects within the Arctic Circle as far as  $77^{\circ} 2'$  and  $77^{\circ} 40'$  N. latitude; while its southern extremities reach  $38^{\circ} 50'$  in Armenia, about  $35^{\circ}$  on the Afghan frontier, and  $42^{\circ} 30'$  on the coasts of the Pacific. To the west it advances as far as  $20^{\circ} 40'$  E. longitude in Lapland,  $18^{\circ} 32'$  in Poland, and  $29^{\circ} 42'$  on the Black Sea; and its eastern limit—East Cape in the Behring Straits—extends to  $169^{\circ}$  W. longitude.

Russia has no oceanic possessions, and had abandoned those she owned in the last century; her islands are mere appendages of the mainland to which they belong.

The total population of the Russian empire was stated in 1882 at 102,000,000; but as it is increasing rapidly, and as the surplus of births over deaths reaches quite 1,000,000 annually, the population at this time can be easily estimated. In 1885 the total population of European and Asiatic Russia was established at 108,787,250. Statistics of their relative strength, however, are very imperfect. But from such data as is available, the population, so far as the census indicates, is as follows: Russ, 69,770,000; Poles, 6,010,000; Lithuanians, 2,910,000; Germans, 1,120,000; Swedes, 270,000; Tajiks (Persians), 1,125,000; Armenians, 800,000; Jews, 2,954,000; Caucasians, 2,850,000; Finns, 2,000,000; Turks and Tartars, 7,700,000; Mongols, 530,000. The largest cities are St. Petersburg (861,303), Moscow (753,469), and Odessa (240,000).

Only 9,263,000 (or 9 per cent.) of the aggregate population of Russia inhabit towns, the number of which is 601 in the fifty Russian governments. The great number of the Russian towns are mere villages; their inhabitants depend on agriculture, and the houses are mostly built of wood, only 127,000 out of about 787,000 houses in towns being built of stone. Of the 68,600,000 who in 1882 formed the rural population of European Russia the greater part were settled in 555,278 villages, almost entirely built of wood; nearly one-seventieth of the houses are destroyed by fire yearly.

Russia is an absolute and strongly centralized monarchy. The primary unit of state organization is the village community, or *mir*. A number of such communities are united into *volosts*, whose peasant inhabitants elect an elder (*volostnoy starshina*) and a peasants' tribunal (*volostnoy sud*). Placed, however, under the uncontrolled rule of a state official—the *mirovoy posrednik*—and of the police, the elder of the volost and his clerk have become mere organs of the local police and tax-gatherers, while the tribunal of the volost is at the mercy both of influential land-proprietors and of

the wealthier peasants or merchants. The system of local self-government is continued in the elective district and provincial assemblies—the *zemstvo*—on the one hand, and on the other in the elective justices of the peace (*mirovoy sudia*), whose periodical gatherings (*mirovoy syezd*) are courts of appeal against the decisions of the individual justices. But neither of these institutions—and least of all the *zemstvo*—is capable of acquiring the necessary independence. The *zemstvos*—one for each district, and another for the province—consist of a representative assembly (*zemskoye sobraniye*) and an executive (*zemskaya uprava*) nominated by the former. The *sobraniye* consists of three classes of delegates:—the landed proprietors (all nobles possessing more than 590 acres, and delegates from the remainder, along with delegates from the clergy in their capacity of land proprietors); representatives of the merchants, artisans, and urban population; and representatives of the peasants, indirectly elected—matters being usually so adjusted that this class is less numerous than the aggregate of the other two. In theory the *zemstvos* have large powers in relation to the incidence of taxation, as well as in matters affecting education, public health, roads, etc. But in reality they are for the most part compelled to limit themselves to the adjustment of the state taxation, which is so high that new taxes for education, sanitary purposes, and so on, must necessarily be very limited. Moreover, the decisions of the *zemstvos* are jealously controlled by the representative of the central government—the governor—and promptly annulled whenever they manifest a different spirit from that prevailing for the time at the court. Disobedience is punished by dissolution, sometimes by administrative exile. These circumstances have helped to eliminate from the *zemstvos* the better elements which at first entered into their composition. The greater number of them are inspired now with the same red-tapeism as the ministerial chancelleries, or are refuges for proprietors in search of a salary. Still, in several provinces a good deal of most useful work has been done, especially educational, by those *zemstvos* in which the peasants are in a majority or the proprietors are inspired with a more liberal spirit; while several other *zemstvos* have recently made extensive and most valuable inquiries into the condition of agriculture, industry, etc.

Since 1870 the municipalities have had institutions like those of the *zemstvos*. All owners of houses, and tax-paying merchants, artisans, and workmen, are enrolled on lists in a descending order according to their assessed wealth. The total valuation is then divided into three equal parts, each of which elects an equal number of representatives to the *duma*. The executive is in the hands of an elective mayor and an *uprava* which consists of several members elected by the *duma*. Both are, in fact, functionaries under the governor, and the municipal institutions have no real independent life.

The organs of the central government in the provinces are the *uryadniks* (a kind of *gardes-champêtres*) in the villages, the *stanovoy*s and *ispravniks* (chiefs of the police) in the districts, and the governors (a kind of Napoleonic prefect) in each government—all invested, the *uryadniks* included, with powers which are the more extensive as they are totally undefined. There is also in each government a special gendarmerie under the "chief of gendarmes," who usually is also the head of the "third section" of the Imperial Chancery. The name of the third section has been recently abolished, but the institution still continues. It has charge of the secret police of the state, and has most varied functions, such as the arrest of supposed political offenders, their

exile to Siberia, the delivery of separation papers to spouses desiring divorce, and so on. Several governments are placed under special governors-general, whom the recent law on the "state of siege" invests with almost dictatorial powers.

The higher administration is represented by the emperor, who unites the supreme legislative, executive, and judicial powers, and is surrounded by four distinct councils—the committee of ministers, the council of the empire, the senate, and the Holy Synod. The ministers, who are considered as executing the will of the czar, and are nominated by him, are invested with very extensive powers; their circulars for the interpretation of laws have greater weight than the laws themselves. The council of the empire, which consists of members nominated by the emperor, besides the ministers and several members of the imperial family, is a consultative body for matters of legislation. The senate, also nominated by the emperor, has two distinct functions. Seven "departments" of it are administrative; they promulgate the laws, examine the acts of governors, adjudicate in their conflicts with *zemstvos*, and, in theory, can make remonstrances to the emperor—in fact they merely register and promulgate laws. Two other "departments" are courts of cassation. A special department, reinforced by representatives of nobility, pronounces judgment in political cases. The Holy Synod, consisting of metropolitans and bishops who sit there in turn, has the superintendence of religious affairs.

The judicial system introduced in 1864 was conceived in a very liberal spirit, which, unfortunately, has not been maintained. Thus a "preliminary instruction," made by the "third section" in political cases, or by the police, has been subsequently introduced. The "judges of instruction," irremovable by law, have not yet been nominated, their functions being discharged by substitutes entirely dependent upon the ministry. Elective justices of the peace decide in all cases involving less than 500 rubles, or less than six months' imprisonment. Their decisions can be brought by appeal before the district gathering of the justices of the peace, and thence before the senate. All criminal cases involving severer penalties are tried by juries, whose verdicts can be set aside only by a court of cassation, but are not respected in cases having a so-called "political" aspect. Political offenses are tried by tribunals composed *ad hoc*. Civil cases, in which more than 500 rubles are involved, are tried by courts of justices, with appeal to chambers of justice.

The empire is divided for administrative purposes into governments (*guberniya*) or territories (*oblast*), of which there are fifty in European Russia and ten in Poland. Each government, or territory, is divided into eight to fifteen districts (*uyezd*). The Asiatic dominions are divided into one lieutenantancy (*namyestnitchestvo*), that of Caucasia, and four general governments—Turkistan, Steppoye (Kirghiz Steppes), East Siberia, and Amur. They comprise thirty-three governments and territories, besides a few districts (*okrug, otdyel*) in Transcaucasia and the Transcaspian region, regarded almost as separate governments. In Siberia the governors and governors-general are assisted by councils which have a consultative voice. The Baltic provinces have some peculiar institutions. Finland is a separate state, having its own finances, army, and representative institutions, with limited rights, but its ministers of war and the exterior are those of the empire, and its institutions are not always respected by the emperor.

The emperor is not the head of the church, all decisions in theological matters having to be given by

the Synod. His influence, however, is very great, as the nomination of the bishops rests with him.

The established church is the Russo-Greek church officially called the "Orthodox Catholic Faith." According to religions there are Greek Catholics, including Dissenters, 72,990,000; Roman Catholics, 8,910,000; Protestants, 4,766,000; Jews, 2,954,000; Mohammedans, 11,814,000; Pagans, 470,000. In 1835 there were 40,569 orthodox churches, 14,000 chapels with 37,318 priests, 7,009 deacons, and 45,395 singers. There were also 6,752 monks, 3,957 aspirants, 4,945 nuns, and 13,803 female aspirants. The total annual revenue is estimated at 10,000,000 rubles.

Much still remains to be done for the diffusion of the first elements of a sound education throughout the empire; unhappily the endeavors of private persons in this field and of the *zemstvos* are for political reasons discouraged by the government. There are several universities—Dorpat, Kazan, Kharkoff, Kieff, Moscow, Odessa, and St. Petersburg—to which may be added those of Warsaw and Helsingfors. In 1883 the seven Russian universities had 605 professors and 10,528 students, and there were 81 professors and 1,228 students at Warsaw. The standard of teaching on the whole is high, and may be compared to that of the German universities. About 950 students in the theological academies and 2,500 in higher technical schools must be added to the above. There were in 1883 180 gymnasiums and progymnasiums for boys in European Russia, and 24 in the Asiatic dominions, and 27 and 10 respectively for girls; there were also 73 "real" schools in European Russia and 8 in the Asiatic dominions, and 48 normal schools in Russia and 10 in the Asiatic dominions. To these must be added the 14,800 pupils in 53 theological seminaries, and about 3,000 in various secondary schools. The aggregate number of schools for secondary instruction in European Russia in 1882 was 456 for boys and 384 for girls, with 107,930 male and 79,625 female scholars. Of these, 355 schools (45,303 boys and 3,199 girls) give professional education. For primary instruction there are in European Russia proper 28,329 schools with 1,177,504 male and 362,471 female pupils. Of the 6,231,160 rubles expended on primary schools only 747,772 rubles were contributed by government, the remainder being supplied by the *zemstvos* (2,512,113 rubles), by municipalities, or by private persons. Sunday schools and public lectures are virtually prohibited.

In addition to these, notwithstanding government opposition, a series of higher schools, where careful instruction in natural and social sciences is given, have been opened in the chief cities under the name of "Pedagogical Courses." At St. Petersburg a women's medical academy, the examinations of which were even more searching than those of the ordinary academy (especially as regards diseases of women and children), was opened, but after about 100 women had received the degree of M.D., it has been suppressed by government. In several university towns there are also free teaching establishments for women, supported by subscription, with programmes and examinations equal to those of the universities. In 1882 the students numbered 914 at St. Petersburg, about 500 at Moscow, and 389 at Kazan.

Russian finances, long in a very unsatisfactory condition, showed signs of improvement in 1889, the income being slightly in excess of expenditure, and a portion of the debt was reduced under favorable conditions. The total debt at the close of 1888 was \$3,731,103,600, the interest on which was \$208,884,260. The revenue for 1889 was estimated at \$450,000,000.

The great defect of Russian finance is that its direct



taxes are chiefly paid by the peasantry (91 per cent. of the whole), and the revenue is chiefly based on excise duties (direct taxes, excise duties on spirits, duties on tobacco and sugar, and import duties).

The zemstvos, which have an aggregate yearly income of about 30,000,000 rubles, have also a yearly deficit of from 3,000,000 to 5,000,000 rubles.

The Russian army has been completely reorganized since the Turkish War, and compulsory military service was introduced in 1874. In 1889 the strength of the army on a peace footing was 800,000 men serving with the colors, with 3,400 guns; in European Russia, 420,000 combatants with 2,800 guns; in the Caucasus, 250,342 combatants with 300 guns; and in Asia, 131,116 combatants with 196 guns. On a war footing it includes altogether 2,151,000 combatants with 6,696 guns.

The irregular troops consist of ten *voiskos*—Don, Kuban, Terek, Astrakhan, Orenburg, Ural, West Siberia, Semiryetchensk, Transbaikalia, and Amur. All the men of these voiskos between sixteen and forty-one years of age are bound to be ready for service in turn in time of peace, and to equip themselves at their own expense, train and artillery being provided by government. In their twofold capacity as peasant settlers and a military force, these men have contributed much to the conquest of Asia.

Since 1878 compulsory military service has been introduced in Finland. The Finnish troops (nine battalions of 4,833 riflemen) must be employed, as a rule, for the defense of their own country.

Notwithstanding large recent outlays, the Russian navy is by no means adapted to the exigencies of modern warfare; much stress is therefore laid on the good organization of the torpedo flotilla. The navy consists of the Baltic fleet, that of the Black Sea, and of flotillas on the Ural and Caspian Seas and in Siberia, comprising 268 armed vessels (of which 32 are iron-clads of all classes, and 139 torpedo boats), with an armament of 1,348 guns. The number of men enrolled in the service is not far from 35,000.

The great territory occupied by European Russia—1,600 miles in length from north to south, and nearly as much from west to east—is on the whole a broad and elevated plain, ranging between 500 and 900 feet above sea-level, deeply cut into by river-valleys, and bounded on all sides by broad hilly swellings or mountains—the lake plateaus of Finland and the Maanselkä heights in the northwest; the Baltic coast-ridge and spurs of the Carpathians in the west, with a broad depression between the two, occupied by Poland; the Crimean and Caucasian mountains in the south; and the broad but moderately high swelling of the Ural Mountains in the east.

The Ural Mountains present the aspect of a broad swelling whose strata no longer exhibit the horizontality we see in Russia, and moreover are deeply cut into by rivers. It is connected in the west with broad plateaus joining those of central Russia, but its orographical relations to other upheavals must be more closely studied before they can be definitely pronounced on. The rhomboidal peninsula of the Crimea, connected by only a narrow isthmus with the continent, is occupied by a dry plateau gently sloping north and east, and bordered in the southeast by the Yaila Mountains, the summits of which range between 4,000 and 5,113 feet (see CRIMEA and TAURIDA).

The rivers take their origin from a series of great lacustrine basins scattered over the surface of the plateaus and differing slightly in elevation; the Russian rivers describe immense curves before reaching the sea, and flow with a very gentle gradient, receiving numerous large tributaries, which collect their waters from vast

areas. Thus the Volga, the Dnieper, and the Don attain respectively a length of 2,110, 1,330, and 1,125 miles, and their basins cover 645,000, 244,600, and about 115,000 square miles respectively. Moreover the chief rivers of Russia—the Volga, the Duna, the Dnieper, and even the Lovat and the Oka—take their rise in the northwestern part of the central plateau, so close to one another that they may be said to radiate from the same marshes. The sources of the Don are ramified among the tributaries of the Oka, while the upper tributaries of the Kama join those of the Dwina and Petchora. In consequence of this, the rivers of Russia have been from remote antiquity the true channels of trade and migration, and have contributed much more to the elaboration of the national unity than any political institutions. By their means the plains of the central plateau—the very heart of Russia, whose natural outlet was the Caspian—were brought into water-communication with the Baltic, and the Volga basin connected with the Gulf of Finland. The White Sea has also been brought into connection with the central Volga basin, while the sister-river of the Volga—the Kama—became the main artery of communication with Siberia. The Volga is the largest river in Europe, and is navigable almost to its source. In Siberia the Obi, Yenisei, Lena, and Amur are each larger than the Volga, with many important tributaries, and the surface along the southern borders is mountainous, rising in many places above the limit of perpetual snow.

It must be observed, however, that, though ranking before the rivers of western Europe in respect of length, the rivers of Russia are far behind as regards the amount of water discharged. They freeze in winter and dry up in summer, and most of them are navigable only during the spring-floods; even the great Volga becomes so shallow during the hot season that only light boats can pass its shoals.

Russia has a very large number of lakes. The aggregate area of the largest ones is stated at 25,800 square miles.

The soil of Russia depends chiefly on the distribution of the boulder-clay and loess coverings, on the progress made by the rivers in the excavation of their valleys, and on the moistness of climate. The distribution of all these is, however, very unequal, and the five following subdivisions may be established: (1) the *tundras*, (2) the forest region; (3) the middle region, comprising the surface available for agriculture and partly covered with forests; (4) the black-earth (*tchernoziom*) region, and (5) the Steppes. Of these the black-earth region—about 150,000,000 acres—which reaches from the Carpathians to the Urals, extending to the Pinsk marshes and the upper Oka in the north, is the most important. It is covered with a thick sheet of black earth, a kind of loess, mixed with 5 to 15 per cent. of humus, due to the decomposition of an herbaceous vegetation, which developed richly during the Lacustrine period on a continent relatively dry even at that epoch. On the three fields system corn has been grown upon it for fifty to seventy consecutive years without manure. Isolated black-earth islands, less fertile of course, occur also in Courland and Kovno, in the Oka, Volga, and Kama depression, on the slopes of the Urals, and in a few patches in the north. Toward the Black Sea coast its thickness diminishes, and it disappears in the valleys. In the extensive region covered with boulder-clay the black earth appears only in isolated places, and the soil consists for the most part of a sandy clay, containing a much smaller admixture of humus. There culture is possible only with the aid of a considerable quantity of manure. Drainage finding no outlet through the thick

clay covering, the soil of the forest region is often covered with extensive marshes, and the forests themselves are often mere thickets spreading over marshy ground; large tracts covered with sand appear in the west, and the admixture of bowlders with the clay in the north-west renders agriculture increasingly difficult. On the whole it may be said that by far the greater portion of Russia is not fit for cultivation. The barren and frozen *tundras* in the north are mostly unproductive of anything except moss; in Finland of the total area 11½ per cent. is covered with lakes, 54 per cent. with woodland, 10 per cent. under cultivation, and the rest waste land or coarse pasture; in the south, at the head of the Caspian Sea, is an immense sandy desert, while in the interior and nearly the whole of Siberia are covered with forests. Between the Black and the Baltic seas, however, the land is fertile. In European Russia the forests are extensive, embracing an area of 460,000,000 acres, grown principally with fir, pine, birch, oak, maple, and ash.

Notwithstanding the fact that Russia extends from north to south through twenty-six degrees of latitude, the climate of its different portions, apart from the Crimea and the Caucasus, presents a striking uniformity. The aerial currents—cyclones, anti-cyclones, and dry southeast winds—extend over wide surfaces and cross the flat plains freely. Everywhere we find a cold winter and a hot summer, both varying in their duration, but differing relatively little in the extremes of temperature recorded. Everywhere the rainfall is small. Everywhere, too, we find that the maximum rainfall does not take place in winter but in summer, and that the months of advanced spring are warmer than the corresponding months of autumn.

Throughout Russia the winter is of long continuance. The last days of frost are experienced for the most part in April, but also in May to the north of 55°. The spring is exceptionally beautiful in central Russia; late as it usually is, it sets in with vigor, and vegetation develops with a rapidity which gives to this season in Russia a special charm, unknown in warmer climates; the rapid melting of snow at the same time raises the rivers, and renders a great many minor streams navigable for a few weeks. The summer is much warmer than might be supposed; in southeastern Russia it is much warmer than in the corresponding latitudes of France, and really hot weather is experienced everywhere. It does not, however, prevail for long, and in the first half of September the first frosts begin to be experienced on the middle Urals; they reach western and southern Russia in the first days of October, and are felt on the Caucasus about the middle of November. The rivers rapidly freeze; toward November 20th all the streams of the White Sea basin are covered with ice, and so remain for an average of 167 days; those of the Baltic, Black Sea, and Caspian basins freeze later, but about December 20th nearly all the rivers of the country are highways for sledges.

The fauna of European Russia does not very materially differ from that of western Europe. In the forests not many animals which have disappeared from western Europe have held their ground; while in the Urals only a few—now Siberian, but formerly also European—are met with. On the whole, Russia belongs to the same zoö-geographical region as central Europe and northern Asia, the same fauna extending in Siberia as far as the Yenisei and Lena. In southeastern Russia, however, toward the Caspian, we find a notable admixture of Asiatic species, the deserts of that part of Russia belonging in reality rather to the Aral-Caspian depression than to Europe.

Like other races of mankind the Russian race is not a

pure one. Three different branches, which may become three separate nationalities, can be distinguished among the Russians since the dawn of their history:—the Great Russians, the Little Russians (Malorusses or Ukrainians), and the White Russians (the Bielorusses). These correspond to the two currents of immigration, the northern and southern, with perhaps an intermediate one, the proper place of the White Russians not having as yet been exactly determined. The primary distinctions between these branches have been increased during the last nine centuries by their contact with different nationalities—the Great Russians taking in Finnish elements, the Little Russians undergoing an admixture of Turkish blood, and the White Russians submitting to Lithuanian influence. Moreover, notwithstanding the unity of language, it is easy to detect among the Great Russians themselves two separate branches, differing from one another by slight divergences of language and type and deep diversities of national character—the Central Russians and the Novgorodians; the latter extend throughout northern Russia into Siberia. They correspond, perhaps, to subdivisions mentioned by Nestor. The Great Russians number about 42,000,000, and occupy in one block the space inclosed by a line drawn from the White Sea to the sources of the western Düna, the Dnieper, and the Donetz, and thence, through the mouth of the Sura, by the Vetluga, to Mezeń. To the east of this boundary they are mixed with Turco-Finns, but in the Ural Mountains they reappear in a compact body, and extend thence through southern Siberia and along the courses of the Lena and Amur. Great Russian nonconformists are disseminated among Little Russians in Tchernigoff and Moghileff, and they reappear in greater masses in Novorossia, as also in northern Caucasia. The Little Russians, who number about 17,000,000, occupy the Steppes of southern Russia, the southwestern slopes of the central plateau and those of the Carpathian and Lublin mountains, and the Carpathian plateau. The Sitch of the Zaporog Cossacks colonized the Steppes farther east, toward the Don, where they met with a large population of Great Russian runaways, constituting the present Don Cossacks. The Zaporog Cossacks, sent by Catherine II. to colonize the east coast of the Sea of Azoff, constituted there the Black Sea and later the Kubañ Cossack (part of whom, the Nekrasovtsy, migrated to Turkey). They have also peopled large parts of Stavropol and northern Caucasia. The White Russians, mixed to some extent with Great and Little Russians, Poles, and Lithuanians, now occupy the upper parts of the western slope of the central plateau. They number about 4,300,000.

The Finnish-Russians are represented by the Western Finns, Tavastas in Central Finland, Kvanes in Northwestern Finland, Karelians in the East, the Izora and Voa on the Neva, the Esthes in Esthonia and Levonia, the Leves on the Gulf of Riga, the Kors, mixed with the Lapps, in Northern Finland, and the Samoyedes in Archangel. The Turco-Tartars number about 3,600,000, and consist of the Kazan Tartars on the Volga, the Tartars of Astrakhan, at the mouth of the Volga, and the Tartars of the Crimea, most of whom have recently emigrated to Turkey. The Mongolian race is represented by the Lamiate and Kalmuks, most of whom inhabit the steppes of the Astrakhan, between the Volga and the Kuma. They immigrated to the country in the seventeenth century, and live for the most part in tents, supporting themselves by cattle breeding and agriculture. The Jews first entered Poland from Germany during the crusades. They now number 3,000,000 Jews and 3,000 Karians, and are met with everywhere on the

Urals. In the villages they are mostly innkeepers, intermediaries in trade, and pawn-brokers. Less than 600,000 inhabit villages, the remainder being concentrated in towns. The Germans number upward of a million, and in the Baltic provinces constitute the ennobled landlord class, being tradesmen and artisans and artisans in towns. They are mostly Lutherans, and in the districts of Akerman, Odessa, Berdiansk, Kamyschür, and Novonzeusk, constitute from 10 to 40 per cent. of the population. Of the remaining varieties of nationalities, the Swedes, who are very numerous in Finland, hardly reach 12,000 in European Russia, mostly in the Baltic provinces. The Roumanians (Moldavians) number not less than 800,000, and are constantly increasing. They inhabit the governments of Bessarabia, as also do many Bulgarians, Germans, Greeks, Frenchmen, Poles, Tartars, and Jews, mixed together and scattered about in small colonies. The Greeks and Armenians inhabit the towns of Southern Russia, appearing in large numbers only in the district of Rostoff, where they constitute 10 per cent. of the population.

The chief occupation of the population of Russia is agriculture. Only in a few parts of Moscow, Vladimir, and Nijni has it been abandoned for manufacturing pursuits. Cattle-breeding is the leading industry in the steppe region, the timber-trade in the northeast, and fishing on the White and Caspian Seas. Of the total surface of Russia, 1,237,360,000 acres (excluding Finland), 1,018,737,000 acres are registered, and it appears that 39.9 per cent. of these belongs to the crown, 1.9 to the domains (*udel*), 31.2 to peasants, 24.7 to landed proprietors or to private companies, and 2.3 to the towns and monasteries. Of the acres registered only 592,650,000 can be considered as "good," that is, capable of paying the land tax; and of these 248,630,000 acres were under crops in 1884. Those of 1884 (a very good year) reached an average of 18 per cent. higher than those of the year previous, when they aggregated 153,477,000 bushels of wheat, corn, rye and other grains, except oats. The crops are, however, very unequally distributed. In an average year there are eight governments which are some 6,930,000 quarters short of their requirements, thirty-five which have an excess of 33,770,000 quarters, and seventeen which have neither excess nor deficiency. The export of corn from Russia is steadily increasing, having risen from 6,560,000 quarters in 1856-60 to an average of 23,700,000 quarters in 1876-83, and 26,623,700 quarters in 1884. This increase does not prove, however, an excess of corn, for even when one-third of Russia was famine-stricken, during the last years of scarcity, the export trade did not decline; even Samara exported during the last famine there, the peasants being compelled to sell their corn in autumn to pay their taxes. Scarcity is quite usual, the food supply of some ten provinces being exhausted every year by the end of the spring. Orach, and even bark, are then mixed with flour for making bread.

Flax, both for yarn and seed, is extensively grown in the northwest and west, and the annual production is estimated at 6,400,000 hundredweights of fiber and 2,900,000 quarters of linseed. Hemp is largely cultivated in the central governments, the yearly production being 1,800,000 hundredweights of fiber and 1,800,000 quarters of seed. The export of both holds the second place in the foreign trade of Russia.

The culture of the beet is increasing, and in 1884 785,700 acres were under this root, chiefly in Little Russia and the neighboring governments; 68,900,000 hundredweights of beetroot were worked up, yielding 5,119,000 hundredweights of sugar, while fifty-five refineries (twenty-six of them in Poland) showed a produc-

tion valued at 118,888,530 rubles in 1882. Tobacco is cultivated everywhere, but good qualities are obtained only in the south. In 1876-80 an average area of 101,600 acres was under this steadily increasing culture, and the crop of 1884 yielded 86,400,000 hundredweights. The vine, which might be grown much farther north than at present, is cultivated only on Mount Caucasus, in Bessarabia, in the Crimea, and on the lower Don for wine, and in Ekaterinoslaff, Podolia, and Astrakhan for raisins. The yearly produce is 10.8 million gallons in Russia, 10.0 in the Caucasus, and 24 in Transcaucasia. Market gardening is extensively carried on in Yaroslavl for a variety of vegetables for exportation, in Moscow and Ryazan for hops, and in the south for sunflowers, poppies, melons, etc. Gardening is also widely spread in Little Russia and in the more fertile central governments. Madder and indigo are cultivated on Caucasus, and the silk-worm in Taurida, Kherson, and Caucasia. Bee-keeping is widely spread.

Fishing is a most important source of income for whole communities in Russia. No less than 2,000 to 3,000 inhabitants of Archangel are engaged in fishing on the Norwegian coast and in the White Sea, the aggregate yield of this industry being estimated at 200,000 hundredweights, including 150,000,000 herrings. These fisheries are, however, declining. Fishing in the Baltic is not of much importance. In the estuaries of the Dnieper, Dniester, and Bug it gives occupation to about 4,000 men, and may be valued at less than 1,000,000 rubles. The fisheries in the Sea of Azoff, which occupy about 15,000 men, are much more important, as are also those of the lower Don, which last alone are valued at over 1,000,000 rubles a year. The chief fisheries of Russia are, however, on the Caspian and in its feeders; those of the Volga cover no less than 6,000 square miles, and those of the Ural extend for over 100 miles on the sea-coast and 400 miles up the river. The lowest estimates give no less than 4,000,000 hundredweights, valued at 15,000,000 rubles, of fish taken every year in the Caspian and its affluents. The fisheries on the lakes of the lake region are also worthy of notice.

Notwithstanding the wealth of the country in minerals and metals of all kinds, and the endeavors made by government to encourage mining, including the imposition of protective tariffs even against Finland (in 1885), this and the related industries are still at a low stage of development. The chief mining districts of Russia are the Ural Mountains and Olonetz for all kinds of metals; the Moscow and Donetz basins for coal and iron; Poland and Finland; Caucasus; and the Altai, the Nertchinsk, and the Amur mountains.

The Ural Mountains, however, contain nearly all the mineral riches of the country, and are the principal seat of mining and metallic industry, producing gold, platinum, copper, iron of very superior quality, rock-salt, marble, and kaolin or china-clay. In the Altai Mountains are extensive and thoroughly worked mines of silver, gold and lead, while from the naphtha springs, which border the Caspian Sea, the output is so great that the European markets, it might be said, are flooded with petroleum. These springs are continually increasing in importance and volume of production. The same may be said of the annual production of pig-iron and steel, also of coal. Immense beds of this latter commodity, both steam and anthracite, were discovered at a comparatively recent date in the Donetz basin, between Donetz and Dnieper rivers, of which Mariupol, Rostoff and Tangouroth are the outlets. Nearly 34,000,000 hundredweights are imported annually. The extraction of naphtha on the Apsheron peninsula of the Caspian has been greatly stimulated of late, reaching about 20,000,000 hundredweights in 1883 (4,600,000

hundredweights of kerosene, 1,000,000 hundredweights of lubricating oils, and 300,000 hundredweights of asphalt).

Excellent graphite is found in the deserts of the Sayan mountains and Turukhansk. Sulphur is obtained in Caucasia, Kazañ, and Poland. The mining and related industries occupy altogether about an aggregate motive force (steam and water) of 73,500 horse-power and 305,000 hands.

Since the time of Peter I. the Russian government has been unceasing in its efforts for the creation and development of home manufactures. Important monopolies in the last century, and heavy protective, or rather prohibitive, import duties, as well as large money bounties, in the present, have contributed toward the accumulation of immense private fortunes, but manufactures have developed but slowly. A great upward movement has, however, been observable since 1863.

Yet the manufactories of rails and railway plant, and even the Ural ironworks, are in a precarious condition, and the textile industries, though undoubtedly they have made great advances, are subject to great fluctuations in connection with those of the home crops, and are thus in an abnormal state. The artisans labor for twelve, fourteen, and sometimes sixteen hours a day, and their condition, as revealed by recent inquiries, is very unsatisfactory. Many causes contribute to this, the want of technical instruction, the want of capital, and above all the want of markets.

The domestic industries which are carried on by the peasants in conjunction with their agricultural pursuits during the long days of idleness imposed by the climate and the reduced allotments of land, continue, not only to hold their ground side by side with the large manufactures, but to develop and to compete with these by the cheapness of their products. The yearly production of 855,000 kustari who have been registered reaches 218,444,000 rubles; while the total number of peasants engaged in the industries, mostly in Great Russia and northern Caucasia, is estimated at a minimum of 7,500,000 persons, with a yearly production of at least 1,800,000,000 rubles, or more than double the aggregate production of the manufactures proper. Of course the machinery they use is very primitive, and the wages for a day of twelve or sixteen hours exceedingly low.

In those very governments where two-thirds of the textile manufactories of Russia are concentrated domestic weaving (for the market, not for domestic use) employs about 200,000 hands, whose yearly production is valued at 45,000,000 rubles. In Stavropol on Caucasia it has so rapidly developed that 42,400 looms are now at work, with a yearly production of 2,007,700 rubles. But no adequate idea could be given of the petty industries of Russia without entering into greater detail than the scope of the present article permits. Suffice it to say that there is no branch of the industries in textiles, leather, woodwork, or metal work, provided it needs no heavy machinery, which is not successfully carried on in the villages. The aggregate production of industries within the empire, inclusive of mining, was stated in 1882 as follows: European Russia, 1,126,033,000 rubles; Poland, 147,309,000; Finland, 15,130,000. The chief manufactures in European Russia (apart from Poland and Finland), and their yearly production in 1882 in millions of rubles, were as follows: cotton yarn and cottons, 208.6; other textile industries, 103.5; metal wares and machinery, 107.9; chemicals, 6.6; candles, soap, glue, leather, and other animal products, 61.4; distillery products, 156.0; other liquors, 39.0; sugar, 140.9; flour, 74.0. The remainder are of minor importance. The geographical distribution of manufact-

ures in Russia is very unequal. The governments of Moscow and St. Petersburg, with a yearly production of 173 and 134 million rubles respectively, represent together two-fifths of the aggregate production of Russia. If we add Vladimir (91,766,000 rubles), Kieff (73,300,000), Perm (50,500,000), Livonia, Esthonia, Kharkoff, and Kherson (from 30,000,000 to 35,000,000 each), we have all the principal manufacturing centers. In fact, Moscow, with portions of the neighboring governments, contains half the Russian manufactures exempted from excise duties, while the southwest governments of Kieff, Podolia, and Kherson contains two-thirds of those not so exempted.

The main wealth of Russia consisting in raw produce, the trade of the country turns chiefly on the purchase of this for export, and the sale of manufactured and imported goods in exchange. This traffic is in the hands of a great number of middlemen—in the west Jews, and elsewhere Russians—to whom the peasants are for the most part in debt, as they purchase in advance on security of subsequent payments in corn, tar, wooden wares, etc.

Eastern Europe, especially England, purchases articles of native produce. In 1888 the chief exports were: Wheat, valued at \$40,642,240; barley, valued at \$13,318,655; oats, at \$1,827,655; other grains at \$3,787,260; bristles, \$456,810; flax, \$9,721,470; hemp, \$1,220,051; ore, \$542,440; hides and leather, \$495,660; oil-seed cake, \$1,180,580; petroleum, \$2,634,625; seeds of all kinds, \$7,298,685; wood and lumber, \$15,828,470; and wool, \$4,086,025.

The chief imports from Europe for the same year were: Alkali, \$6,838,400; herrings, \$7,380,000; implements and tools, \$338,350; bags and sacks, \$412,000; machinery, \$5,075,010; coal, \$3,010,353; chemical products, \$401,817; metals, \$4,874,480; cotton yarns and cotton manufactures, \$3,559,630; and wool and woolen manufactures, valued at \$1,727,070.

The mercantile marine of Russia in 1886 numbered 2,289 vessels, 653,446 tons. The chief ports are St. Petersburg, Odessa, Riga, Taganrog, Libau, and Reval. Baku has recently acquired some importance in consequence of the naphtha trade.

The rivers of the empire, mostly connected by canals, play a very important part in the inland traffic. The aggregate length of navigable waters reaches 21,510 miles (453 miles of canals), and 12,600 miles more are available for floating rafts.

Twenty-five years ago Russia had only 993 miles of railways; on January 1, 1883, the totals were 13,428 miles for Russia and Caucasia, 888 for Poland, 734 for Finland, and 141 for the Transcaspian region; two years later they had reached an aggregate length of 16,155 miles, and in November, 1888, there were 18,670 miles open to traffic. The railways chiefly connect the Baltic ports with the granaries of Russia in the southeast, and the western frontier with Moscow, whence six trunk lines radiate in all directions.

Only 738 miles of the railways of Russia belong to the state, but most of them have been constructed under government guarantees, involving payment of from 11,000,000 to 21,000,000 rubles yearly. Of the aggregate value of the Russian railways, estimated at 2,210,000,000 rubles, no less than 1,971,000,000 rubles were held by government in shares and bonds. The cost of construction has been altogether out of proportion to what it ought to be; for, whereas the average rate per verst (0.663 mile) in Finland was only 20,000 silver rubles, in Russia it reached 60,000, 75,000, 90,000, and even 100,000 rubles. In 1884 34,674,853 passengers, 2,287,955 military, and 834,500,000 hundredweights of merchandise were conveyed by 5,808 locomotives and

120,940 carriages and wagons. Fully one-half of the merchandise carried consisted of grain (24 per cent.), coal (13 per cent.), firewood (12 per cent.), and timber (8 per cent.)

For the conveyance of correspondence and travelers along ordinary routes the state maintains an extensive organization of post-horses between all towns of the empire, that is, over an aggregate length of 110,170 miles. In 1888 5,200 stations, with a staff of men and horses, were kept for that purpose. In 1887 280,000,000 letters were carried, of which 29,808,100 belonged to international correspondence. The telegraph system had in the same year an aggregate length of 91,000 miles, with 370 telegraph offices.

The derivation of the words Russia, Russian (*Rous, Rossia, Rossiane*), has been much disputed. The old-fashioned view was to identify them with the *Rhoxolani*, who are now generally believed to have been a Medish tribe. The later and probably correct one is to derive the name from the Finnish *Ruotsi* applied to the Swedes, and considered by Professor Thomsen of Copenhagen to be itself a corruption of the Swedish word *rothsmenn*, rowers or seafarers. They are Scandinavian vikings with whom we first become acquainted in northern Russia, and who in a way founded the empire, although from Arabian and Jewish writers we have dim records of a Slavonic race inhabiting the basin of the Dnieper about the close of the ninth century. In recent times Ilovaiski and Gedeonoff have again attacked the view of the Swedish origin of the invaders. They see in them only Slavs, but they are not considered to have shaken the theory which derives the name from *Ruotsi*. As the story goes, three brothers, Rurik, Sineus, and Truvor, were invited to Russia from the north and settled at Novgorod in 862.

Having greatly extended his dominions by subduing the surrounding Slavonic tribes, Rurik died at an advanced age in 879, leaving the regency of the principality and the guardianship of his son Igor to the renowned Oleg. This chief subdued Smolensk, a city of the Krivitchi, in 882. Allured by its wealth and advantageous situation, Oleg now resolved to attempt Kieff, which was held by Askold and Dir. The story goes that he took young Igor with him, and disguised himself and his companions as Slavonic merchants. The unsuspecting Askold and Dir were invited to a conference and slain on the spot. Thus was Kieff added to the dominions of Igor, who was recognized as the lord of the town. In 903 Oleg chose a wife for Igor, named Olga, said to have been a native of Pskoff, the origin of which place, now mentioned for the first time, is unknown. Soon after overcoming the Greeks at Constantinople Oleg died; he had exercised supreme power till the time of his death to the exclusion of Igor, and seems to have been regarded by the people as a wizard. Igor was succeeded by his son Sviatoslaff, the first Russian prince with a Slavonic name. This son was as celebrated a warrior as Oleg; his victories were chiefly over the Petchenegs, a people of mongrel origin inhabiting the basin of the Don. Vladimir, the son of Sviatoslaff, was for some time a monster of cruelty and debauchery. He killed his brother Yaropolk, and seized his dominions; and, Yaropolk having some time before murdered his brother Oleg, Vladimir now became sole ruler. However, he went to Constantinople in 988, and was admitted into the church. As Vladimir introduced Christianity into Russia, so Yaroslaff his son was the first legislator. He was prince of Novgorod, and died in 1054. Vladimir on his death divided his dominions among his sons—to Yaroslaff, Novgorod; to Isiaslaff, Polotsk; to Boris, Rostoff; to Gleb, Murom; to Sviatoslaff, the Drevlians;

and a few other provinces to others of his sons. Kieff, his capital, was seized by his nephew Sviatopolk, who murdered Boris and Gleb, now canonized among the martyrs of the Russian Church. The country was now broken up into petty principalities. Iziaslaff, the son of Yaroslaff, seems to have had a troubled reign of twenty-four years, constantly disturbed by civil wars. On his death in 1078 he left the principality of Kieff to his brother Vsevolod, apparently on a principle common among the Slavs to bequeath the crown to the oldest male of the family; on the death of Vsevolod, Sviatopolk, the son of Iziaslaff, succeeded in 1093. At his death, Vladimir Monomakh came to the throne, and ruled from 1113 to 1125. From 1125 to 1238 George Dolgoruki, one of the sons of Vladimir Monomachus, and Andrew Bololioubski, were two noteworthy princes among a score of unimportant persons who ruled. From 1238 to 1462 Russia was under the yoke of the Mongols. From 1462 to 1613 Ivan III., Basil V., and Ivan IV. maintained an ascendancy. During this period the empire was consolidated, Boris Godunuff usurped the throne of the false Demetrius, and in 1613 the house of Romanoff succeeded to the throne in the person of Michael.

The Romanoffs were connected on the female side with the house of Rurik, Anastasia Romanova having been the first wife of Ivan the Terrible. Before being allowed to ascend the throne, the youthful sovereign, according to some authors, took a constitutional oath. The reign of Michael, however, was not very eventful; he employed it wisely in ameliorating the condition of the country, which had recently suffered so much, and in improving the condition of his army. Foreigners began to visit the country in great numbers, and Russia was gradually opening itself to Western civilization. Gustavus Adolphus, of Sweden, induced the czar to sign a treaty offensive and defensive, and a Swedish ambassador appeared at the Russian court. Dutch and German artisans were taken into the Russian service to assist in the iron foundries, with special view to the manufacture of cannon. The country swarmed with English merchants who had obtained valuable privileges. Scottish adventurers were to be met with in the Russian army in great numbers. From Scottish settlers in Russia sprang the celebrated poet, Lermontoff, the first two syllables of whose name fully show his Caledonian origin. Upon Michael's death in 1645, Alexis, his son, succeeded. The leading events of his reign were: The codification of the laws, the incorporation with Russia of the Ukraine and country of the Cossacks; the restoration to Russia of the towns which had been taken by the Lithuanians and conceded to Poland by the treaty of Lublin (1596); the great riot at Moscow in 1648 on account of the depreciation of the coinage, and the rebellion of Stenka Razin, a Cossack. He in turn was succeeded by his son Feodor, whose reign was uneventful. He was twice married. His first wife Maria Miloseavskaia bore him two sons, Feodor and Ivan, and several daughters; his second wife, Natalia, was the mother of Peter and a daughter, Natalia. Under these circumstances the court was rent by rival factions of both houses. At this juncture Sophia, the daughter of Alexis, a woman of singular energy of character, instigated the murder of some of the family and partisans of Natalia. The result was that Ivan and Peter were declared joint sovereigns, and Sophia regent during their minority. Peter, known in history as Peter the Great, began to rule in 1689, and Ivan died in 1696. In the same year Peter gained possession of Azoff at the mouth of the Don, and afterward made his triumphal entry into Moscow. After touring in Holland, where he worked at the docks of Saardam,

visiting England, defeating Charles XII., and marrying Martha Skavronska, a Livonian or Lithuanian peasant, who received the name of Catherine upon being baptized into the Greek church, he set about his great plan of civilizing the country on the model of the nations of the west. He remodeled the army, abolished the patriarchate, based nobility upon civil or military service, attempted to introduce primogeniture into Russia, etc. In 1721 he promulgated the ukaze, afterward abrogated by Paul, that the sovereign had the right of naming his successor.

On January 28, 1725, the great reformer was dead. An attempt to estimate his character has been made in the separate article assigned to him. Catherine died in 1727. She designated as her successor Peter the son of Alexis, and, in default of Peter and his issue, Anna, who had married the duke of Holstein, and Elizabeth, her daughters. On the death of Peter at the age of fifteen, various claimants of the throne were put forward. The High Secret Council resolved to call to the throne Anna of Courland, thinking that, as she was so much more remote by birth than the daughters of Peter, she would more willingly submit to their terms.

Anna assented to these terms, limiting certain prerogatives exercised by her predecessors, and made her entry into Moscow, which was now to be the capital. But the empress was soon informed how universally unpopular these *pacta conventa* were, which in reality put Russia into the hands of a few powerful families, chiefly the Dolgorukis and Golitzins. She accordingly convened her supporters, and publicly tore the document to pieces, and thus ended the last attempt to give Russia a constitution. In 1740 the empress Anna died; she had reigned exactly ten years. She left the crown to Ivan, the son of her niece Anna, daughter of her sister Catherine, duchess of Mecklenburg. But Elizabeth ingratiated herself into the favor of the soldiers, by whom the name of Peter the Great was still so much cherished. Anna Leopoldovna, as she was called, her husband Anthony Ulrich, the infant emperor, Munich, Ostermann, and the whole German faction were arrested in the night, and Elizabeth ascended the throne. On ascending the throne she summoned to her court the son of her sister Anna and the duke of Holstein, who took the name of Peter Feodorovich on assuming the Greek religion, and was declared heir to the throne. Elizabeth died in December, 1761, and was succeeded by her nephew Peter, son of her sister Anna and Charles Frederick, duke of Holstein-Gottorp. He was suspected of German leanings, but his measures made him very popular. He lived very unhappily with his wife Catherine, and meditated divorcing her and imprisoning her for the rest of her life in a convent. She, however, quietly waited her time, and a conspiracy was concocted in which she was assisted by the Orloffs, Potemkin, the princess Dashkoff, and others, (see PETER III.) Leaving her residence at Peterhof, Catherine boldly put herself at the head of 20,000 men. The miserable emperor abdicated without a struggle, and was soon afterward secretly assassinated at Ropcha, near St. Petersburg.

A great codification of the laws took place under Catherine, which may be styled the sixth great period of Russian legislation. The country was now divided into governments for the better administration of justice, each government being subdivided into *uezdi* or districts. Catherine also took away from the monasteries their lands and serfs, and allotted them payments according to their importance from the state revenues. The plans of Peter I. were thus fully carried out, and the church became entirely dependent upon the state. In 1783 the Crimea was annexed to Russia. A second war with Turkey broke out in 1787; and, to increase

the embarrassed position of the empress, Sweden did the same, requiring from Russia the cession of the southern part of Finland which had been taken from her. But King Gustavus III., in spite of some petty successes, was unable to carry on the war, and soon signed the peace of Verela on the footing of *status quo ante bellum*. The empress met with equal good fortune in the south. She was next occupied with the affairs of Poland. In 1794 Suwaroff stormed Warsaw, and the inhabitants were massacred. In the following year Stanislaus Poniatowski laid down his crown, the third division of Poland took place, and the independence of that country was at an end. In spite of her correspondence and affected sympathies with Voltaire, Diderot, and many of the advanced French thinkers, Catherine showed great opposition to the principles of the French Revolution, and the policy of the latter part of her reign was reactionary. She died suddenly on November 17, 1796.

Paul, who had lived in retirement during the life of his mother, was an object of aversion to her. The events of his reign can be only briefly discussed here. He concluded an alliance with Turkey, and entered into a coalition against the French republic, which he regarded with horror. Suwaroff took the command of the united Russian and Austrian troops at Verona. In 1799 he defeated the French general Moreau on the banks of the Adda, and made a triumphant entry into Milan. After this he won another victory over Macdonald on the Trebbia, and later the same year that of Novi over Joubert. He then crossed the Alps for the purpose of driving the French out of Switzerland, but he was everywhere hampered by the Austrians, and, after fighting his way over the Alps and suffering great losses, he reached his winter quarters between the Iller and the Lech, and soon afterward he was recalled in disgrace. Paul now completely changed his tactics. Accusing England and Austria of having acted treacherously toward him, he threw himself into the arms of Bonaparte, and meditated joining him in a plan for conquering India; but in the night between March 23 and 24, 1801, he was assassinated.

He was succeeded by his eldest son, Alexander I. (1801-1825). One of the first acts of the new emperor was to make peace with England and France. He, however, soon changed his policy, and in 1805 joined the third coalition against France, to which Austria and England were parties. On December 2d of that year took place the battle of Austerlitz, in which the Russians lost 21,000 men, 133 guns, and 30 flags. They accused their Austrian allies of treachery. The war was soon ended by the treaty of Pressburg. In 1807 Napoleon engaged the Russian general Benningsen at Eylau. A defeat at Friedland in the same year was followed by the peace of Tilsit. Frederick William III. lost half his dominions. Nearly all his Polish possessions were to go to the king of Saxony under the name of the grand-duchy of Warsaw. By a secret treaty, it seemed as if Alexander and Napoleon almost aspired to divide the world, or at least Europe, between them. The terms, however, were received by a large party in Russia with disgust. The next important event in the reign of Alexander was the conquest of Finland. The Finns were allowed a kind of autonomy, which they have preserved to this day. The annexation of Georgia to Russia was consolidated at the beginning of this reign, having been long in preparation. It led to a war with Persia, which resulted in the incorporation of the province of Shirvan with the Russian empire in 1806.

In 1809 Alexander, who was obliged by treaty to furnish assistance to the French emperor, did all that he could to prevent the war. Gradually an estrangement

took place between Alexander and Napoleon, not only on account of the creation of the grand-duchy of Warsaw, but because Russia was suffering greatly from the Continental blockade, to which Alexander had been forced to give his adhesion. This led to the great invasion of Russia by Napoleon in 1812.

In 1825 the emperor died suddenly at Taganrog at the mouth of the Don, while visiting the southern provinces of his empire. He had added to the Russian dominions Finland, Poland, Bessarabia, and that part of the Caucasus which includes Daghestan, Shirvan, Mingrelia, and Imeretia. Much was done in this reign to improve the condition of the serfs. The Raskolniks were better treated; many efforts were made to improve public education, and the universities of Kazan, Khar-koff, and St. Petersburg were founded.

The new emperor, Nicholas, the next brother in succession, showed throughout his reign reactionary tendencies; all liberalism was sternly repressed. In 1830 appeared the *Complete Collection of the Laws of the Russian Empire*, which Nicholas had caused to be codified. He partly restored the right of primogeniture which had been taken away by the empress Anna as contrary to Russian usages, allowing a father to make his eldest son his sole heir. In spite of the increased severity of the censorship of the press, literature made great progress in his reign.

Soon after the revolution of 1848 the emperor Nicholas, who became even more reactionary in consequence of the disturbed state of Europe, answered the appeal of the emperor Francis Joseph, and sent an army under Paskewitch to suppress the Hungarian revolt.

In 1853 broke out the Crimean War. The emperor was anxious to distribute the possessions of the "sick man," but found enemies instead of allies in England and France. The chief events of this memorable struggle were the battles of the Alma, Balaklava, Inkermann, and Tchernaya, and the siege of Sebastopol; this had been skillfully fortified by Todleben, who appears to have been the only man of genius who came to the front on either side during the war. In 1855 the Russians destroyed the southern side of the city, and retreated to the northern. In the same year, on March 14th, died the emperor Nicholas, after a short illness. Finding all his plans frustrated, he had grown weary of life, and rashly exposed himself to the severe temperature of the northern spring. He was succeeded by his son Alexander II. (1855-1881), at the age of thirty-seven. One of the first objects of the new czar was to put an end to the war, and the treaty of Paris was signed in 1856. The next important measure was the emancipation of the serfs in 1861.

Among important foreign events of this reign must be mentioned the capture of Schamyl in 1859 by Prince Bariatski, and the pacification of the Caucasus.

In 1877 Russia came to the assistance of the Slavonic Christians against the Turks. After the terrible siege of Plevna, nothing stood between them and the gates of Constantinople. In 1878 the treaty of San Stefano was signed, by which Roumania became independent, Servia was enlarged, and a free Bulgaria, but under Turkish suzerainty, was created. But these arrangements were subsequently modified by the treaty of Berlin. The latter part of the reign of Alexander II. was a period of great internal commotion, on account of the spread of Nihilism, and the attempts upon the emperor's life, which unfortunately were at last successful. In the cities in which his despotic father had walked about fearless, without a single attendant, the mild and amiable Alexander was in daily peril of his life. On April 16, 1866, Karakozoff shot at the emperor at St.

Petersburg; in the following year another attempt was made by a Pole, Berezowski, while Alexander was at Paris on a visit to Napoleon III.; on April 14, 1879, Solovioff shot at him. The same year saw the attempt to blow up the Winter Palace and to wreck the train by which the czar was traveling from Moscow to St. Petersburg. A similar conspiracy in 1881 (March 13) was successful. Five of the conspirators, including a woman, Sophia Perovskaia, were publicly executed. Thus terminated the reign of Alexander II., which had lasted nearly twenty-six years. He was succeeded by his second son Alexander, born in 1845, whose reign has been characterized by conspiracies and constant deportations of suspected persons. It was long before he ventured to be crowned in his ancient capital of Moscow (1883), and the chief event since then has been the disturbed relations with England, which for a time threatened war.

RUSTCHUK (RUSCUK), a city of Bulgaria, Turkey in Europe, on the south bank of the Danube, opposite Giurgevo, at the point where the river receives the waters of the Lom, a fine stream from the northern slopes of the Balkans. Since 1807 it has been connected by rail (139 miles) with Varna. The town was nearly destroyed by the Russian bombardment from Giurgevo in 1877, and the military works have since been dismantled in terms of the treaty in Berlin. Its position on the river frontier of Turkey made it a place of strategic importance. In 1871 the population was about 23,000 (10,800 Turks, 7,700 Bulgarians, 1,000 Jews, 800 Armenians, 500 Gipsies, 800 Wallachians and Serbs, 400 Western Europeans); in 1881 it was returned as 26,163, and in 1889 it was estimated 28,000.

RUTH, BOOK OF. The story of Ruth, the Moabitess, great-grandmother of David, one of the Old Testament Hagiographa, is usually reckoned as the second of the five Megilloth or Festal Roll. On the other hand the Septuagint, the Vulgate, and the English version make Ruth follow Judges. It has sometimes been held that this was its original place in the Hebrew Bible also, or rather that Ruth was originally reckoned as an appendix to Judges, since it is only by doing this, and also by reckoning Lamentations to Jeremiah, that all the books of the Hebrew canon can be reduced to twenty-two, the number assigned by Josephus and other ancient authorities. That the book of Ruth did not originally form part of the series of *Propheta priores* (Judges-Kings) is further probable from the fact that it is quite untouched by the process of "prophetic" or "Deuteronomistic" editing, which gave that series its present shape at a time soon after the fall of the kingdom of Judah. But if the book had been known at the time when the history from Judges to Kings was edited, it could hardly have been excluded from the collection. In truth the book of Ruth does not offer itself as a document written soon after the period to which it refers; it presents itself as dealing with times far back (Ruth i. 1), and takes obvious delight in depicting details of antique life and obsolete usages; it views the rude and stormy period before the institution of the kingship through the softening atmosphere of time, which imparts to the scene a gentle sweetness very different from the harsher colors of the old narratives of the book of Judges. In the language, too, there is a good deal that makes for and nothing that makes against a date subsequent to the captivity, and the very designation of a period of Hebrew history as "the days of the judges" is based on the Deuteronomic addition to the book of Judges (ii. 16 sq.) and does not occur till the period of the exile. An inferior limit for the date of the book cannot be assigned with precision. It has been argued that, as the author seems to take no offense

at the marriage of Israelites with Moabite women, he must have lived before the time of Ezra and Nehemiah (Ezra ix.; Neh. xiii.); but the same argument would prove that the book of Esther was written before Ezra, and indeed "a disposition to derive prominent Jewish families from proselytes prevailed to a much later date," and finds expression in the Talmud (see Wellhausen-Bleek, p. 205). The language of Ruth, however, though post-classical, does not seem to place it among the very latest Old Testament books, and the manner in which the story is told is as remote from the legal pragmatism of Chronicles as from the prophetic pragmatism of the editor of the older histories. The tone of simple piety and graciousness which runs through the narrative, unencumbered by the pedantry of Jewish legality, seems to indicate that the book was written before all the living impulses of Jewish literature were choked by the growing influence of the doctors of the law.

RUTHENIANS. See SLAVS.

RUTHENIUM. See PLATINUM.

RUTHERFURD, or RUTHERFORD, SAMUEL, Scottish divine, was born about 1600 at the village of Nisbet, in Roxburghshire, Scotland, and died March 20, 1661.

RUTHERGLEN, an ancient royal burgh of Lanarkshire, Scotland, is situated near the left bank of the Clyde, two miles southeast of Glasgow. In the vicinity there are extensive collieries and ironworks, and the town possesses chemical works, a paper mill, a pottery, and a shipbuilding yard. The corporation consists of a provost, two bailies, a dean of guild, a treasurer, and fifteen councillors. The population of the royal burgh in 1871 was 9,239; and in 1881 it was 11,473; and 12,500 in 1890.

RUTILIUS CLAUDIUS NAMATIUS is known to us as the author of a Latin poem in elegiac meter, describing a coast voyage from Rome to Gaul in 416 A.D. The literary excellence of the work and the flashes of light which it throws across a momentous but dark epoch of history combine to give it exceptional importance among the relics of late Roman literature. The poem was in two books; the exordium of the first and the greater part of the second have been lost. What remains consists of about 700 lines.

RUTLAND, the smallest county in England, is bounded north and northeast by Lincolnshire, southeast by Northamptonshire, and west by Leicestershire. Its shape is extremely irregular. The greatest length from northeast to southwest is about twenty miles, and the greatest breadth from east to west about sixteen miles. The area is 94,889 acres, or about 148 square miles. The surface is pleasantly undulating, ridges of high ground running east and west, separated by rich and luxuriant valleys, generally about half a mile in breadth. The principal valley is that of Catmoss to the south of Oakham, having to the north of it a tract of table-land commanding an extensive prospect into Leicestershire.

The Welland, which is navigable to Stamford, flows northeast, forming the greater part of the boundary of the county with Northamptonshire. The Gwash or Wash, which rises in Leicestershire, flows eastward though the center of the county, and just beyond its borders enters the Welland in Lincolnshire. The Chater, also rising in Leicestershire and flowing eastward, enters the Welland about two miles from Stamford. The Eye flows southeastward along the borders of Leicestershire. The county belongs almost entirely to the Jurassic formation, consisting of Liassic and Oölitic strata—the harder strata, chiefly limestone containing iron, forming the hills and escarpments, and the clay-beds the slopes of the valleys. Formerly the iron was largely dug and smelted by means of the wood in

the extensive forests, and the industry is again reviving.

In the eastern and southeastern districts the soil is light and shallow. In the other districts it consists chiefly of a tenacious but fertile loam, and in the fertile vale of Catmoss the soil is either clay or loam, or a mixture of the two. The eastern portions of the county are chiefly under tillage and the western in grass. Out of 94,889 acres no fewer than 86,477 acres in 1885 were under cultivation, grain crops occupying 22,820 acres, green crops 7,520 acres, rotation grasses 6,553 acres, and permanent pasture 47,816 acres. Over 3,000 acres were under woodland. The principal grain crop is barley, which occupied 9,484 acres, but wheat and oats are also largely grown. Turnips and swedes occupy about five-sixths of the area under green crops. The rearing of sheep and cattle occupies the chief attention of the farmer. Large quantities of cheese are manufactured and sold as Stilton. The main line of the Great Northern intersects the northeastern corner of the county, and branches of that system, of the London and Northwestern, and of the Midland connect it with all parts of the country.

Rutland comprises five hundreds and contains fifty-seven civil parishes, and part of the parish of Stoke-Dry, which extends into Leicestershire. Formerly represented by two members of parliament, since 1885 it returns one only. There is no municipal or parliamentary borough. The county has one court of quarter sessions, but is not subdivided for petty sessional purposes. The population was 21,434 in 1881 and estimated at 25,000 in 1890.

RUTLAND, a township and village of the United States, capital of Rutland county, Vt., 117 miles north-northwest of Boston. It is an important railway junction, being the terminus of several minor lines and the seat of machine-shops and engine-houses; but its name is even better known through its quarries of white marble. The population by the United States census of 1890 was 11,760.

RUYSBROECK, or RUYSBROEK, JOHN, mystic, was born at Ruysbroek, near Brussels, about 1293, and died as first prior of the convent of Groenendael, near Waterloo, in 1381. (See MYSTICISM.)

RUYSCH, FREDERIK, anatomist, was born at The Hague in 1638, and died at Amsterdam on February 22, 1731. (See ANATOMY.)

RUYSDAEL, or RUISDAAL, JACOB, the most celebrated of the Dutch landscapists, was born at Haarlem about 1625. The earliest date that appears on his paintings and etchings is 1645. During his lifetime his works were little appreciated, and he seems to have suffered from poverty. In 1681 the sect of the Mennonites, with whom he was connected, petitioned the council of Haarlem for his admission into the alms-house of the town, and there the artist died on March 14, 1682.

The works of Ruysdael may be studied in the Louvre and the National Gallery, London, and in the collections at The Hague, Amsterdam, Berlin, and Dresden. His favorite subjects are simple woodland scenes. His views of distant cities, such as that of Haarlem, in the possession of the marquis of Bute, and that of Katwijk, in the Glasgow Corporation Galleries, clearly indicate the influence of Rembrandt.

RUYSSELÈDE, or RUISSELÈDE, a market-town of Belgium, in the province of West Flanders, fifteen miles southeast of Bruges. It is best known as the seat of a great reformatory for boys, founded by the government in 1849. The population was 6,663 in 1874; 6,670 in 1881, and 6,900 in 1890.

RUYTER, MICHAEL ADRIAN DE, a distinguished Dutch naval officer, was born at Flushing, March 24, 1607. In 1676 he was dispatched to the assistance of



Spain against France, in the Mediterranean, and, receiving a mortal wound in the battle on April 21st, off Messina, died on the 29th at Syracuse. A patent by the king of Spain, investing him with the dignity of duke, did not reach the fleet till after his death. His body was carried to Amsterdam, where a magnificent monument to his memory was erected by command of the states-general.

RYAZAN, a government of Central Russia, is bounded by Moscow and Tula on the west, by Vladimir on the north, and by Tamboff on the east and south, with an area of 16,255 square miles, and a population of 1,713,581 in 1882. Ryazañ is an intermediate link between the central Great Russian governments and the steppe governments of the southeast—the wide and deep valley of the Oka, by which it is traversed from west to east, with a broad curve to the south, being the natural boundary between the two. On the left of the Oka the surface often consists of sands, marshes, and forests; while on the right the fertile black-earth prairies begin, occupying especially the southern part of the government (the districts of Ranenburg, Sapojok, and Dankoff). The whole of Ryazañ is a plateau about 700 feet above the sea, but deeply cut by the river valleys and numerous ravines. The geological formations represented are the Devonian, the Carboniferous, the Jurassic, and the Quaternary. Iron-ores, limestone, grindstone grits, potters' clays, and thick beds of peat are worked, besides coal. The northern parts of Ryazañ belong to the forest regions of Russia, and, notwithstanding the wholesale destruction of forests in that part of the country, these (chiefly Coniferous) still cover one-third of the surface in several districts. In the south, where the proximity of the steppes is felt, they are much less extensive, the prevailing species being oak, birch, and other deciduous trees. They cover an aggregate area of more than 2,000,000 acres.

The Ōka is the chief river; it is navigable throughout, and receives the navigable Pronya, Pra, and Tsna, besides a great many smaller streams utilized for floating timber. Steamers ply on the Okato Kasimoff and Nijni Novgorod. The Don and the Lyesnoi Voronezh belong to Ryazañ in their upper courses only. The climate is a little warmer than at Moscow, the average temperature at Ryazañ being 41°.

The chief occupation in Ryazañ is agriculture. Out of 10,100,000 acres only 838,000 are unfit for tillage. 5,482,000 acres are under crops, and the annual produce is estimated at about 4,248,000 quarters of grain and 972,000 quarters of potatoes. The area under cultivation and the crops themselves are increasing, as also is the export of grain. In the northern part of the government various industries are carried on, such as boat-building, the preparation of pitch and tar, the manufacture of wooden vessels, sledges, etc. Various other petty trades, such as weaving, lace-making, and boot-making, are combined with agriculture. Manufactures also have lately begun to make progress, and in 1882 their aggregate production reached 13,000,000 rubles (cotton and flax-spinning mills, glass-works, and metal-ware works, and distilleries, the last-named producing to the value of 1,850,000 rubles). Trade, especially in grain and other agricultural produce and in merchandise manufactures in the villages, is very active. The railway from Ryazañ to Moscow is one of the most important in Russia, from the amount of goods carried from the southeast steppe governments. Large villages are numerous, about sixty having each from 2,500 to 7,000 inhabitants.

RYAZAN, capital of the above government, lies 119 miles to the southeast of Moscow, on the elevated right

bank of the Trubej, a mile above its junction with the Oka. The industries are undeveloped, and the trade has less importance than might be expected from the position of the town in so rich a region. It is, however, an important railway center, no less than 15,000,000 hundredweights, chiefly of grain, being brought from the southeast and sent on to Moscow, while nearly 3,390,000 hundredweights of various manufactured and grocery wares are conveyed in the opposite direction. The loading place on the Oka also has some importance. The population, 30,325 in 1883, is increasing but slowly.

RYBINSK, or RUIBINSK, though but a district town of the government of Yaroslavl, with a permanent population (1883) of only 18,900, is, as being virtually the port of St. Petersburg on the Volga, one of the most important towns of the northern part of Central Russia. It lies fifty-four miles to the northwest of Yaroslavl, and is connected by rail (186 miles) with Bologoye, on the line between St. Petersburg and Moscow. It derives its importance from its situation on the Volga, opposite the mouth of the Sheksna—one of those tributaries which, flowing from the northwest, have since the dawn of Russian history connected the Volga with the regions around Lake Ladoga. The cargoes of the larger boats from the lower Volga, consisting mainly of corn and flour, as also salt, spirits, potash, and tallow, are here transferred to smaller boats capable of accomplishing the navigation to St. Petersburg, and *vice versa*. The amount of goods thus transhipped is estimated at 16,000,000 hundredweights, worth 32,800,000 rubles. Since the opening of the line to Bologoye, a large portion of this merchandise is sent to St. Petersburg by rail. The total number of boats visiting Rybinsk annually is estimated at 5,000 to 7,000, their aggregate cargoes amounting to nearly 20,000,000 hundredweights (about 40,000,000 rubles). Upward of 100,000 laborers (male and female), assemble at Rybinsk during the navigation, and the number of vessels is so great as to cover the Volga and the Sheksna like a bridge. Besides the business of transshipment, Rybinsk has an active trade in grain, hemp, etc., from the neighboring districts.

RYCAUT, or RICAUT, SIR PAUL, traveler and diplomatist, was the tenth son of Sir Peter Ricaut, a Royalist who, on account of his support of King Charles, had to pay a composition of \$7,500. The son was admitted a scholar of Trinity College, Cambridge, in 1647, and took his B.A. degree in 1650. During a residence of eight years in Turkey he wrote *The Present State of the Ottoman Empire, in three books; containing the Maxims of the Turkish Politie, their Religion and Military Discipline*. In 1663 he published at Constantinople *The Capitulation, Articles of Peace, etc., concluded between the King of England and the Sultan of the Ottoman Empire*. Subsequently he was for eleven years consul at Smyrna, and at the command of Charles II. wrote *The Present State of the Greek and Armenian Churches, Anno Christi 1678*. He died on December 16, 1700.

RYDE, a municipal borough and watering place of the Isle of Wight, is finely situated on a sloping eminence above the Solent, five miles south-by-west of Portsmouth, and seven (twelve by rail) from West Cowes. It is connected by rail with the principal other towns in the island, and there is also steamboat communication with Portsmouth, Southampton, Southsea, Portsea, and Stoke's Bay. The town was incorporated in 1868, and is governed by a mayor, six aldermen, and eighteen councilors. The population of the municipal borough (area 792 acres) in 1871 was 11,260, in 1881 it was 11,461, and in 1890, estimated at 13,500.

RYE. As in the case of other cereals, it is doubtful if rye (*Secale cereale*) exists at the present time in a

truly wild state. The best evidence on this point goes to show that the plant is a native of the regions between the Black and Caspian seas. It is also recorded from Afghanistan and Turkestan; but botanists are very chary about admitting the validity of the evidence hitherto adduced. In spite of the uncertainty as to the precise origin of the cultivated plant, its cultivation does not appear to have been practised at a very early date, relatively speaking. Rye is a tall-growing annual grass, with fibrous roots, flat, narrow, ribbon-like bluish-green leaves, and erect or decurved cylindrical slender spikes like those of barley. The spikelets contain two or three flowers, of which the uppermost is usually imperfect. The outer glumes are acute glabrous, the flowering plumes lance-shaped with a comb-like keel at the back, and the outer or lower one prolonged at the apex into a very long bristly awn. Within these are threestamens surrounding a compressed ovary, with two feathery stigmas. When ripe, the grain is of an elongated oval form, with a few hairs at the summit.

In the southern part of Great Britain rye is chiefly or solely cultivated as a forage-plant for cattle and horses, being usually sown in autumn for spring use, after the crop of roots, turnips, etc., is exhausted, and before the clover and lucerne are ready. For forage purposes it is best to cut early, before the leaves and haulms have been exhausted of their supplies to benefit the grain. In the northern parts of Europe, and more especially in Scandinavia, Russia, and parts of northern Germany, rye is the principal cereal; and in nutritive value, as measured by the amount of gluten it contains, it stands next to wheat, a fact which furnishes the explanation of its culture in northern latitudes ill-suited for the growth of wheat. Rye-bread or black-bread is in general use in northern Europe, but finds little favor with those unaccustomed to its use, owing to its sour taste, the sugar it contains rapidly passing into the acetous fermentation. When the ovaries of the plant become affected with a peculiar fungus (*Cordyceps*), they become blackened and distorted, constituting ERGOT (*q. v.*)

RYE, a municipal town and seaport at the eastern extremity of the county of Sussex, England, sixty-three miles south-southeast of London, is built upon a rocky eminence which two or three centuries ago was washed on all sides by the influx of the tide, but now, in consequence of the gradual recession of the sea, lies two miles inland. The trade is chiefly in coal, timber, and bark, and shipbuilding is carried on as well as fishing. There is a large market every alternate Wednesday, and considerable business in cattle, sheep, corn, wool, and hops is transacted. Rye ceased in 1885 to be a parliamentary borough, but gives its name to the eastern division of the county. The population in 1881 was 4,224, and estimated at 5,000 in 1890.

RYEZHITZA, a town of European Russia at the head of a district in the Vitebsk governments  $56^{\circ} 30' N.$  latitude and  $27^{\circ} 21' E.$  longitude, 198 miles northwest from Vitebsk on the railway between St. Petersburg and Warsaw, near the Ryezhitza, which falls into Lake Luban. Its population increased from 7,306 (2,902 Jews) in 1867 to about 9,000 in 1881; but its importance is mainly historical.

Ryezhitza, or, as it is called in the Livonian chronicles, Roziten, was founded in 1285 by Wilhelm von

Harburg to keep in subjection the Lithuanians and Letts. The castle was continually the object of hostile attacks. In 1559 the Livonian order, exhausted by the war with Russia, gave it in pawn to Poland, and, though it was captured by the Russians in 1567 and 1577, and had its fortifications dismantled by the Swedes during the war of 1656-1660, it continued Polish till 1772, when White Russia was united with the Russian empire. In early times Ryzehitza was a large and beautiful town.

RYLAND, WILLIAM WYNNE, engraver, was born in London in July, 1738, the son of an engraver and copper-plate printer. He studied under Ravenet, and in Paris under Boucher and J. P. le Bas. After spending five years on the Continent he returned to England, and having engraved portraits of George III. and Lord Bute after Ramsay (a commission declined by Strange), and a portrait of Queen Charlotte and the Princess Royal after Francis Cotes, R.A., he was appointed engraver to the king. In his later life Ryland abandoned line-engraving, and introduced "chalk-engraving," in which the line is composed of stippled dots, a method by means of which he attained great excellence, and in which he transcribed Mortimer's *King John Signing Magna Charta*, and copied the drawings of the old masters and works of Angelica Kauffman. He was convicted of forging bills upon the East India Company, and, after attempting to commit suicide, was executed at Tyburn on August 29, 1783.

RYMER, THOMAS, historiographer royal, was probably born at Yafforth Hall early in 1641, and was educated at a private school kept by Thomas Smelt, a noted Royalist. On May 2, 1666, he became a member of Gray's Inn, and was called to the bar on June 16, 1673. His first appearance in print was as translator of *Cicero's Prince* (1668), from the Latin treatise (1608) drawn up for Prince Henry. He also translated Rapin's *Reflections on Aristotle's Treatise of Poesie* (1674), and followed the principles there set forth in a tragedy in verse, licensed September 13, 1677, called *Edgar, or the English Monarch*, which was not, however, very successful. These were followed by publications at brief intervals of a dramatic, poetic, and political character, and on November 20, 1704, issued the first folio volume of *Fœdera Conventiones, Literæ et cujuscunque generis Acta Publica inter reges Angliæ et alios quosvis imperatores reges, etc., ab A.D. 1101 ad nostra usque tempora habita aut tractata*. In nine years fifteen volumes were brought out by Rymer. He died in 1713, shortly after the appearance of the fifteenth volume.

RZHEFF, RSHEFF, RJEV, or RZHOFF, a town of European Russia at the head of a district in the Tver government, in  $56^{\circ} 16' N.$  latitude and  $34^{\circ} 21' E.$  longitude, eighty-nine miles southwest of Tver, occupies the bluffs on both banks of the Volga (here 350 feet wide) near the confluence of the river Bazuza. It is the terminus of a branch line from the St. Petersburg and Moscow railway, and had a population of 18,569 in 1880 (19,660 in 1866), carries on a variety of manufactures—hemp-spinning, malting, brewing, ship-building, etc.—and is the center of a great transit trade between the provinces of the lower Volga, Orel, Kaluga, and Smolensk, and the ports of St. Petersburg and Riga.

## S.

**S** represents the hard open (or fricative) sound produced by bringing the blade of the tongue close to the front palate, immediately behind the gums, or rather, this is the normal position for S, as slight varieties can be produced by bringing the tongue farther back. By the "blade" is meant the pointed end of the tongue, not the mere point, which at the same part of the palate produces R. This position differs from that for TH, into which S passes in a lisping pronunciation; a larger part of the surface of the tongue is brought near to the palate for TH than for S. The symbol which represents the soft open sound corresponding to S is Z, though in practice S often stands for both.

In English the symbol *s* alone existed till *z* was introduced from France with words of French origin as "zeal," "zone." An attempt was made to employ it at the end of plural nouns, where the sound is regularly heard except when the last sound of the noun is hard, *e. g.*, "bedz" (beds), but "hops;" but this was not maintained, nor even consistently done, for the symbol was used even when the sound must have been *s*. We regularly write *s* for both sounds—*e. g.*, in "lose" and "loose," "curs" and "curse," "hers" and "hearse." When there is a distinction in spelling the *s* commonly has the value of *z*—*e. g.*, S has the sound of *sh* in "sure," "sugar," and some other words; this is due to the palatal sound heard before the *u*. *Sh*, in spite of its spelling, is a single sound, the position of which differs from that for *s* only in a slight retraction of the point of the tongue; it is commonly found in English words which originally had *sk*—*e. g.*, "shall," O. E. *sceal*; "shabby," a doublet of "scabby;" "fish," O. E. *fisk*. The sound is the same as that of French *ch* in "château," "chef," "sécher," where it is due to assibilation of original *k*.

SAADI. See SA'DÍ.

SAADIA, or SAADIAS (Heb. *Se'adyah*, Arab. *Sa'id*), was the most accomplished, learned, and noble gaon (head of the academy) of Sūrā (see RAB). Mar Rab Se'adyah b. Yoseph was born in the Fayyūm, Upper Egypt, in 892 and died at Sūrā in 942.

SAALFELD, a busy little town of Germany, in the eastern horn of the crescent-shaped duchy of Saxe-Meiningen, is picturesquely situated on the left bank of the Saale (here spanned by a bridge), twenty-four miles south of Weimar and seventy-seven miles southwest of Leipzig. Saalfeld is situated in one of the busiest parts of Meiningen, and carries on a number of brisk industries, including the manufacture of sewing-machines, colors, wax-cloth and wire-cloth, brewing, and iron-founding. It has an active trade in iron, slate, wood, and wooden goods, and there are ochre and iron mines in the neighborhood. The population in 1880 was 7,458, and in 1890 (estimated) 9,160.

SAARBRÜCKEN, an important industrial and commercial town in Prussia, on the left bank of the Saar, a navigable tributary of the Moselle, is situated forty-nine miles east of Metz, at the south end of one of the most extensive coal-fields in Europe, to which it has given

its name. With the town of St. Johann, immediately opposite on the right bank of the river, here spanned by two bridges, Saarbrücken forms in reality a single community, with a united population of nearly 22,000. The industries of St. Johann-Saarbrücken include wool-spinning, brewing, and the manufacture of tobacco, chemicals, tin, and stoneware. The trade is chiefly connected with the produce of the neighboring coal-mines, and that of the numerous important iron and glass works of the district. The Saarbrücken coal-field extends over seventy square miles; and its annual output is about 6,000,000 tons. Of this total the Prussian state mines yield about 5,200,000 tons, Prussian private mines 100,000 tons, the mines in Lorraine 500,000 tons, and mines in Rhenish Bavaria 200,000 tons.

SAARDAM. See ZAANDAM.

SAARGEMÜND, (Fr. *Sarreguemines*), an industrial town and railway junction of Germany, in the imperial province of Alsace-Lorraine, is situated at the confluence of the Blies and Saar, forty miles east of Metz. It carries on considerable manufactures of silk, plush, porcelain, and earthenware, and is a chief depot for the papier-maché boxes (mostly snuff-boxes) which are made in great quantity in the neighborhood. The town, which is garrisoned by four squadrons of cavalry, in 1880 had a population of 9,573; in 1889 it was estimated at 10,500.

SAAVEDRA, ANGEL DE, DUKE OF RIVAS, Spanish poet and politician, was born at Cordova in 1791, and fought with bravery in the Spanish War of Independence. In 1836 he became minister of the interior under Isturiz, and along with his chief had to leave the country. Having returned with Maria Christina in 1844, he again held a portfolio for a short time in 1854; and during the last two decades of his life he was ambassador at Naples, Paris, and Florence for considerable periods. He died in 1865.

SAAVEDRA, MIGUEL DE CERVANTES. See CERVANTES.

SAAVEDRA FLAXARDO, DIEGO DE, diplomatist and man of letters, was born of a noble family at Algazares in the Spanish province of Murcia in 1584. He died in 1648.

SAAZ (Bohemian, *Zatec*), a manufacturing and commercial town in the north of Bohemia, is situated on the right bank of the Eger, 42 miles northwest of Prague. The suspension bridge, 210 feet long, which here spans the river, was constructed in 1826 and is one of the oldest of the kind in Bohemia. Nails, leather, beetroot-sugar, and pasteboard are among the chief manufactures of Saaz, which, however, owes its main importance to being the center of the extensive hop-trade of the neighborhood. The hops of Saaz are said to have been renowned for the last 500 years; and nearly 800 tons are annually raised in the district to which the town gives its name. The population of Saaz was 12,425 in 1880, and 15,000 in 1890.

SABÆA. See YEMEN.

SABAH, or BRITISH NORTH BORNEO, is all that portion of the island of BORNEO (*q.v.*) which was formally recognized by the charter of incorporation granted in November, 1881, as the territory of the British North Borneo Company. It has a coast-line of over 600 miles, and its area, still to a great extent unexplored, is estimated at 30,000 square miles.

The great central feature of Sabah is the magnificent mountain of Kinabalu (compare BORNEO) or Nabalun, built up of porphyritic granite and igneous rocks to a height of 13,698 feet, and dominating the whole northern part of the island, with all its profusion of lesser mountains and hills.

The climate of North Borneo is of course tropical, with a very equable temperature. The lowest minimum of the thermometer recorded in 1883 at Sandakan was 68.5° in December. The greatest interval without rain was eight days in March. The rainfall was 34½ inches (157 in 1880) at Sandakan, 129 at Papar, and 120 at Kudat. In the interior it must often be much above these figures.

That North Borneo should prove rich in minerals was supposed probable from the character of some other parts of the island; but hitherto investigations have not in this matter proved very successful. Coal or lignite exists, but most frequently in thin seams and insignificant pockets; the petroleum springs cannot come into any true competition with those worked elsewhere; gold has been discovered (1885) in the Segama river and may prove a stimulus to immigration; iron-ores appear both abundant and at times productive; and there are indications of the existence of copper, antimony, tin, and zinc ores. As yet the wealth of the country lies in its timber and jungle products (camphor and gutta-percha in great quantities), and in its edible nuts, guano, sago, sugar, tobacco, coffee, pepper, and gambier. Tobacco is most successfully grown by the natives in the inland district of Mansalut, Kandassang, Koporingan, Gana-Gana, Tomborongo, Karnahan, Penusak, Tiong-Tuhan, etc.; and its cultivation has been taken up by several foreign companies. The birds'-nest caves of Gomanton (Gormanton) near the village of Malape on the Kinabatangan yield the government a revenue of from \$6,000 to \$7,000; and other caves of the same kind are still unworked. As the natives (Dusuns, Tagaas-Bajaus, Idaan, etc.) are scattered, mostly in small villages, throughout the unexplored as well as the explored districts, their number can only be guessed, but it is usually stated at 150,000. Since the formation of the company there has been a steady immigration, especially of Chinese from Singapore.

In 1865 an American company started by Mr. Torrey obtained from the sultan of Brunei certain concessions of territory in North Borneo; but this enterprise proved a financial failure and the settlement formed on the Kimanis river broke up. The rights of the American company were bought up by the Austrian Baron von Overbeck and the English merchant Mr. Alfred Dent, who further obtained from the sultan of Brunei and the sultan of Sulu a series of charters conferring on them the sovereign authority in North Borneo under the titles of maharajah of Sabah, rajah of Gaya and Sandakan and Data Bandahara. In spite of the opposition of Spain the English company organized by Mr. Dent succeeded in obtaining a charter of incorporation under Act of Parliament, November 1, 1881, as the "British North Borneo Company," with right to acquire other interests in, over, or affecting the territories or property comprised in the several grants.

SABAS, or SABBAS, St. (Syr., *Mār Sābhā*), one of the early leaders of monasticism in Palestine, was a native of Cappadocia, born about 439. He died about

532 and is commemorated on December 5th. Another saint of this name, surnamed "the Goth," suffered martyrdom at the hands of Athanaric, the Visigothic king, in the reign of Valentinian; he is commemorated on April 15th (or 18th).

SABBATH (*שַׁבָּת*), the day of sacred rest which among the Hebrews followed six days of labor and closed the week. The later Jewish Sabbath, observed in accordance with the rules of the Scribes, was a very peculiar institution, and formed one of the most marked distinctions between the Hebrews and other nations, as appears in a striking way from the fact that on this account alone the Romans found themselves compelled to exempt the Jews from all military service. Strictly speaking, the Sabbath was neither a day of relief to toiling humanity nor a day appointed for public worship; the positive duties of its observance were to wear one's best clothes, eat, drink, and be glad (justified from Isa. lviii. 13). A more directly religious element, it is true, was introduced by the practice of attending the synagogue service; but it is to be remembered that this service was primarily regarded not as an act of worship, but as a meeting for instruction in the law. So far, therefore, as the Sabbath existed for any end outside itself it was an institution to help every Jew to learn the law, and from this point of view it is regarded by Philo and Josephus, who are accustomed to seek a philosophical justification for the peculiar institutions of their religion. But this certainly was not the leading point of view with the mass of the Rabbins; and at any rate it is quite certain that the synagogue is a post-exilic institution, and therefore that the Sabbath in old Israel must either have been entirely different from the Sabbath of the Scribes, or else must have been a mere day of idleness and feasting, not accompanied by any properly religious observances or having any properly religious meaning.

As the Sabbath was originally a religious feast, the question of the origin of the Sabbath resolves itself into an inquiry why and in what circle a festal cycle of seven days was first established. In Gen. ii. 1-3 and Exod. xx. 11 the Sabbath is declared to be a memorial of the completion of the work of creation in six days. The connection, however, between the seven days' week and the work of creation is now generally recognized as secondary. At the same time, there was a peculiar appropriateness in associating the Sabbath with the doctrine that Jehovah is the Creator of all things; for we see from Isa. xl.-lxvi. that this doctrine was a mainstay of Jewish faith in those very days of exile which gave the Sabbath a new importance for the faithful. Investigations make it safe to reject one often-repeated explanation of the Sabbath, viz., that it was in its origin what it is in the astrological week, the day sacred to Saturn, and that its observance is to be derived from an ancient Hebrew worship of that planet. In truth there is no evidence of the worship of Saturn among the oldest Hebrews; Amos v. 26, where Chiun (*Kaiwan*) is taken by many to mean Saturn, is of uncertain interpretation, and, when the tenses are rightly rendered, refers not to idolatry of the Israelites in the wilderness but to the time of the prophet.

The week, however, is found in various parts of the world in a form that has nothing to do with astrology or the seven planets. In fact the four quarters of the moon supply an obvious division of the month: and, wherever new moon and full moon are religious occasions, we get in the most natural way a sacred cycle of fourteen or fifteen days, of which the week of seven or eight days (determined by half moon) is the half.

From this point of view it is most significant that in

the older parts of the Hebrew Scriptures the new moon and the Sabbath are almost invariably mentioned together.

That full moon as well as new moon had a religious significance among the ancient Hebrews seems to follow from the fact that, when the great agricultural feasts were fixed to set days, the full moon was chosen. In older times these feast days appear to have been Sabbaths (Lev. xxiii. 11; comp. PASSOVER).

We cannot tell when the Sabbath became dissociated from the month; but the change seems to have been made before the Book of the Covenant, which already regards the Sabbath simply as an institution of humanity and ignores the new moon. In both points it is followed by Deuteronomy.

SABELLIUS. Even after the elimination of Gnosticism the church remained without any uniform Christology; the Trinitarians and the Unitarians continued to confront each other, the latter at the beginning of the third century still forming the large majority. These in turn split into two principal groups—the Adoptianists and the Modalists—the former holding Christ to be the man chosen of God, on whom the Holy Spirit rested in a quite unique sense, and who after toil and suffering, through His oneness of will with God, became divine, the latter maintaining Christ to be a manifestation of God himself. Both groups had their scientific theologians who sought to vindicate their characteristic doctrines, the Adoptianist divines holding by the Aristotelian philosophy, and the Modalists by that of the Stoics; while the Trinitarians (Tertullian, Hippolytus, Origen, Novatian), on the other hand, appealed to Plato.

The teaching of Sabellius himself was indubitably very closely allied to the older Modalism ("Patripassianism") of Noetus and Praxeas, but was distinguished from it by its more careful theological elaboration and by the account it took of the Holy Spirit. His central proposition was to the effect that Father, Son, and Holy Spirit are the same person, three names thus being attached to one and the same being. To explain how one and the same being could have various forms of manifestation, he pointed to the tripartite nature of man (body, soul, spirit), and to the sun, which manifests itself as a heavenly body, as a source of light, and also as a source of warmth. He further maintained that God is not at one and the same time Father, Son, and Spirit, but, on the contrary, has been active in three consecutive energies—first in the prosopon of the Father as Creator, then in the prosopon of the Son as Redeemer, and lastly in the prosopon of the Spirit as the Giver of Life. It is by this doctrine of the succession of the prosopa that Sabellius is essentially distinguished from the older Modalists. In particular it is significant, in conjunction with the reference to the Holy Spirit, that Sabellius regards the Father also as merely a form of manifestation of the one God—in other words, has formally put Him in a position of complete equality with the other Persons. This view prepares the way for Augustine's doctrine of the Trinity. Of his later history nothing is known; his followers died out in the course of the fourth century.

SABIANS. See MOHAMMEDANISM. The name is derived from the Aramaic *ܫܒܝܐ*, with a softening of *ܫ* to *ܫ*, such as took place in certain dialects of that speech, and means "Baptists." The older Mohammedan theologians were agreed that the Sabians possessed a written revelation, and were entitled accordingly to enjoy a toleration not granted to mere heathen. But under Al-Mamún (830) a body that had certainly no claim to be deemed other than polytheists began to shield themselves under the same name, viz., the Har-

ranians, or remnant of the old heathen of Mesopotamia. Star-worship had a chief place in the religion of the Harranians, as it had had in the older Babylonian and Syrian faiths, but they had partly disguised their polytheism in a fantastic philosophy, so that they were able on occasion to pose as people of enlightened beliefs. Accounts of these false Sabians reached the West through Maimonides, and then through Arabic sources, long before it was understood that, in this application, the name was only a disguise. Hence it is quite inappropriate to call star-worshippers in general Sabians or Zabians or to speak of a distinct Sabian religion, as older writers do. The religion of the Harranians is simply a modernized form of the old Syrian polytheism.

SABICU WOOD is the produce of a large leguminous tree, *Lysiloma Sabicu*, a native of Cuba, where alone it appears to be found. The wood has a rich mahogany color; it is exceedingly heavy, hard, and durable, and therefore most valuable for shipbuilding. Sabicu, on account of its durability, was selected for the stairs of the Great Exhibition (London) of 1851, and, notwithstanding the enormous traffic which passed over them, the wood at the end was found to be little affected by wear.

SABINE, SIR EDWARD, astronomer, was born in Dublin October 14, 1788, a scion of a family said to be of Italian origin. He was educated at Woolwich and obtained a commission in the Royal Artillery at the age of fifteen. He attained the rank of major-general in 1859. In early life he devoted himself to astronomy and physical geography, and in consequence he was appointed astronomer to various expeditions, among others that of Sir J. Ross (1818) in search of the Northwest Passage, and that of Sir E. Parry soon afterward. Sir Edward Sabine died at East Sheen, Surrey, England, on May 26, 1883.

SABINES. The Sabines (Sabini) were a people of Central Italy, who played an important part in the early history of Rome. According to all old writers they were one of the most ancient nations of Italy, and the parent stock from which many of the other tribes that occupied the central and southern regions of the peninsula derived their origin. The story of their Laconian descent may be safely rejected as one of those fictions by which a certain class of the later Greek writers sought to derive every people in Italy from a Greek origin. But the evidence concerning their language, scanty as it is, is sufficient to prove that they were a cognate race with the neighboring Umbrians and Oscans, as well as, more remotely, with the Latins.

Their power appears to have attained its highest point about the time of the foundation of Rome, and the legendary history, familiar to every schoolboy, of the contests between Romulus and Tatius, the divided sovereignty at one time established between them, and the peaceful reign and legislation of the Sabine king Numa may be taken as representing the historical fact that the population of Rome really contained an important Sabine element, and that Sabine influences were largely intermixed with those of Latin origin, both in the civil institutions and still more in the religious rites and ceremonies of the rising republic. Beyond this it is impossible to pronounce with certainty as to the real value and significance of the traditions preserved to us in the poetical legends transmitted in the garb of history; and it is impossible in an article like the present to give even an outline of the various theories that have been devised by modern writers to put an historical interpretation upon the records thus preserved to us.

No remains of the Sabine language are extant in the form of inscriptions, but coins struck during the Social War with the inscription "Safinim" show that the native

appellation was the same as that in use among the Latins. The form "Sabellus" is frequently found in Latin writers as an ethnic adjective equivalent to Sabine; but the practice adopted by modern writers, of employing the term "Sabellian" to designate all the tribes of Sabine origin, including Samnites, Lucanians, etc., was first introduced by Niebuhr, and is not supported by any ancient authority.

**SABLE** (*Mustela zibellina*). See **MARTEN**, and **FUR**.

**SABLES D'OLONNE**, a seaport town of France, the chef-lieu of an arrondissement of the department of La Vendée, is situated on the Atlantic seaboard in 46° 30' N. latitude, 300 miles southwest of Paris by the railway for Tours and La-Roche-sur-Yon. The port of Sables, consisting of a tidal basin and a wet-dock, is accessible only to vessels of from 350 to 400 tons, and is dangerous when the winds are from the southwest. The entrance is shown by six lights; a seventh lighthouse, that of the Barges, a mile out at sea to the west, has a height of eighty feet and is visible for seventeen to eighteen nautical miles. The staple articles of trade are grain, wine, cattle, timber, salt, tar, fish, building stone, manures; 400 boats are engaged in the sardine fishery. The beautiful smoothly sloping beach, a mile in length, is much frequented by bathers. It is lined by an embankment which serves as a promenade and drive, and is bordered by hotels, villas, and cafés. The population in 1881 was 9,769, that of the commune 10,420; in 1890 it was estimated at 10,746 and 11,640 respectively.

**SACCATOO**. See **SOKOTA**.

**SACCHETTI, FRANCO**, Italian novelist, was the son of Benci di Ugucione, surnamed "Buono," of the noble and ancient Florentine family of the Sacchetti (comp. Dante, *Par.*, c. xvi.), and was born at Florence about the year 1335. The date of his death is unknown; most probably it occurred about 1400, though some writers place it as late as 1410.

**SACCHI, ANDREA**, a leading painter of the later Roman school, was born in Rome in 1600, or perhaps as early as 1598. He died at Rome, in 1661.

**SACCHINI, ANTONIO MARIA GASPARE**, musical composer, of the Italian school, was born at Pozzuoli, July 23, 1734, and educated under Durante at the Conservatorio di San Giosafro at Naples. He died at Paris, October 7, 1786.

**SACHEVERELL, HENRY**, an English church and state politician of extreme views, was born in 1674 and died at the Grove, Highgate, June 5, 1724.

Ample information about his life and trial will be found in Hearne's *Diaries*, Bloxam's *Register of Magdalen*, iii. 98-110, and Hill Burton's *Queen Anne*, vol. ii. Mr. Madan of the Bodleian Library has compiled a Sacheverell bibliography.

**SACHS, HANS**, the most eminent German poet of the sixteenth century, was born at Nuremberg on November 5, 1494. He died on January 19, 1576.

**SACKING AND SACK MANUFACTURE**. Sacking is a stout close-woven fabric, properly of flax, but now very largely made of jute. Sacks, however, are made of many qualities and from different fibers, according to the purposes to which they are devoted. A large proportion of flour sacks, those particularly of American origin, are made of stout cotton. Numerous attempts have been made to manufacture seamless sacks; but none have met with success. The invention of a sewing-machine for the "overhead" seaming of sacks has been successfully solved in the machine of Laing and other inventors.

**SACO**, a city of the United States, in York county, Me., on the left or north bank of the Saco river, op-

posite Biddeford, 9 miles from the sea and 100 from Boston by the Boston and Maine railroad. The water-power furnished by the river, which falls here fifty-five feet, is utilized by various cotton-factories, machine-shops, lumber-mills, etc. Originally included in Biddeford, but separately incorporated in 1762 as Pepperellborough, Saco received its present name in 1805 and was made a city in 1867. The population was 5,755 in 1870, 6,389 in 1880, and 6,075 in 1890.

**SACRAMENT**. The Latin word *sacramentum*, meaning "an oath," is most commonly used by classical writers to denote the military oath of allegiance; for its technical application in legal phraseology see **ROMAN LAW**. In the earliest ecclesiastical Latin traces of the old military meaning are still present. In addition to its general sense the word *μυστήριον* not unnaturally soon came to have for Christians a more special meaning as denoting those external rites of their religion, solemn, instructive, and more or less secret, which had most analogy with the **MYSTERIES** (*q.v.*) of paganism. No attempt, however, was at first made to enumerate or to define these. What proved to be an important new departure was taken by Peter Lombard (d. 1164), in the fourth book of his *Sentences*, which treats "of sacraments and sacramental signs." There for the first time are enumerated the seven sacraments (baptism, confirmation, the Eucharist, penance, extreme unction, orders, matrimony), which were afterward formally recognized by the Church of Rome at the councils of Florence (1439) and of Trent; and there also for the first time it was expressly recognized that not all signs of sacred things can be regarded as sacraments, but only those which are the form of invisible grace in such a sense as to represent it and bring it about ("ut ipsius imaginem gerat et causa existat"). The main points in the Tridentine doctrine are these: the sacraments have the power of conferring grace *ex opere operato* on the recipients who do not resist it ("non ponentibus obicem"); for their validity, however, there must be in the minister the intention of doing that which the church does. Though all are in a sense necessary, they are not so with equal directness for each individual, nor are they alike in dignity. The two principal sacraments are baptism and the Lord's Supper.

**SACRAMENTO**, a city of the United States, the capital of California and the county seat of Sacramento county, 135 miles by rail northeast of San Francisco on the east bank of the Sacramento river, which at this point receives the American river and becomes navigable for large steamboats. The site is only fifteen feet above low water of the river, or thirty above sea-level, and as the river sometimes rises twenty feet the city was originally subject to destructive floods. Those of 1850, 1852, and 1853, however, led to the raising of the level of the principal streets and buildings in the business quarter by five feet, and to the construction of strong levees or embankments, from four to twenty feet high for two miles along the Sacramento and three along the American river. Further measures of the same kind were adopted after the disaster of 1861, which almost rendered the city bankrupt; and the level of the principal districts is now 8 feet above the river. The shops and stores in the city are mostly of brick, but the dwelling-houses generally only of wood. The State capitol, commenced in 1861 and completed at a cost of \$2,500,000, is one of the finest buildings of its kind in the country; it stands in the heart of the city in the midst of a park of fifty acres. The other public buildings—the State printing-office and armory, the agricultural hall, the Oddfellows' hall, the hospital, the grammar-school, etc.—are comparatively unimportant. Besides the State library (36,000 volumes) there are two other public

libraries in the city. The number of industrial establishments has recently been rapidly increasing; they comprise the extensive workshops of the Central Pacific railroad, a woolen-mill, carriage-factories, plow-factories, marble-works, breweries, potteries, glue-works, etc. The population was 6,820 in 1850, 13,785 in 1860, 16,283 in 1870, 21,420 in 1880, and 26,386 in 1890.

In 1841 John Augustus Sutter (b. 1803), a Swiss military officer, obtained a grant of land at the junction of the Sacramento and American rivers, and made a settlement which he called New Helvetia. The discovery of gold on his property in 1848 changed the whole history of California. Sutter's Fort, as the spot was popularly called, became the site of a mining town, which was made the capital of the State in 1854, and obtained a city charter in 1863. The name of Sacramento was first applied to the place in the advertisement for the sale of ground-lots in 1848.

**SACRIFICE.** The Latin word *sacrificium*, from which we have the English "sacrifice," properly means an action within the sphere of things sacred to the gods, so that "sacrificial" and "hierurgic" are synonymous, and, strictly speaking, cover the whole field of sacred ritual. By the Romans, as by all ancient or primitive nations, the gods were habitually approached with gifts, and the presentation of the gift, being the central feature in every ordinary act of worship, is regarded as the sacrifice proper. In all parts of the world, moreover, for reasons which will appear by and by, the stated gifts by which the gods are honored in private worship or public feasts are drawn from the stores on which human life is supported—fruits, grain, wine, oil, the flesh of animals, and the like. All gifts of this kind, which are not merely presented to the god but consumed in his service, fall under the notion of sacrifice, while permanent votive offerings of treasure, lands, temples, images, or the like, not forming part of any stated ritual, are excluded. But again, where we find a practice of sacrificing honorific gifts to the gods, we usually find also certain other sacrifices which resemble those already characterized, inasmuch as something is given up by the worshipers to be consumed in sacred ceremony, but differ from them inasmuch as the sacrifice—usually a living victim—is not regarded as a tribute of honor to the god, but has a special atoning or mystic significance. The most familiar case of this second species of sacrifice is that which the Romans distinguished from the *hostia honoraria* by the name of *hostia piacularis*. In the former case the deity accepts a gift; in the latter he demands a life. The former kind of sacrifice is offered by the worshiper on the basis of an established relation of friendly dependence on his divine lord; the latter is directed to appease the divine anger, or to conciliate the favor of a deity on whom the worshiper has no right to count.

*Honorific Sacrifices* naturally hold the chief place in all natural (as opposed to positive) religions that have reached the stage in which orthodox ritual is differentiated from sorcery, and in which the relations between the gods and their worshipers are conceived as being of a fixed and habitually friendly character, so that the acts by which a continuance of divine favor can be secured are known by well-established tradition and regularly practiced with full confidence in their efficacy. Religions of this type unite the god to a definite circle of worshipers forming a natural unity, so that every man's birth or political and social status determines at once what god he is called upon to worship and may confidently look to for help. Religions of this sort, therefore, are mainly tribal or national, and the deity is regarded as a king, or, if there are several gods worshipped by the same circle, they are lords and ladies

and are naturally to be honored in the same way as earthly grandees. Thus among the Hebrews, whose early institutions afford a typical example of a national religion, the fundamental rule is that no one is to appear before Jehovah empty-handed (Exod. xxiii. 15), just as it would be indecent (and in the East is still indecent) to approach a king or great man without some present, however trifling. In like manner Homer teaches that gods and kings alike are persuaded by gifts. A special request will naturally be accompanied by a special gift proportioned to the occasion or by a vow to be fulfilled when the prayer is heard; but apart from this the general goodwill whether of god or king falls to be acknowledged and secured by offerings renewed from time to time by way of tribute or homage.

A sacrifice, therefore, is primarily a meal offered to deity. In some of the cases already noticed, and in the case of holocausts or whole burnt-offerings, the sacrificial gift is entirely made over to the god; but ordinarily the sacrifice is a feast of which god and worshipers partake together. If all sacrifices are not convivial entertainments, at least the tendency is to give to all feasts, nay to all meals, a sacrificial character by inviting the gods to partake of them (Athenæus, v. 19).

*Human Sacrifices.*—From these observations the transition is easy to those human sacrifices which are not piacular. It is perfectly clear in many cases that such sacrifices are associated with cannibalism, a practice which always means eating the flesh of men of alien and hostile kin. The human wolves would no more eat a brother than they would eat a wolf; but to eat an enemy is another matter. Naturally enough traces of cannibalism persist in religion after they have disappeared from ordinary life, and especially in the religion of carnivorous gods. Thus it may be conjectured that the human sacrifices offered to the wolf-Zeus (Lycæus) in Arcadia were originally cannibal feasts of a wolf tribe. The first participants in the rite were, according to later legends, changed into wolves (Lycaon and his sons); and in later times, as appears by comparing Plato (*Rep.*, viii. 15) with Pausanias (viii. 2), at least one fragment of the human flesh was placed among the sacrificial portions derived from other victims, and the man who ate it was believed to become a were-wolf. All human sacrifices where the victim is a captive or other foreigner may be presumed to be derived from cannibal feasts; but a quite different explanation is required for the cases, which are by far more numerous among people no longer mere savages, in which a father sacrifices his child or a tribe its fellow-tribesman. This case belongs to the head of piacular sacrifices.

*Piacular Sacrifices.*—Among all primitive peoples there are certain offenses against piety (especially bloodshed within the kin) which are regarded as properly inexpiable; the offender must die or become an outlaw. Where the god of the kin appears as vindicator of this law he demands the life of the culprit; if the kinsmen refuse this they share the guilt. Thus the execution of a criminal assumes the character of a religious action. If now it appears in any way that the god is offended and refuses to help his people, it is concluded that a crime has been committed and not expiated. This neglect must be repaired, and, if the true culprit cannot be found or cannot be spared, the worshipers as a whole bear the guilt until they or the guilty man himself find a substitute. The idea of substitution is widespread through all early religions, and is found in honorific as well as in piacular rites; the Romans, for example, substituted models in wax or dough for victims that could not be procured according to the ritual, or

else feigned that a sheep was a stag (*cervaria ovis*) and the like. In all such cases the idea is that the substitute shall imitate as closely as is possible or convenient the victim whose place it supplies; and so in piacular ceremonies the god may indeed accept one life for another, or certain select lives to atone for the guilt of a whole community, but these lives ought to be of the guilty kin, just as in blood-revenge the death of any kinsman of the manslayer satisfies justice. Hence such rites as the Semitic sacrifices of children by their fathers (see MOLOCH), the sacrifice of Iphigeneia and similar cases among the Greeks, or the offering up of boys to the goddess Mania at Rome *pro familiarium sospitate* (Macrob., i. 7, 34). In the oldest Semitic cases it is only under extreme manifestations of divine wrath that such offerings are made (comp. Porph., *De Abst.*, ii. 56), and so it was probably among other races also; but under the pressure of long-continued calamity, or other circumstances which made men doubtful of the steady favor of the gods, piacular offerings might easily become more frequent and ultimately assume a stated character, and be made at regular intervals by way of precaution without waiting for an actual outbreak of divine anger. Thus the Carthaginians, as Theophrastus relates, annually sprinkled their altars with "a tribesman's blood" (Porph., *De Abst.*, ii. 28). But in advanced societies the tendency is to modify the horrors of the ritual either by accepting an effusion of blood without actually slaying the victim, *e.g.*, in the flagellation of the Spartan lads at the altar of Artemis Orthia (Paus., iii. 16, 7; comp. Eurip., *Iph. Taur.*, 1479 sq.; 1 Kings xviii. 28), or by a further extension of the doctrine of substitution; the Romans, for example, substituted puppets for the human sacrifices to Mania, and cast rush dolls into the Tiber at the yearly atoning sacrifice on the Sublician bridge. More usually, however, the life of an animal is accepted by the god in place of a human life. This explanation of the origin of piacular animal sacrifices has often been disputed, mainly on dogmatic grounds and in connection with the Hebrew sin offerings; but it is quite clearly brought out wherever we have an ancient account of the origin of such a rite (*e.g.*, for the Hebrews, Gen. xxii. 13; the Phœnicians, Porph., *De Abst.*, iv. 15; the Greeks and many others, *ibid.*, ii. 54 sq.; the Romans, Ovid, *Fasti*, vi. 162). Among the Egyptians the victim was marked with a seal bearing the image of a man bound, and kneeling with a sword at his throat, (Plut., *Is. et Os.*, chap. xxxi.) And often we find a ceremonial laying of the sin to be expiated on the head of the victim (Herod., ii. 39; Lev. iv. 4 compared with xiv. 21).

**SACRILEGE.** The robbery of churches was in Roman law punishable with death. There are early instances of persons having suffered death for this offense in Scotland. In England, at common law, benefit of clergy was denied to robbers of churches. The tendency of the later law has been to put the offense of sacrilege in the same position as if the offense had not been committed in a sacred building.

**SACRO BOSCO, JOHANNES DE, or JOHN HOLYWOOD,** astronomical author, died 1244 (or 1256) as professor of mathematics at the university of Paris. Nothing else is known about his life.

**SACY, ANTOINE ISAAC, BARON SILVESTRE DE,** the greatest of French Orientalists and the founder of the modern school of Arabic scholarship, was the second son of a Parisian notary, and was born at Paris on September 21, 1758. He died in 1838.

**SACY, ISAAC LOUIS LE MAÎTRE DE,** a figure of some prominence in the literary annals of PORT ROYAL (*q.v.*), and after the death of St. Cyran (1643) and Singlin (1664) the leading confessor and "director" of

the Jansenists in France, was born in Paris on March 29, 1613. He died in 1684.

**SADDLERY** embraces the industries connected with the harnessing and controlling of all beasts of draft and burden. The materials used in harnessing the various creatures so employed and the modifications of harness necessary to suit their structure, temperament, and duties are, of course, exceedingly varied. In a restricted sense saddlery is principally a leather trade, and has to do with the harnessing of the horse. The trade divides itself into two branches, brown saddlery and black saddlery. The former is concerned with saddlemaking and the cutting and sewing of bridles, reins, and all other uncolored leather-work. The saddle is the most important article on the brown saddler's list. It consists of the tree or skeleton, on which the leather is stretched, the seat, the skirts, and the flaps. The tree is commonly made of beech strengthened with iron plates. The whole leather-work ought to be of pig-skin, but often the seat alone is of that material, the other parts being imitation, cleverly grained by means of electro-deposit copper casts from the surface of real pig-skin. There are many varieties of saddles, such as racing, military, hunting, and ladies' saddles, etc. A racing saddle may weigh not more than two or three pounds, while a cavalry saddle will be four times heavier. The saddle-maker has to consider the ease and comfort of both horse and rider. The saddle must fit closely and evenly to the curvature of the horse's back without tendency to shift, and it ought to offer as far as possible a soft and elastic seat for the rider. The black saddler is concerned with the harness of carriage, cart, and draft horses generally. The portions of saddlery by which the horseman controls and guides the horse are the bridle and bit and the reins.

**SADDUCEES (צַדִּיקִים, *i.e.*, Zadokites),** the party of the priestly aristocracy under the latter Hasmonæans. The Sadducees were essentially a political party opposed to the Pharisees or party of the Scribes, and their position and history have therefore already been discussed in ISRAEL. The common view that Sadduceeism was essentially a philosophico-religious school is due partly to Josephus but mainly to later Jewish tradition, which never could realize the difference between a nation and a sect, and fancied that the whole history of Israel was made up of such scholastic controversies as engrossed the attention of later times. The theological tenets of the Sadducees as they appear in the New Testament and in Josephus had a purely political basis. They detested the doctrine of the resurrection and the fatalism of the Pharisees because these opinions were used by their adversaries to thwart their political aims.

**SÁ DE MIRANDA, FRANCISCO DE,** Portuguese poet, was born of noble family on October 27, 1495. He died on his own property at Tapada near Ponte do Lima on March 15, 1558.

**SA'DÍ,** generally called MUSLIH-UDDÍN, but more correctly MUSHARRIF-UDDÍN B. MUSLIH-UDDÍN, the greatest didactic poet and the most popular writer of Persia, was born about 1184 (580 A.H.) in Shíráz, where his father, Abdalláh, a man of practical religion and good common sense, who impressed upon his son from early childhood the great maxims of doing good and fearing nobody, was in the service of the Turkoman race of the Salgharides or Atábegs of Fárs. The fifth ruler of this dynasty, Sa'd b. Zengí, who ascended the throne in 1195 (591 A.H.) conceived a great affection for young Musharrif-uddín, and enabled him, after the premature death of his father, to pursue his studies in the famous medreseh of Baghdád, the Nizámiyyah, where



he remained about thirty years (1196-1224). Strict college discipline and severe theological studies repressed for a long time the inborn cheerfulness and joviality of his nature; but his poetical genius, which rapidly developed, kept alive in him, amid all the privations of an austere life, the elasticity of youth, and some of his "early odes," in which he praises the pleasures of life and the sweetness of love, were no doubt composed during his stay in Baghdád. At any rate his literary fame had already spread about 1210 (606 A.H.) as far as Káshgar in Turkistán, which the young poet (who in honor of his patron had assumed the name of Sa'dí) visited in his twenty-sixth or twenty-seventh year. After mastering all the dogmatic disciplines of the Islamic faith he turned his attention first to practical philosophy, and later on to the more ideal tenets of Súfic pantheism, under the spiritual guidance of the famous sheikh Shiháb-uddín 'Umar Suhrawadí (died 1234; 632 A.H.) Between 1220 and 1225 he paid a visit to a friend in Ispahán, went from there to Damascus, and returned to Ispahán just at the time of the inroads of the Mongols, when the Atábeg Sa'd had been deposed by the victorious ruler of Kirmán, Ghiyáth-uddín (1223). Sa'dí died at Shíráz in 1292 (691 A.H.) according to Hamdalláh Mustaufí (who wrote only forty years later), or in December, 1291 (690 A.H.), at the age of 110 lunar years.

SADLER, SIR RALPH, English statesman, was the son of Henry Sadler, steward to the proprietor of the manor of Gillney, near Great Hadham, Hertfordshire, and was born at Hackney in Middlesex, England, in 1507. In 1537 he was sent to Scotland to strengthen the English interest; in 1539-40 he was commissioned to persuade the Scottish king James V. to cast off the supremacy of the pope; in 1541 he went back to enforce the same counsel; and in 1542 he was appointed to settle the proposed match between Edward prince of Wales and Mary the infant queen of Scots. Although not successful in any of these missions, he continued to retain the full confidence of the king, who, in recognition of his zealous services, conferred on him in 1543 the honor of knighthood. On Henry's death in 1547 Sadler's name was found in the royal will as one of the councilors to the sixteen nobles who were entrusted with the guardianship of the young king. In 1584 he was appointed keeper of Mary queen of Scots in the castle of Tutbury; but on account of "age and infirmity" he was permitted to resign his charge some time before the death of the queen. His last service was to repair to Scotland to pacify the king's indignation on account of Mary's death. He died after his return home at Standon in Hertfordshire, March 30, 1587.

SADOLETO, JACOPO, Italian humanist and churchman, was born at Modena in 1477, and died in 1547.

SÆMUND. See EDDA, and ICELAND.

SAFES. A safe is any repository in which valuable property is guarded against risk of loss by fire or from the attacks of thieves. The protection of valuable documents and possessions was only imperfectly effected in the charter-rooms of old mansions and in iron-bound oaken chests and iron coffers of the Middle Ages; but these in their day represented the strong rooms and safes of modern times. The vast increase in realized wealth and the complication of financial and banking operations necessitate in our days the greatest attention to the safeguarding of securities and property. The ingenuity of inventors has, within practicable limits, effected much in safe-making; but the cunning of thieves has increased in proportion to the obstacles to be overcome and to the value of booty at which they aim. No safe can be held to be invulnerable; for, whatever human ingenuity can put together and close, the same in-

genuity can tear down and open. An impregnable safe would indeed be a source of greater danger than of security to its owner, for, were the key or other means of access lost or rendered unworkable, the contents of the safe would of necessity be irrecoverable. The efficiency of a safe, therefore, does not depend on absolute impregnability, but on the nature of the obstacles it presents to successful attack, and to the generally unfavorable conditions under which such attacks are made. It is common to make safes both thief and fire-resisting, and the conditions necessary for the one object to a certain extent conduce to the attainment of both; but for many purposes security from the one danger alone is requisite.

The devices for baffling thieves are numerous. The safe must in the first place be made heavy and unwieldy, or otherwise it must be so fixed that it can only be carried away with the utmost difficulty. Next, the greatest obstacles to obtaining illegitimate access must be presented. To prevent fracturing a tough metal must be used in the construction, and to resist penetration by drilling metal of great hardness must be interposed. These conditions are commonly met by making the outer casing of the safe of boiler plate, backed by a lining of hard steel, over which is an inner lining of thin boiler plate, the three layers being securely bolted together by screws from within. By some makers a layer of hard metal is poured, in a fluid state, between the outer and inner casing; others case-harden one surface; and there are numerous additional devices for securing the combination of hardness and toughness. To prevent wrenching of joints, the two sides with top and bottom of the outer shell are sometimes made out of a single plate welded at the joint, and the back and front are then attached to that shell by angle irons screwed from within. The frame upon which the door hangs and into which the bolts shoot is made of great strength, with special precautions to prevent the wrenching off of the door by means of crowbars or wedges. In an ordinary safe the massive bolts, three or more in number, shoot only at the front, and fixed dogs or sham bolts fit into slots at the back or hinged side. This arrangement is sufficient to keep the door closed independent of hinges, which are merely the pivot on which the door turns. Safe bolts are shot not by the key, as in an ordinary lock, but by the door handle, and the key simply secures them in their position. The lock of a safe must be a careful piece of mechanism, not subject to derangement, unpickable and gunpowder-proof. The portion of the door on which it is fastened is generally provided with extra precautions against drilling. A safe being well made and securely locked remains vulnerable through the medium of the key, which may be surreptitiously obtained either for direct use or to form a mold by which false keys can be cut. On this account, keyless locks and time locks are in great favor in America. In keyless permutation locks, such as those of Hall, Sargeant, Yale, and Dalton, the bolts can be withdrawn only after an indicator has been successively set against a combination of numbers arranged before the closing of the door; and in the time lock of these inventors the safe can only be opened at any hour to which the time controller is set before closing. Electrical arrangements have also been attached to safes by which signals are conveyed to any spot when a safe so guarded is unlawfully interfered with.

It is much easier to render a safe fire-proof than to guard it against burglary. It requires nothing more than a calculation of the intensity and duration of any fire to which it is likely to be exposed, and the provision of a sufficient lining of fire-resisting material. What

is principally used is a mixture of some absorbent medium—such as sawdust, powdered gypsum or cement, or infusorial earth—with ground alum. Asbestos, silicate cotton, mica, and other non-conductors are also used; and by some makers sealed tubes of alkaline salts are distributed through the absorbent material. These burst when exposed to high heat and their contents saturate the surrounding substance. A carefully packed shell of not less than three and one-half inches of the fire-resisting medium should line the interior of every fire-proof safe; but in many cheap safes a quantity of brick dust is the only fire-resisting medium.

Where an ordinary safe provides insufficient accommodation the strong room takes its place. Such an apartment, being generally in the basement of a building, presents no special difficulties to make it proof against fire and thieves. Thickness of walls, built by preference of hard brick laid in cement, and liberal use of cement within the walls, as well as at the floor and over the arched roof, give strength against both fire and burglars. The interior of a strong room is generally lined with boiler-plate, and, in addition to the massive steel and iron door, it has an inner wrought-iron grill-door, which secures the vault during business hours and permits the ventilation of the apartment. Within such a strong room extra strong chambers or separate safes may be placed, and in this way precautions may be indefinitely multiplied.

SAFE DEPOSIT COMPANIES are among the comparatively recent additions to the list of bodies corporate, organized for a specific purpose, and operating under and by virtue of statutory law or special acts of State legislatures. Deposit companies were formed for the purpose of receiving deposits of valuables of almost every description, such as bonds, notes, mortgages, jewelry, gold and silver ware, family heirlooms, wills, and other legal documents, etc., companies guaranteeing to owners, upon payment by the latter of a premium corresponding to the risk undertaken, absolute security, from loss by fire or otherwise, to the articles deposited. The acts of incorporation also authorize the construction of such buildings, safes, and other appurtenances as will promote the security contemplated, and the faithful execution of the trust created for the benefit of depositors. The company's affairs are directed by an executive board and board of directors elected by the stockholders, and who, with such stockholders, are jointly and severally liable for all debts of the corporation to an amount equal to the par value of their stock. A set of books is kept in which is recorded the names of depositors, together with a minute description of each, of the character and value of the articles deposited by them, together with such other facts in connection with the transaction of the business as will preclude all possible danger of loss to either patron or company. The vaults or safe deposits for the storage of valuables are constructed after the latest designs, of the most substantial material, and provided with every appliance known to scientific investigation or mechanical development for attaining the end in view, *i. e.*, absolute security from visitations either by burglars or the elements. The interior of these vaults is peopled, so to speak, with boxes and safes in which are contained the valuables of clients, access to which is obtained by keys, one being held by the lessee and the other by the company. The vaults are opened and closed by electricity at designated hours, and their protection is further guaranteed by locks and bolts, as also by the presence of custodians, who are relieved at intervals by colleagues. Automatic signals are connected with

the police department and private detective agencies of cities in which the company does business, and either upon the sounding of the alarm or its failure to signal "all is well," as the device is constructed to do, investigation is at once instituted to ascertain the cause. A pass-word is employed by some of the companies as a further preventive against intrusion, and other agencies for the promotion of security are adopted as rapidly as they become available.

SAFETY LAMP. See COAL.

SAFFÁRIDS, a Persian dynasty of the ninth century. (See MOHAMMEDANISM.)

SAFFI (Asafi), a seaport of Morocco, with 6,000 inhabitants, some commerce, and a famous shrine, the House of the Seven Sleepers, frequented by Moslem and Jewish pilgrims.

SAFFLOWER, or BASTARD SAFFRON (*Carthamus tinctorius*), belongs to the natural order *Compositæ*; its flowers form the basis of the safflower dye of commerce. The plant is a native of the East Indies, but is cultivated in Egypt, and to some extent in southern Europe. To obtain the dyeing principle—carthamine—the flowers are first washed to free them from a soluble yellow coloring matter they contain; they are then dried and powdered, and digested in an alkaline solution in which pieces of clean white cotton are immersed. The alkaline solution having been neutralized with weak acetic acid, the cotton is removed and washed in another alkaline solution. When this second solution is neutralized with acid, carthamine in a pure condition is precipitated.

SAFFRON (Arab., *za'farān*) is manufactured from the dried stigmas and part of the style of the saffron crocus, a cultivated form of *Crocus sativus*, L., the precise origin of which is unknown. It has long been cultivated in Persia and Kashmir, and is supposed to have been introduced into China by the Mogul invasion. According to Hakluyt, it was brought into England from Tripoli by a pilgrim, who hid a stolen corm in the hollow of his staff. It was especially cultivated near Hinton in Cambridgeshire, and in Essex at Saffron Walden (*i. e.*, Saffron Woods, not Saffron Walled-in, as the canting crest of the town would imply), its cultivators being called "crokers." This industry, though very important in the fifteenth century, when English saffron commanded the highest prices on the Continent, appears to have died out about 1768.

Saffron was used as an ingredient in many of the complicated medicines of early times. It was, however, mainly used as a dye. It was a royal color in early Greek times, though afterward, perhaps from its abundant use in the baths, and as a scented salve, it was especially appropriated by the hetairæ. In ancient Ireland a king's mantle was dyed with saffron, and even down to the seventeenth century the "lein-croich," or saffron-dyed shirt, was worn by persons of rank in the Hebrides.

SAFFRON WALDEN, a market-town and municipal borough of Essex, England, is finely situated near the Cam in a valley surrounded by hills, on a branch of the Great Eastern railway, forty-four miles north-northeast of London and fourteen south of Cambridge. The town is an important center of agricultural industry and has large corn, cattle, and sheep markets. Brewing and malting are carried on. The population of the municipal borough (area, 7,416 acres) in 1871 was 5,718, and in 1881 it was 6,060.

SAGAN, a manufacturing town in Prussian Silesia, situated on the Bober, a tributary of the Oder, lies sixty miles south-southeast of Frankfort-on-the-Oder and 102 miles southeast of Berlin. The population in 1880 was 11,373.

**SAGAR**, or **SAUGOR**, a British district of India, situated in the extreme northwest of the Central Provinces, and comprised between  $23^{\circ} 4'$  and  $24^{\circ} 27'$  N. latitude, and between  $78^{\circ} 6'$  and  $79^{\circ} 12'$  E. longitude, with a total area of 4,005 square miles.

By the census of 1881 the population numbered 564,950 (294,795 males and 270,155 females). Hindus numbered 498,071, Mohammedans 25,396, Buddhists and Jains 16,432, Christians 1,034, and aboriginals 19,144. The only town except the capital (see below) with a population exceeding 10,000 is Garhakota, which contains 11,414 inhabitants. Of the total area only 1,396 square miles are cultivated, and of the portion lying waste 1,220 are returned as cultivable. Wheat forms the principal crop, which is produced in large quantities all over the district; other products are food grains, rice, oil-seeds, cotton, and sugar-cane. Cattle and buffaloes are bred to a large extent both for draft and carriage, and also for dairy purposes, especially for the manufacture of ghee.

**SAGAR**, principal town and headquarters of the above district, situated in  $23^{\circ} 50'$  N. latitude and  $78^{\circ} 49'$  E. longitude, is well built with wide streets and stands on the borders of a small but beautiful lake, and has military cantonments. The population of the town in 1881 was 44,416 (males 22,556, females 21,860).

**SAGE, LE.** See **LE SAGE**.

**SAGHALIN**, or **SAKHALIN**, is the name improperly given to a large elongated island in the North Pacific, lying between  $45^{\circ} 57'$  and  $54^{\circ} 24'$  N. latitude and  $141^{\circ} 30'$  and  $144^{\circ} 50'$  E. longitude, off the coast of Russian Manchuria. Its proper name is *Karaftu* or *Karafuto*. It is separated from the mainland by the narrow and shallow Strait of Tartary, which often freezes in winter in its narrower part, and from Yezo (Japan) by the Strait of La Pèrouse. This island (670 miles long, 20 to 150 broad, with an area of 24,560 square miles), about equal in size to Belgium and Holland together, must be considered as a continuation of the mountains bordering the Manchurian littoral. Its orography is still imperfectly known.

Saghalin has been inhabited since at least the Neolithic Stone Age. Flint implements, exactly like those of Siberia and Russia, have been found at Dui and Kusunai in great numbers, as well as polished hatchets (of trap, diorite, and argillaceous schists)—also like the European ones—primitive pottery with decorations like those of Olonetz, and stone weights for nets. Afterward came a population to whom bronze was known; they have left their traces in earthen walls and kitchen-middens (in the Bay of Aniva). The present inhabitants consist of some 2,000 Gilyaks, 2,500 Ainos, 500 Oroks, as many Japanese, and about 6,000 Russians. The Gilyaks, who do not differ from those of the Amur, inhabit the northern part of the island. They support themselves by fishing and partly by hunting, but suffer from competition with the Japanese, who take possession of the best fishing-grounds. The Oroks, of Tungus origin, resemble the Orotchons of the Amur; they live by hunting. The Ainos, who are still the subject of so much discussion among ethnologists, are the aborigines of the island; they are closely akin to the Curilians, and, like these, differ from all other Mongolian races by their luxuriance of hair and beard. They now inhabit only the south part of the island, and have been brought into a condition of slavery by the Japanese, by whom they have been driven out of Yezo and Nippon, in both of which they were the aborigines.

**SAGINAW**, capital of Saginaw county, Mich., lies on an elevated plateau about thirty feet above the water on the left bank of the Saginaw river, which falls into Saginaw Bay on Lake Huron, about eighteen

miles lower down. It is a railway junction of some importance, 100 miles northwest of Detroit, is connected with East Saginaw by a street railway, and can be reached by the largest vessels that ply on the lake. The upper branches of the river are also available for boat traffic throughout a considerable district. Saw-mills, planing-mills, and salt-works are the principal industrial establishments. The population was 7,460 in 1870, 29,521 in 1880, and 46,322 in 1890. The city charter dates from 1859, the first settlement from 1822.

**SAGITTA.** The name "Sagitta" was given by Martin Slabber in 1775 to a small marine worm which is now known as the type of a distinct group, the *Chetognatha* (Leuckart). The group comprises two genera (*Sagitta* and *Spadella*) and a considerable number of species; they are small transparent pelagic animals, varying in length from a few lines up to two inches, and are universally distributed.

**SAGO** is a food-starch prepared from a deposit in the trunk of several palms, the principal source being the sago palm, *Metroxylon Rumphii* (Mart.), and *M. lœve*, (Mart.) These palms are natives of the East Indian Archipelago, the sago forests being especially extensive in the island of Ceram. The trees flourish only in low, marshy situations, seldom attaining a height of thirty feet, with a thick-set trunk. They attain maturity as starch-yielding plants at the age of about fifteen years, when the stem is gorged with an enormous mass of spongy medullary matter, around which is an outer rind consisting of a hard dense woody wall about two inches thick. When the fruit is allowed to form and ripen, the whole of this starchy core disappears, leaving the stem a mere hollow shell; and the tree immediately after ripening its fruit dies. When ripe the palms are cut down, the stems divided into sections and split up, and the starchy pith extracted and grated to a powder. The powder is then kneaded with water over a strainer, through which the starch passes, leaving the woody fiber behind. The starch settles in the bottom of a trough, in which it is floated, and after one or two washings is fit for use by the natives for their cakes and soups. That intended for exportation is mixed into a paste with water and rubbed through sieves into small grains, from the size of a coriander seed and larger, whence it is known according to size as pearl sago, bullet sago, etc. A large proportion of the sago imported into Europe comes from Borneo, and the increasing demand has led to a large extension of sago-palm planting along the marshy river banks of Sarawak.

**SAGUNTUM**, an ancient city of Hispania Tarracensis, was situated near the mouth of the river Palantias (Palància). The modern Sagunto or Murviedro (*muri veteres*), eighteen miles by rail from Valencia on the line to Tarragona, is now about three miles from the sea; the population within the municipal boundaries was 6,287 in 1877.

**SAHARA** is the great desert region which stretches across the continent of Africa eastward from the Atlantic for a considerable distance on both sides of the Tropic of Cancer, and is generally distinguished by aridity of soil, absence of running water, dryness of atmosphere, and comparative scarcity of vegetable and animal life. The physical limits of this region are in some directions marked with great precision, as in part of Morocco and Algeria, where the southern edge of the Atlas range looks out on what has almost the appearance of a boundless sea, and forms, as it were, a bold coast-line, whose sheltered bays and commanding promontories are occupied by a series of towns and villages—Tizgi, Figig, Laghouat, etc. In other directions the boundaries are vague, conventional, and disputed. This is especially

the case toward the south, where the desert sometimes comes to a close as suddenly as if it had been cut off with a knife, but at other times merges gradually and irregularly into the well-watered and fertile lands of the Sudan (Soudan). The desert, indeed, does not end with Africa, but is prolonged eastward through Arabia toward the desert of Sind. The Sahara is estimated to have an area of 3,565,565 square miles, or nearly as much as all Europe minus the Scandinavian peninsula and Iceland; but, while Europe supports a population of 327,000,000, the Sahara probably does not contain more than 2,500,000—a figure, however, which is sufficiently startling to those who think of it as an uninhabitable expanse of sand. The sea-like aspect of certain portions of the Sahara has given rise to much popular misconception, and has even affected the ideas and phraseology of scientific writers. Instead of being a boundless plain broken only by wave-like mounds of sand hardly more stable and little less dangerous than the waves of ocean, the Sahara is a region of the most varied surface and irregular relief, ranging in altitude from 100 feet below to some 5,000 or 6,000, or even it may be 8,000 feet above the sea-level, and, besides sand-dunes and oases, containing rocky plateaus, vast tracts of loose stones and pebbles, ranges of hills of the most dissimilar types, and valleys through which abundant watercourses must once have flowed.

The present population of the Sahara consists almost exclusively of Arabs, Berbers, and Negro tribes. The Berbers (Tuareg or Tuarik, etc.) occupy the west central region almost exclusively, appear sporadically in the western, and stretch northward into Morocco and Algeria; the Negro tribes form a compact block in the east central region northward and northeastward from Lake Tchad; and the Arabs are in possession of all the rest of the country. Politically the Sahara belongs partly to Morocco (Taflet, etc.), partly to Algeria and Tunis (and thus to France), and partly to the Turkish empire (Tripolis, Egypt, etc.). France especially has been steadily pushing south with the purpose of forming a junction ultimately with her colony on the Senegal. The spirit of independence among the Mohammedan populations has been crystallized and stimulated by the remarkable confraternity of Sidi Mohammed ben 'Ali es-Senusi, founded about 1837, and now possessing about 120 convents or zawiga (mostly in the Saharan region), with its headquarters at Jerabub. With this organization the French have already come into conflict in their southward progress. To establish their influence they propose the construction of a trans-Saharan railway and the opening up of the region to the south of Algeria and Tunis by the construction of an inland sea. According to M. Roudaire, the author and protagonist of this scheme, which is familiarly but deceptively styled the "flooding of the Sahara," it is possible by proper engineering works to create an inland sea to the south of Algeria and Tunis with an average depth of seventy-eight feet and an area of 3,100 square miles, or about fourteen times the size of the Lake of Geneva. A government commission decided that the excavation of the necessary canal would not be difficult, and that, in spite of silting-up processes, the work would at least last 1,000 to 1,500 years. M. de Lesseps, M. Roudaire's principal supporter, visited the district in 1883 and reported that the canal would cost five years' labor and 150,000,000 francs. The scheme, which has met with persistent hostility on the part of M. Cosson and others, is based on the following facts. The Gulf of Gabes is separated by a ridge thirteen miles across and 150 feet high from Shott al-Fejej, a depression which extends southwest into the Shott Jerid, which in its turn is separated from the Shott Rharsa only by a still

narrower ridge. Shott Rharsa is succeeded westward by a series of smaller depressions and beyond them lies the Shott Melrir, whose northwest end is not far from the town of Biskra. What we know about such inland seas as the Caspian and the Aral seems to cast serious doubt on the probability of any increase of the rainfall in the Sahara by the formation of Roudaire's sea.

The commerce of the Sahara is not inconsiderable. Among the more important trade routes are—(1) from Morocco to Cairo by Insalah and Ghadames, which is followed by the pilgrims of Western Africa bound for Mecca; (2) from Kuka to Murzuk and Tripolis; (3) from the Soudan to Tripolis by Air and Ghat; (4) from Timbuktu to Insalah, Ghadames, and Tripolis; (5) from Timbuktu to Insalah and thence to Algeria and Tunis; (6) from Timbuktu to Morocco. The two great products are dates and salt. Full details of the date trade will be found in Fischer's *Die Dattelpalme*, 1881. The principal sources of salt are the rock-salt deposits of the Juf (especially Taudeni), the lakes of Kufra, and the rock-salt and brine of Kawar (Bilma).

SAHÁRANPUR, or SEHARUNPOOR, a British district of India, in the Meerut division of the lieutenant-governorship of the Northwestern Provinces. It lies between  $29^{\circ} 35'$  and  $30^{\circ} 21'$  N. latitude, and between  $77^{\circ} 9'$  and  $78^{\circ} 15'$  E. longitude, and is bounded on the north by the Siwálik Hills, separating it from the district of Dehra Dún, on the south by the district of Muzaffarnagar, on the east by the Ganges, and on the west by the Jumna. The climate of Saháranpur is that of the Northwestern Provinces in general; at one season it is tropical, at another partially European. Its average annual rainfall is about thirty-seven inches. Wild animals are plentiful, including the tiger, leopard, wild cat, lynx, hyæna, and wolf. By the census of 1881 the population of Saháranpur numbered 979,544.

SAHARANPUR, principal town and administrative headquarters of the above district, is situated in  $29^{\circ} 58' 15''$  N. latitude and  $77^{\circ} 35' 15''$  E. longitude, on a small stream (the Damaula Nadi) in an open level country. A considerable trade is carried on in grain, sugar, molasses and country cloth. The population in 1881 was 59,194.

SAIDA. See SIDON.

SAIGA. See ANTELOPE.

SAIGON, the capital of French Cochin China, occupies an area of 1,000 acres, on the right bank of the Saigon river or Don-nai (one of the streams that insculcate with the deltaic branches of the Me-kong), about sixty miles from the China Sea. In 1884 it was connected by rail with Mytho, thirty-seven miles southwest on one of the branches of the Me-kong, with which it had obtained direct water communication in 1877 by the opening of the Canal de Cho-gon. The present city has been practically created since 1861, and its fine streets, boulevards, squares, and public buildings make it one of the most attractive towns in the East, as it was well planned and the plan not unworthily carried out. The population of Saigon in 1881 was 13,348. The Europeans, exclusive of the troops, numbered only 965 (913 French).

SAIL, SAILCLOTH, SAILMAKING. A sail is a sheet of canvas (or other material of the requisite flexibility and strength) by the action of the wind on which, when spread out or extended, a vessel is moved through the water. Sails are supported and extended by means of masts, yards, gaffs, booms, bowsprit—all technically termed "spars"—and stays or slanting ropes. In the first experiments for impelling vessels by sails the least complicated form, that of a single square sail erected on a single mast, was no doubt adopted. To the quadrangular the triangular sail would soon be added; and

single sails of both these forms are known to have been used at very early periods. Subsequently the trapeziform and trapezoidal sails also came into use. As vessels increased in size, thereby requiring a greater surface of canvas to impel them, it became necessary to use not only more sails but also an increased number of masts; and the number and disposition of the several kinds of sails could be almost indefinitely varied according to the ideas of navigators, the services required of the vessels, the places in which they were employed, and the size of the crews. Thus a great variety of rig naturally arose. Leaving out of account the many nondescript styles adopted in the case of boats and small craft, all modern vessels may, for general purposes, be considered as belonging to one or other of the following categories—cutter, schooner, three-masted schooner, brigantine, brig, barkentine, bark, or full square-rigged ship; but the cardinal distinction is that by which they are classified as *square-rigged* or *fore-and-aft-rigged* (compare SEAMANSHIP and SHIP). These expressions can be easily explained by reference to any three-masted ship. The mast nearest the bow or head is known as the fore-mast, the next abaft or nearest the middle of the ship as the main-mast, and the third or that nearest the stern as the mizzen-mast. Each mast consists of several sections, that attached to the hull being called the lower or standing-mast, the next above that the top-mast, the next the top-gallant-mast, above which may rise a pole or royal-mast. On each of these masts, and at right angles with it, is a yard denominated "square," which is hung (slung) by the middle and balanced. These yards are named according to their situation, those placed on the fore and main standing-masts being called respectively the fore and main lower-yards, that on the mizzen the cross-jack-yard; the yards on the top-masts are called the top-sail-yards, those on the top-gallant-masts the top-gallant-yards, and those on the royal-masts the royal-yards. To each of these yards a sail is *bent* or attached, taking its name from the yard; thus the principal sail upon the fore-lower-yard is called the fore-course or fore-sail; the next above, upon the fore-top-sail-yard, is the fore-top-sail; above which, upon the fore-top-gallant-yard, is the fore-top-gallant-sail; and above all, upon the fore-royal-yard, is the fore-royal. In like manner on the main-mast we have the main-course or main-sail, main-top-sail, main-top-gallant-sail, and the main-royal. Similar appellations are given to those on the mizzen-mast; in large merchant-ships, by means of a sky-sail-pole, a sail termed "sky-scraper" is sometimes set above the royals, but not so frequently as formerly. Such square sails can be placed at right angles to the direction of the keel of the ship, a position given to them when going before the wind; the same sails can also, by means of braces, be placed obliquely to the keel with a side wind, commonly termed by seamen "on a wind" or "by the wind." In addition to these there are sails between the masts, set either on gaffs (unbalanced) or on stays, also others beyond the extremities of the ship, extended principally by means of the bowsprit, which, in addition to supporting the fore-mast by a stay, also supports the jib and flying-jib-booms for extending the sails still farther forward; the means for extending the after-sail are the driver or spanker-boom and the gaff. Sails extended or set on gaffs and on stays are called "fore-and-aft," and are generally or approximately in a vertical plane passing through the keel; but a certain degree of obliquity can be given them by easing off the sheet or aft lower corner of the sail. A ship fitted as above described would be termed "square-rigged," the square sails predominating both in importance and in number.

*Sailcloth* is obtainable from any description of fibrous material capable of being woven into cloth, having suf-

ficient compactness and closeness of texture, and possessing the requisite strength for sustaining the heavy pressure which sails often have to bear in severe weather. Several descriptions of fiber might be enumerated which would to a certain extent serve for sailcloth but for the absence of quality of endurance or resistance; hemp has been and is now occasionally used, as also a mixture of cotton and linen yarn, or cotton only—especially in America; but in the United Kingdom FLAX (*q.v.*) is the usual staple material, since when well manufactured, it possesses the qualities of flexibility and lightness, and, what is still more important, the element of strength in a very large degree.

*Sailmaking* is a very old branch of industry in connection with the navy and commerce, and it still continues to be important, notwithstanding the enormous extent to which steam is now employed in navigation.

The tools and appliances of a sailmaker are not very numerous:—a bench about seven feet long and fifteen inches high, upon which he sits to perform the greater part of his work; palms for seaming and roping to fit the hand, made of hide lined with leather, a plate properly tempered being fixed in it having chambers to catch the head of the needle, thus acting as a thimble in forcing it through the several parts of canvas in seaming, and between the strands and through the canvas in roping; needles of various sizes, that for seaming being the smallest; and fids, splicing, serving, and stretching knife, rubber, sail-hook, bobbin for twine, and sundry small articles.

SAINFOIN (*Onobrychis sativa*) is a low-growing perennial plant with a woody root-stock, whence proceed the stems, which are covered with fine hairs and bear numerous long pinnate leaves, the segments of which are elliptic. The flowers are borne in close pyramidal or cylindrical clusters on the end of long stalks. It is native throughout the whole of central Europe and Siberia. It is grown as a foliage plant, being especially well adapted for dry limestone soils. It has about the same nutritive value as lucerne, and is esteemed for milch cattle and for sheep in winter.

SAINT. The New Testament writers have much to say about the relations of the "saints" (as members of the various churches are usually called) with their living contemporaries, but are comparatively reticent on their duties and privileges with regard to their departed brethren. Long before the close of the fourth century, however, certain very definite practices in the way of commemoration and invocation had sprung up, which ultimately found doctrinal expression in the authoritative documents alike of the Eastern and Western Church. (1) *Commemoration*—Under FUNERAL RITES, MANES, etc., allusion has already been made to the ancient custom of visiting the tombs of the deceased relatives at certain periods and there offering various gifts. With certain modifications, this practice was retained by the early Christians; they celebrated the Eucharist at or near the grave, laid oblations on the altar in the name of the departed, and in the precommunion prayer made supplication for the peace of their souls. If such commemoration was usual in domestic circles, it was little likely to be omitted by Christian congregations in the case of those who had "spoken to them the word of God," least of all when the bishop had also been, as was so often the case, a martyr. (2) *Invocation*—It is not difficult to understand how a belief in the efficacy of the prayers of departed saints—especially of martyrs—should at an early date have taken a practical form. Martyrs were believed to pass into the immediate presence of God, and the supposed nature of their claims there is not dimly indicated in the document already referred to, which once and again speaks of Polycarp

as "a noble victim selected from the flock," "a rich and acceptable sacrifice to God." The readers of Cyprian are familiar with the use made of the intercession of living "martyrs" by the lapsed to secure their reconciliation with the church; but positive evidence of the intercession of the dead being invoked for obtaining favor with God is not forthcoming so soon. Perhaps, indeed, Cyril of Jerusalem (c. 350) is the earliest author to make express allusion to the practice. In the liturgies, however, the oblation still continued to be offered "for all martyrs and confessors" as well as for others, and Augustine was the first to declare that "at the table of the Lord we do not commemorate martyrs in the same way that we do others who rest in peace so as to pray for them, but rather that they may pray for us that we may follow in their footsteps."

ST. ALBANS, a city, municipal borough, and market-town of Hertfordshire, England, is finely situated on an eminence above the river Ver, on the main line of the Midland railway and on branches of the London and Northwestern and the Great Northern lines, about twenty-four miles northwest of London and five miles west from Hatfield. The principal industries are the manufacture of silk and straw-plaiting. There are also breweries and iron foundries. The population of the municipal borough (area, 997 acres, extended in 1879) in 1881 was 10,931; the population of the same area in 1871 was estimated at 8,239.

ST. ALBANS, a township and village of the United States, the capital of Franklin county, Vt., at the junction of several divisions of the Central Vermont railroad. The village lies on an elevated plain about three miles east of Lake Champlain, and has its principal buildings arranged round a public park. Besides being the seat of the extensive workshops of the railroad company, St. Albans is the great cheese and butter market of the eastern States. In the neighborhood, which is celebrated for the beauty of its scenery, are quarries of calico stone and variegated marble. The population of the township was 1,814 in 1850, 3,637 in 1860, 7,014 in 1870, 7,193 in 1880, and 7,500 in 1890. Being only fourteen miles distant from the Canadian frontier, the village has more than once been the scene of political disturbances. In 1866 a band of 1,200 Fenians, on their return from a fruitless invasion of Canada, were disarmed there by the United States troops.

ST. AMEND-LES-EAUX, a town of France, in the department of Nord, at the junction of the Elnon with the Scarpe (a left-hand tributary of the Scheldt), seven and one-half miles by rail northwest of Valenciennes and twenty-two southwest of Lille. The population in 1881 was 7,881 (commune, 11,184).

SAINT-AMANT, MARC ANTOINE GERARD, SIEUR DE, the most eminent of a curious bacchanalian school of poets in France during the seventeenth century, was born at Rouen in the year 1594. He died at Paris in 1661.

ST. ANDREWS, a city, royal burgh, university town, seaport of Scotland, in the county of Fife, is situated on a bay of the German Ocean and on a branch of the North British Railway, nine miles east of Cupar and eleven south-southeast of Dundee. The population of St. Andrews in 1801 was only 3,263, but by 1881 it had nearly doubled, being 6,406. The parliamentary burgh in 1881 numbered 6,458.

ST. ASAPH, a city and parliamentary borough of North Wales, in the county of Flint, is situated on an eminence in the Vale of Clwyd, near the junction of the Clwyd and Elwy, about six miles south-southeast of Rhyl and six north-northwest of Denbigh. The population of the borough (area, 1,155 acres) in 1881 was 1,901, and of the parish 3,177.

ST. AUGUSTINE, capital of St. John's county, Fla., has the distinction of being the oldest city in the United States built by Europeans, and has recently become a popular winter watering-place. By rail it is thirty-six miles southeast from Jacksonville. It stands on a narrow sandy peninsula, not more than twelve feet above the sea, formed by the Matanzas and Sebastian rivers, and is separated from the ocean by the northern end of Anastasia Island. The streets are very narrow, the principal thoroughfares being only twelve or fifteen feet wide, and the balconies of the old houses often project so as almost to meet overhead. Along the sea-front for nearly a mile extends a granite-coped sea-wall (1837-43), which forms a fine promenade. At its northern end stands the old fort of San Marco (now Fort Marion), a well-preserved specimen of Spanish military architecture (finished 1756), with moat and outworks, walls twenty-one feet high, bastions at the corners, heavy casemates, dungeons, and subterranean passages. It is in the form of a trapezium, and covers about four acres. Like most of the Spanish buildings, it is constructed of coquina, a curious shelly conglomerate from Anastasia Island, which was easily quarried, but grew very hard on exposure to the atmosphere. The same material was used for paving the streets, which were thus kept extremely clean and firm. At the southern end of the sea-wall is the old Franciscan monastery, now used as United States barracks. Of the Spanish wall which ran across the peninsula and defended the city on the north side there only remains the so-called city gate. In the center of St. Augustine is the Plaza de la Constitucion, which takes its name from the monument in the middle, erected in 1812 in memory of the Liberal Spanish Constitution. On this square stand the cathedral (1793), with a Moorish belfry, the old governor's palace, now used as a post-office and public library, and an Episcopal church in modern Gothic. Other buildings of note in the town are the convent of St. Mary and the convent of the sisters of St. Joseph. Modern villas and hotels have recently been erected in various parts. Palmetto straw goods are largely manufactured in St. Augustine, the palmetto being one of the characteristic features of the surrounding landscape, to which orange and lemon trees also contribute. The climate is remarkably equable, the mean temperature for winter being 58°, and for the other seasons 68°, 80°, and 71° respectively. Frosts seldom occur, though that of 1835 killed many of the orange trees. In 1890 the total population of the city was 2,293, but in winter northern visitors swell the number to 7,000 or 8,000.

Menendez de Aviles arrived off the coast of Florida on August 28 (St. Augustine's day), 1565, and accordingly he gave the name of that saint to the city which he shortly afterward founded. His first act was to attack the French settlement on St. John's river, and two years later the French retaliated on St. Augustine (see FLORIDA and RIBAULT). In 1586 Drake attacked and plundered the town, and throughout the seventeenth century it frequently suffered from the raids of Indians, pirates, and the English settlers of South Carolina and Georgia. Occupied by the British from 1763 to 1783, it ultimately passed to the United States in 1821. During the Civil War it changed hands three times.

ST. BARTHOLOMEW, or ST. BARTHÉLEMY, a French island of the West Indies, in the archipelago of the Antilles, is situated in 17° 55' 35" N. latitude and 63° 60' 15" W. longitude, 108 miles north-northwest of Guadaloupe, of which, politically, it is a dependency. The chief town is Gustavia, near the port. The population was 2,942 in 1883.

ST. BRIEUC, a town of France, *chef-lieu* of the department of Côtes du Nord, 295 miles west of Paris by the railway from Brest, at the junction of a branch to Vannes by Pontivy. The population in 1881 was 14,869 (commune 17,833).

ST. CATHARINES, a city and port of entry of Ontario, Canada, and the capital of Lincoln county, is situated twelve miles northwest of Niagara Falls and thirty-five south of Toronto (by water), on the Welland canal and the Grand Trunk and Welland branch of the Grand Trunk railway. It is celebrated for its artesian mineral wells, and contains a convent and marine hospital. The manufacture of flour has long been a staple industry, and the abundant water-power is also utilized in cotton-mills, machine-shops, agricultural implement works, etc. Incorporated as a town in 1845, St. Catharines had in 1861 a population of 6,284, in 1871 of 7,864, 1881 of 9,631, and in 1890 of 10,000. A city charter was granted in 1875.

ST. CHAMOND, a manufacturing town of France, in the department of Loire, seven and a half miles east-northeast of St. Étienne, at the confluence of the Janon with the Gier (an affluent of the Rhone), and on the railway from St. Étienne to Lyons. The population was 14,149 in 1881.

ST. CHARLES, a city of the United States, the county seat of St. Charles county, Mo., is situated on the left or north bank of the Missouri twenty miles from its mouth, and twenty-three from St. Louis by the St. Louis and Omaha line of the Wabash, St. Louis and Pacific railway, which crosses the river by a great iron bridge 6,535 feet long, erected in 1871 at a cost of \$1,750,000. Besides one of the largest car-factories in the United States, the industrial establishments of St. Charles comprise tobacco-factories, flour-mills, hominy-mills, creameries, woolen-factories, and breweries. St. Charles College (Methodist Episcopal), chartered in 1838, the Lindenwood Female College (Presbyterian), the Convent of the Sacred Heart, and the Roman Catholic public library are the principal institutions. In 1850 the inhabitants numbered only 1,498; by 1870 they were 5,570, in 1880 5,014, and 6,500 in 1890.

A Spanish post was established at St. Charles in 1769. As a town it dates from 1809 and as a city from 1849. The first State legislature of Missouri met in the town in 1821 and St. Charles continued to be the State capital till 1826.

ST. CHRISTOPHER, or ST. KITTS, one of the Leeward Islands, West Indies, situated in  $17^{\circ} 18'$  N. latitude and  $62^{\circ} 48'$  W. longitude. Its length is twenty-three miles, its greatest breadth five miles, and the total area sixty-eight square miles.

ST. CLAIR, a county town of the United States, in Schuylkill county, Penn., three miles east of Pottsville on the Reading and Philadelphia railroad. It mainly depends on its coal-mines. The population was 5,726 in 1870 and 6,950 in 1890.

ST. CLOUD, a village of France, on the left bank of the Seine, seven miles west from the center of Paris and nine and one-half by the railroad from Paris to Versailles, forming part of the canton of Sèvres and of the *arrondissement* of Versailles (Seine-et-Oise). The palace of St. Cloud, which had been a summer residence for Napoleon I., Louis XVIII., Charles X., Louis Philippe, and Napoleon III., was burned by the Prussians in 1870 along with part of the village. In spite of the damage inflicted on the park at the same period, magnificent avenues still make it one of the finest rural haunts in the neighborhood of Paris. It occupies a varied tract of 960 acres, and abounds in picturesque views. Every year in September a great fair, lasting three weeks, is held in the park; and within its pre-

cincts are situated the new national Sèvres porcelain manufacture and the Breteuil pavilion, the seat of the international meter commission. The population in 1881 was 4,081, and 4,126 in the commune.

ST. CROIX, or SAINTE CROIX, one of the Danish West India Islands is situated between  $17^{\circ}$  and  $18^{\circ}$  N. latitude, about forty miles south-southeast of St. Thomas. Twenty-three miles long, and with a maximum width of six miles, it has an area estimated at 51,168 acres. The population of the island was 23,194 in 1860, 22,760 in 1870, 18,430 in 1880. This decrease is due to the comparative failure of the sugar-crops. Destruction of the forests (or some unsuspected cause) has brought diminished rainfall (from twenty to thirty-four inches per annum); and the belt of abandoned cane-ground has been steadily increasing. To help in checking this decay the government constructed (1876) a great central factory, to which the juice is conveyed from the plantations by a system of pipes.

ST. CYR, MARSHAL. See GOUVION ST. CYR.

ST. CYR-L'ÉCOLE, a village of France (Seine-et-Oise), two and a half miles west of Versailles, at the end of the old park of Louis XIV. It had only 2,712 inhabitants in 1881, and its importance is solely due to the famous military school now established in the convent which Madame de Maintenon founded for the education of noble young ladies in indigent circumstances. It was here that Racine's *Esther* and *Athalie* were first acted, having been written expressly for the pupils. Madame de Maintenon's tomb is still preserved in the chapel. The convent was suppressed at the Revolution, and the gardens are now partly transformed into parade-grounds. Two advanced forts of the new enceinte round Paris are situated at St. Cyr.

ST. DAVID'S, a village of Pembrokeshire, South Wales, and the seat of a bishopric, is situated in the valley of the Alan, sixteen miles northwest of Haverfordwest, the nearest railway station, and one and a half miles east from the most westerly point of Wales. The population of the parish in 1881 was 2,053.

ST. DENIS, a town of France, in the department of Seine, four and a half miles north of Paris by the Northern railway, which there divides into two branches leading respectively to Pontoise and Creil, is now a great manufacturing center for machinery, boats, railway carriages, chemical products, printed goods, candles, beer, leather, and flour. Many of the works are supplied with water from the Croud and the Rouillon, which there fall into the Seine; and a canal extends from the Seine to La Villette, the great inner harbor of Paris. In 1881 the population was 43,127. The name and fame of the town are derived from the abbe, founded by Dagobert on the spot where St. Denis, the apostle of Paris, was interred.

St. Denis, the ancient Catulliacum, was a town of no pretensions till the founding of its abbey. The process of rebuilding begun in the twelfth century by Abbé Suger was completed under Philip the Bold. In the meantime St. Louis caused mausoleums to be erected with figures of the princes already buried in the abbey; and from his time onward to Henry II. every monarch in succession had his monument. Louis IV. reduced the abbey to the rank of a priory; and at the Revolution it was suppressed, the tombs being violated and the church sacked (1793). Two years later all the remains and fragments that could be recovered were collected in the museum of the Petit Augustines at Paris; but the bronze tombs had been melted down, the stained-glass windows shattered, and large numbers of interesting objects stolen or lost. Napoleon established in the monastery a school for daughters of the members of the Legion of Honor, which has continued

to flourish. Louis XVIII. caused all the articles belonging to St. Denis to be brought back from the museums to their original site, and added numerous other monuments from the suppressed abbeys. But it was not till after 1848 that, under the intelligent direction of Viollet le Duc, the damage inflicted by revolutionist and unskillful restorer was repaired and the basilica recovered its original appearance. Charles the Bold instituted the famous fair of Landit, which was transferred from the neighboring plain to St. Denis itself in 1552, and is still held in the town. Sheep and parchment were formerly the staples. The abbey was pillaged by Charles the Bad, king of Navarre, in 1358, by the Burgundians and Flemings, in 1411, and by the English in 1430. A sanguinary battle, in which the Catholic leader Constable Anne de Montmorency found victory and death, was fought between Huguenots and Catholics in the neighborhood on November 10, 1567.

ST. DENIS, the capital of RÉUNION.

ST. DIÉ, a town of France, chef-lieu of an arrondissement and a bishop's see in the department of Vosges, is situated on the right bank of the Meurthe, 1,030 feet above the sea, on the railway from Lunéville (thirty-two miles northwest) to Épinal (thirty-eight miles southwest). The population in 1881 was 12,677 (15,312 in the commune).

SAINTE-BEUVE, CHARLES AUGUSTIN, the most notable critic of our time, was born at Boulogne-sur-Mer on December 23, 1804. In 1829 he made his first venture as a poet with the *Vie, Poésies, et Pensées de Joseph Delorme*. But the critic in him grew to prevail more and more and pushed out the poet. In 1831 the *Revue des Deux Mondes* was founded in rivalry with the *Revue de Paris*, and from the first Sainte-Beuve was one of the most active and important contributors. He brought out his novel of *Volupté* in 1834, his third and last volume of poetry, the *Pensées d' Août*, in 1837. He himself thought that the activity which he had in the meanwhile exercised as a critic, and the offense which in some quarters his criticism had given, were the cause of the less favorable reception which this volume received. Seven volumes of "Portraits," contributed to the *Revue de Paris* and the *Revue des Deux Mondes*, exhibit his work in the years from 1832 to 1848, a work constantly increasing in range and value. In 1844 he was elected to the French Academy as successor to Casimir Delavigne, and was received there at the beginning of 1845 by Victor Hugo.

The work of Sainte-Beuve divides itself into three portions—his poetry, his criticism before 1848, and his criticism after that year. His novel of *Volupté* may properly go with his poetry.

Perhaps the best way to get a sense of the value and extent of the work done in his life by the critic is to take a single volume of the *Causeries du Lundi*, and look through its list of subjects. As a guide to bring us to a knowledge of the French genius and literature he is unrivaled—perfect, so far as a poor mortal critic can be perfect, in knowledge of his subject, in judgment, in tact, and tone. He died in 1869.

SAINTE-CLAIRE DEVILLE, ÉTIENNE HENRI, French chemist, was born on March 11, 1818, in the island of St. Thomas, West Indies, where his father was French consul. He was educated in Paris along with his elder brother Charles at the Collège Rollin. In 1844, having graduated as a doctor of medicine and doctor of science, he was appointed dean of the new faculty of science at Besançon by Thenard. In 1851 he succeeded Balard in the École Normale and in the Sorbonne. He died at Boulogne-sur-Seine on July 1, 1881.

SAINTE-S, a town in France, the chef-lieu of an ar-

rondissement in the department of Charente-Inférieure, on the left bank of the Charente, eighty-eight feet above the sea and forty-five miles southeast of La Rochelle by the railway from Nantes to Bordeaux. The population in 1881 was 13,341 (15,763 in the commune).

ST. ÉTIENNE, an industrial and manufacturing town of France, chef-lieu of the department of Loire, 312 miles south-southeast of Paris and 36 miles south-southwest of Lyons by rail, with a branch line to Le Puy. The coal-field of St. Étienne is the richest in France after that of Valenciennes and Pas de Calais, giving employment to 12,000 miners and 5,000 workmen at the pit-heads. The national gun-factory, under the direction of artillery officers and employing 4,300 workmen, is almost exclusively devoted to the production of rifles and revolvers for the army. A certain number of gun-makers not engaged in the factory turn out from 80,000 to 90,000 firearms (hunting-pieces, revolvers, etc.) per annum. The population of the town was 28,000 in 1764; by 1876 it was 126,019, but it had decreased to 114,962 (123,813 in the commune) in 1881.

ST. EUSTATIUS, or ST. EUSTACHE, one of the Dutch West India Islands, a dependency of Curaçoa, lying northwest of St. Kitts in 17° 50' N. latitude and 62° 40' W. longitude, consists of two volcanic cones and an intervening valley, and contains the small town of Orangetown and two forts. The population, which from 7,600 in 1786 had decreased to 1,741 (about 1,000 negroes), was again 2,247 in 1882.

SAINT ÉVREMOND, CHARLES DE MARGUETEL DE SAINT-DENIS, SEIGNEUR DE, French author, was born at Saint-Denis-le-Guast near Coutances, the seat of his family in Normandy, on April 1, 1613. He died on Michaelmas Day, 1703, and was buried in Westminster Abbey, where his monument still is in Poet's Corner close to that of Prior.

ST. GALL, in area the sixth (789 square miles), in actual population the fourth (210,491), and in relative density of population the tenth of the Swiss cantons, was formed in 1803, out of the two independent communities of the "town" and the "abbey" (including Toggenburg), Rapperswyl, Uznach, Gaster, Sargans, Gams, Rheintal, Sax (with Forsteck), which belonged to Zurich, and Werdenberg, which belonged to Glarus. It incloses the canton of Appenzell, extending between the Lake of Constance and the Lake of Zurich on the west, and being bounded by the Rhine on the east, while in the southwest lies the valley occupied by the Wallenstätt Lake and the Linth Canal. The Rhine separates St. Gall from Tyrol, and the rest of its frontier is conterminous in succession with Grisons, Glarus, Schwyz, Zurich, and Thurgau. The people of St. Gall are three-fifths Roman Catholic and two-fifths Protestant (126,164 and 83,441 in 1880.)

ST. GALL (German, *Sankt Gallen*), capital of the above canton, occupies along with its suburbs St. Fiden, Neudorf, and Langgasse (to the east), and Lachen and Vonwil (to the west), an area four miles long by one broad in the highland valley of the Steinach, which descends northeast to the Lake of Constance. In 1870 the population was 16,675, in 1880 21,438.

SAINT-GERMAIN, COMTE DE, a celebrated adventurer of the eighteenth century who, by the assertion of his discovery of some extraordinary secrets of nature, exercised considerable influence at several European courts. Of his parentage and place of birth nothing is definitely known; the common version is that he was a Portuguese Jew. The most remarkable of his professed discoveries was of a liquid which could prolong life, and by which he asserted he had lived 2,000 years. At the court of Louis XV., where he appeared about 1748, he exercised for a time



extraordinary influence, but, having interfered in the dispute between the houses of Austria and France, he was compelled in June, 1760, on account of the hostility of the duke of Choiseul, to remove to England. He appears to have resided in London for one or two years, but was at St. Petersburg in 1762, and is asserted to have played an important part in connection with the conspiracy against the emperor Peter III., in July of that year. He then went to Germany, where, according to the *Mémoires authentiques* of Cagliostro, he was the founder of freemasonry, and initiated Cagliostro into that rite. After frequenting several of the German courts, he finally took up his residence in Schleswig-Holstein, where he and the landgrave Charles of Hesse pursued together the study of the "secret" sciences. He died at Schleswig in 1780.

ST. GERMAIN-EN-LAYE, a town of France, in the department of Seine-et-Oise, eight miles north of Versailles, and thirteen west of Paris by rail. It had 15,545 inhabitants in 1881 (15,790 in the commune). The history of St. Germain centers in the castle, now occupied by a museum of national antiquities.

ST. HELENA, an island in the Atlantic in  $15^{\circ} 55' 26''$  S. latitude and  $5^{\circ} 42' 30''$  W. longitude (Ladder Hill Observatory), lies 1,140 miles from Africa, 1,800 from America, 700 southeast of the island of Ascension (the nearest land), and 4,000 from Great Britain, of which it has been a dependency since 1651. The area is about forty-five square miles, the extreme length from southwest to northeast being ten and a quarter miles and the extreme breadth eight and a quarter. The island is a very ancient volcano, greatly changed by oceanic abrasion and atmospheric denudation. The island is chiefly of interest as the place of detention of Napoleon Bonaparte.

The population of St. Helena was 6,444 in 1871 and 5,059 (2,617 males, 2,442 females) in 1881; it consists of Government officials, of old-established residents ("yam-stalks") of somewhat composite origin, European and Asiatic, and of the descendants of Negroes landed from West African slave ships subsequent to 1840. The only town—Jamestown (3,000 inhabitants)—lies in a deep valley on the northwest coast, and there is a village in the neighboring Rupert's Valley. Ladder Hill, the seat of the garrison, is so called from the almost precipitous ladder-like wooden stair by which its height of 600 feet can be scaled. Longwood, where Napoleon died in 1821, is a farmhouse in an elevated plain (2,000 feet high), about three and a quarter miles inland from Jamestown.

St. Helena was discovered by the Portuguese navigator João da Nova on May 21, 1501. The island received its first known inhabitant in 1513 in the person of Fernandez Lopez, a Portuguese of good family, who preferred being marooned to returning to Europe after the barbarous mutilation to which he had been subjected for some misdemeanor.

ST. HELEN'S, a market-town and municipal and parliamentary borough of southwest Lancashire, England, is situated on a branch of the London and North-Western railway, twenty-one miles west by south of Manchester and ten east-northeast of Liverpool. The population of the borough (area, 6,586 acres) in 1871 was 45,134, and in 1881 it was 57,403.

ST. HELIER. See JERSEY.

ST. HENRI, or TANNERY WEST, formerly a post-village in Hochelaga county, Quebec, and for many years a suburb of Montreal, has since been practically included within the limits of that city. It is located on the Grand Trunk railroad and contains several churches, stores, and manufacturing establishments. Its present (1890) population is 9,000.

SAINT-HILAIRE. See GEOFFROY SAINT-HILAIRE.

SAINT-HILAIRE, AUGUSTE DE, French botanist and traveler, was born at Orleans on October 4, 1799. He began to publish memoirs on botanical subjects at an early age. In 1816-22 and in 1830 he traveled in South America, especially in south and central Brazil, and the results of his personal study of the rich flora of the regions through which he passed appeared in several books and numerous articles in scientific journals. He died at Orleans on September 30, 1853.

ST. HYACINTHE, a city of the province of Quebec, Canada, and capital of St. Hyacinthe county, is located on the Yamaska river, thirty-six miles east-northeast of Montreal, as also on the Grand Trunk and Canadian Pacific railroads. The city contains a court-house, city hall, bank, and market, two printing offices, a college with a faculty consisting of twelve professors, a nunnery, Roman Catholic cathedral, bishops' palace, and other parochial buildings, several hotels and a number of stores. Grist and saw mills, woolen-mills, wooden-ware factories, tanneries, foundries, and machine shops, and boot and shoe factories constitute the leading industrial interests represented. The population in 1890 was estimated at 5,321.

ST. IVES, a seaport and borough of west Cornwall, England, is situated at the west entrance of the beautiful St. Ives Bay on the Bristol Channel, seven miles north of Penzance. The population of the municipal borough (area, 1890 acres) in 1871 was 6,965, and in 1881 it was 6,445.

ST. JEAN BAPTISTE, a suburb of Montreal, Canada, under a separate municipality. It lies north-northeast of Mount Royal Park and is hardly a mile from the center of the city. The population in 1881 was 5,874.

ST. JEAN D'ACRE. See ACRE.

ST. JEAN D'ANGELY, a town in France, the chef-lieu of an arrondissement in the department of Charante-Inférieure, on the right bank of the Boutonne (a right-hand affluent of the Charente) and on the railway from Taillebourg (twelve miles southwest) to Niort (thirty miles north). The population was 6,538 in 1881 (7,279 in the commune).

ST. JOHN, capital of St. John county and the largest city of the province of New Brunswick, is strikingly situated at the mouth of the river of the same name, in  $45^{\circ} 14' 6''$  N. latitude, and  $66^{\circ} 3' 30''$  W. longitude. It stands on an elevated rocky peninsula which projects into the harbor for a considerable distance. The latter, which is protected by batteries and never freezes, is well equipped with wharves and docks, and is capable of accommodating ships of the largest size. Its entrance is guarded by Partridge Island, lying 2 miles south of the city, and containing the quarantine hospital and light-house. About  $1\frac{1}{4}$  miles north of the light-house is situated the Beacon, and below the town, east of the channel, is the breakwater, 2,250 feet long. The St. John river enters the harbor through a rocky and sharply defined gorge, 100 yards wide, and about 400 long, having a total fall of about 17 feet, which is passable to ships for 45 minutes during each ebb and flow of the tide. The river has alternately an inward and an outward fall twice every 24 hours, the high-water tide level immediately below the gorge being 6 to 8 feet higher than the average level above the gorge. The river is here spanned by a stanch suspension bridge 640 feet long and 100 feet above low-water level, and a cantilever railway bridge, 2,260 feet long, with a river span of 825 feet, was opened in 1885. The city, approached from the sea, presents a bold and picturesque appearance, and, next to Quebec, possesses more

natural beauty than any other town in Canada. There are three large public squares, and the streets (lighted with gas and the electric light) are regularly laid out. The water supply is derived from Little river, five miles distant, and brought to the city by three separate mains, with an aggregate capacity estimated at 10,000,000 gallons daily; the present daily consumption (including that of the city of Portland) is 5,000,000 gallons. The works, which are owned by the city, cost \$992,326. The water supply of St. John (West) is derived from Spruce Lake. St. John (East) has also an admirable sewerage system.

On June 20, 1877, two-fifths of St. John (about 200 acres) was destroyed by a fire, which in nine hours burned over \$27,000,000 worth of property. The city was quickly rebuilt, and on a much grander scale, many brick and stone edifices taking the place of the old landmarks, which were principally composed of wood. The chief buildings are—the Roman Catholic cathedral, Trinity, St. Andrew's, the Stone, St. David's, the Centenary, German Street Baptist, and Leinster Street Baptist churches, the custom-house, postoffice, city-hall, savings bank, Wiggins' Orphan Asylum, Victoria skating-rink, lunatic asylum, Victoria and Madras schools, the Masonic and Oddfellows' halls, the young men's Christian association building, the general public, the epidemic and the marine hospitals, the courthouse, jail, police office, and mechanics' institute (with a reading-room, library, and museum). There are thirty-three places of worship (Church of England six, Roman Catholic three, Presbyterian seven, Wesleyan Methodist five, Baptist six, Congregationalist one, Methodist Episcopal one, Christian Brethren one, Disciples of Christ two, and Christadelphians one); the educational institutions consist of a grammar school, a Madras school, Baptist seminary, and several public and private schools and academies. St. John has also a free public library, numerous religious, charitable, scientific, and literary societies, and three daily newspapers. Carleton, on the opposite side of the river, and connected with the east side by ferry, is included within the corporation limits, and is represented in the common council. The population in 1871 was 28,805, in 1881 it was 26,127, the decrease being caused by the great fire of 1877, when many persons left the city. In 1890 it was 45,000.

ST. JOHN, CHARLES WILLIAM GEORGE, naturalist and sportsman, was the son of General the Hon. Frederick St. John, second son of Frederick, second viscount Bolingbroke, and was born December 3, 1809. He died at Wooston near Southampton, England, on July 22, 1856.

SAINT-JOHN, HENRY. See BOLINGBROKE.

ST. JOHN, JAMES AUGUSTUS, traveler and author, was born in Carmarthenshire, Wales, on September 24, 1801. He died on September 22, 1875.

SAINT JOHN OF JERUSALEM, KNIGHTS OF THE ORDER OF (see KNIGHTHOOD). In the year 1023 certain merchants of Amalfi obtained permission from the caliph of Egypt to establish a hospital in Jerusalem for the use of "poor and sick Latin pilgrims." The hospice prospered far beyond the hopes of its founders, and grateful travelers spread its fame throughout Europe and sent offerings to its funds, while others voluntarily remained behind to assist actively in its pious purposes. With its increased utility organization became necessary, and in this organization is to be found the origin of the Order of Saint John. When Jerusalem was taken by Godfrey de Bouillon (see CRUSADES), his wounded soldiers were tended by Peter Gerard, rector of the Amalfi hospital of St. John, and the more wealthy of the crusaders eagerly followed the example of their leader in endowing so useful and so practical an institu-

tion. Many of the Christian warriors sought permission to join the ranks of the fraternity. At the proposal of Gerard a regularly constituted religious body was formed; the patriarch of Jerusalem invested every approved candidate with a black robe bearing on the breast an eight-pointed white cross, and received in return a vow of poverty, obedience, and chastity. In 1113 Pope Paschal II. formally sanctioned the establishment of the order by a bull. Five years later Gerard was succeeded by Raymond du Puy, and under his auspices the monastic knights took a fresh oath to become militant defenders of the cause of the Cross. During the first century of its existence the fraternity thus acquired a religious, republican, military, and aristocratic character. About 1289 an overwhelming force was sent from Egypt to besiege Acre, which only fell after a desperate resistance. Under cover of the arrows of their archers the knights sailed for Cyprus (1291). Repeated acts of prowess by sea still served to remind the Moslem corsairs of the survival of their implacable foes. De Villiers died three years later and was succeeded by Odon de Pins, who tried ineffectually to restore the purely conventual character of the order. William de Villaret (elected in 1300) shared the dangers of an expedition to Palestine and prepared for the conquest of Rhodes, which was effected in 1310 by his brother and successor. The revenues of the Hospitallers were now augmented from the confiscated estates of their old rivals the Templars. Fulk de Villaret was attacked at Rhodes by Osman, ruler of Bithynia, but with the assistance of Amadeus of Savoy he defeated the invaders. A serious difference which arose between De Villaret and his subordinate knights enabled Pope John XXII. to appoint his nominee John de Villanova (1319). It was at this period that the order was divided into the seven *langues* of France, Provence, Auvergne, Italy, Germany, England, and Aragon. In 1346 De Gozon became grand-master. His administration and that of his immediate successors are only remarkable for a perpetual struggle for supremacy with the papal court. In 1365 Raymond Beranger captured Alexandria in concert with the king of Cyprus, but the victors contented themselves with burning the city. Philibert de Naillac had no sooner been elected grand-master than he was summoned to join the European crusade against the sultan Bajazet, and took part in the disastrous battle of Nicopolis. The Greek emperor unfortunately invoked the aid of Timur, who overthrew Bajazet, but followed up his success by an attack on Smyrna, the defense of which had been intrusted to the knights. Smyrna was taken and its brave garrison put to the sword. In 1440 and 1444 De Lastic defeated two expeditions sent against him from Egypt. Nine years later Constantinople fell at last into the hands of the Turks. It was evident to the knights that an attack on their sanctuary would follow the triumph of Islam, but it was not till 1480 that the long-dreaded descent on Rhodes took place. Fortunately for the order, Peter d'Aubusson was grand-master, and the skillfully planned attack of the three renegades was valorously repulsed. The heroic D'Aubusson recovered from his wounds, restored the shattered fortifications, and survived till 1503. Nearly twenty years passed away before the sultan Solymán determined to crush the knights, who had just elected L'Isle d'Adam as their chief. After a glorious resistance, D'Adam capitulated, and Charles V., in 1530, with the approval of the pope, ceded the island of Malta and the fortress of Tripoli in Africa to the homeless knights. The order never perhaps seemed to all outward appearances more prosperous than when the storm of the French Revolution broke suddenly upon it. In 1792 the Directory decreed the abolition of

the order in France and the forfeiture of its possessions. The grand-master had taken no pains to conceal his sympathy for the losing cause in France, and his court had become an asylum and home for many French refugees. His successor Ferdinand Hompesch was perhaps the weakest man ever elected to fill a responsible position in critical times. On April 12, 1798, the French Government resolved on the forcible seizure of Malta. Warnings were sent to the grand-master in vain. Within two months from that date the island was in the hands of Bonaparte, and Hompesch was permitted to retire to Trieste with some of the cherished relics of the order.

Subsequent to the departure of Hompesch a number of the knights who had taken refuge at St. Petersburg elected the emperor Paul grand-master. Notwithstanding the patent illegality of the proceeding the proffered honor was eagerly accepted and duly announced to all the courts of Europe (October, 1798). Hompesch was induced to resign in the following year. On the death of Paul an arrangement was arrived at which vested the actual nomination in the pope. From 1805 to 1879 only lieutenants of the order were appointed, who resided first at Catania, then at Ferrara, and finally at Rome. In 1879 Leo XIII. made Giovanni Battista Ceschi grand-master, and he actually rules over portions of the Italian and German *langues* and some other scattered groups of the ancient fraternity.

Two other associations also trace their origin from the same parent stock—the Brandenburg branch and the English *langue*. The former can claim an unbroken existence since its establishment in 1160. In 1853 the king of Prussia (in whom the right of nomination had been vested since 1812) restored the original bailiwick of Brandenburg and the assembled commanders elected Prince Charles of Prussia *Herrn Meister*, who notified his election to the lieutenant of the grand-master at Rome. The "Johanniter" did good service in the German campaigns of 1866 and 1870. As regards the English *langue*, 1 Elizabeth c. 24 annexed to the crown all the property of the order in England. After the restoration of the Bourbons the French knights met once more in chapter-general and elected a permanent capitular commission, which was officially recognized by both Louis XVIII. and the pope. After certain negotiations, the three French *langues*, acting in accord with those of Aragon and Castile, agreed to the resuscitation of the dormant *langue* of England (1827-1831), and Sir Robert Peat was appointed lord prior, taking the customary oath *de fidei administratione* in the Court of King's Bench. During the past half century the good work done by the modern knights—now once more located in St. John's Gate, Clerkenwell—can honorably compare with the memorable deeds of their predecessors. The establishment of the hospice at Jerusalem is due to the energy and zeal of Sir Edmund Leclimere, who has been mainly instrumental in collecting at St. John's Gate the unrivaled historical literature of which the order can boast.

ST. JOHN'S, the capital of Newfoundland, is situated on the eastern shore of the island, sixty miles north of Cape Race, in  $47^{\circ} 33' 33''$  N. latitude and  $52^{\circ} 45' 10''$  W. longitude. It is  $10^{\circ} 52'$  east of Halifax, and stands on what is nearly the most eastern point of America—Cape Spear, five miles south of St. John's, alone projecting a little farther toward the Old World. It is 1,000 miles nearer than New York to England, and but 1,640 from the coast of Ireland. The approach to the harbor of St. John's presents one of the most picturesque views along the coast of America. In a lofty iron-bound coast a narrow opening occurs in the rocky wall, guarded

on one side by Signal Hill (520 feet) and on the other by South Side Hill (620 feet), with Fort Amherst lighthouse on a rocky promontory at its base. The entrance of the Narrows is about 1,400 feet in width, and at the narrowest point, between Pancake and Chain Rocks, the channel is not more than 600 feet wide. The Narrows are half a mile in length, and at their termination the harbor trends suddenly to the west, thus completely shutting out the swell from the ocean. Vessels of the largest tonnage can enter at all periods of the tide. The harbor is a mile in length and nearly half a mile in width. At its head is a dry dock, recently completed at a cost of \$550,000; it is 600 feet in length, 83 in breadth, and 26 in depth, capable of admitting the largest steamers afloat. The city is built on sloping ground on the northern side of the harbor, on the southern side of which the hills rise so abruptly from the water that there is only room for a range of warehouses and oil-factories. Three principal streets, winding and irregular, follow the sinuosities of the harbor and of one another the whole length of the city, and these are intersected by a number of cross-streets. Water street, the principal business locality, presents a very substantial, though not handsome, appearance, the houses being of stone or brick. Shops, stores, and counting-houses occupy the ground floor, while many of the merchants and shop-keepers live in the upper stories. Fish-stores, warehouses, and wharves project from behind on the side next the harbor. The city, three-fourths of which is still of wood, is rapidly extending in several directions, and in recent years many dwelling-houses of an improved description have been erected. There is an abundant supply of excellent water, brought in pipes from a lake five miles off. Epidemics are rare, and the city is very healthy. Of the public buildings the most important are Government House, a substantial and spacious building erected in 1828 by the Imperial Government; the colonial building (1847), containing the chambers of the legislature and government offices; the athenæum (1877), containing a public hall, library, reading-room, savings bank, museum, etc. The foundation of a new post-office was laid in the same year. The churches are—the Church of England and Roman Catholic cathedrals, St. Thomas' and St. Mary's (Church of England), St. Patrick's, three Methodist churches, St. Andrew's Presbyterian church, and the Congregational church. The manufacture of seal and cod oils has long been carried on upon an extensive scale. Of late years other manufactures have been introduced, and have made considerable progress. There are three iron foundries, two large machine shops, two boot and shoe factories, a nail-factory, three furniture-factories, two tobacco-factories, soap-works, two tanneries, and a large and well-equipped factory for the manufacture of cables, ropes, twines, nets, seines, etc. The export trade in fish of various kinds, fish oils, seal oil, and seal skins is very large; the greater part of all the imports into Newfoundland also arrives at St. John's. The population, which in 1780 was 1,605, had in 1801 increased to 3,420, in 1812 to 7,075, in 1835 to 15,000, and in 1874 to 23,890; in 1884 it was 28,610, and 1890 it was 31,000. The census last mentioned also shows the population of the whole island and Labrador to be 197,589, being an increase of 36,209 since 1874, or at the rate of about 22 per cent. in sixteen years. The population of the Atlantic coast of Labrador, which is under the jurisdiction of Newfoundland, was 4,211—1,347 being Eskimo.

ST. JOHNSBURY, capital of Caledonia county, Vt., on the Passumpsic river (a tributary of the river Connecticut), about fifty miles south of the Canadian frontier, and on the railway between Boston (205 miles)

and Montreal. St. Johnsbury is the seat of perhaps the largest scale-factory in the world, which employs about 7,000 hands and works up 6,000 tons of iron per annum. The township contains an athenæum, public library (12,000 vols.), and art gallery. The population has increased from 2,758 in 1850 to 4,665 in 1870, 5,800 in 1880, and 6,100 in 1890. The three villages are distinguished as St. Johnsbury (3,360 in 1880), St. Johnsbury Center, and St. Johnsbury East. Founded in 1786, the township received its name in honor of St. John de Crèvecoeur, French consul at New York, and a benefactor of Vermont.

ST. JOSEPH, capital of Buchanan county, Mo., on the right bank of the Missouri, 260 miles west-by-north of St. Louis. It is an important railway junction, possessing since 1873 a great road and railway bridge over the river constructed of iron; in the extent of its wholesale business it ranks as the third city in the State; and among its manufacturing establishments are flour-mills, starch-works, boot and shoe factories, pork-packing establishments, wagon-factories, a distillery, etc. Besides a city-hall and market-house, it contains a court-house (1875), an opera-house, a State lunatic asylum (1874), an agricultural and mechanical exposition association, a Roman Catholic cathedral, and five public libraries. The population was 8,932 in 1860, 19,565 in 1870, 32,431 in 1880, and 52,324 in 1890.

Founded in 1843 by Joseph Robidoux, a French Roman Catholic, who had settled in the district some years previously as a trader, St. Joseph in 1846 was made the county seat, and before 1857, when it received its first city charter, became well known as the great point of departure for emigrants bound for California and the West. During the Civil War, when it was fortified by the Federals, its natural development was considerably checked, but this revived as soon as the struggle was over. Its growth in the last decade has been marvelous.

SAINT-JUST, ANTOINE, French revolutionary leader, was born at Decize in the Nivernaize on August 25, 1767. Intoxicated with republican ideas, Saint-Just threw himself with enthusiasm into the political troubles of his time, had himself appointed an officer in the National Guard, and by fraud—he being yet under age—admitted as a member of the electoral assembly of his district. He now entered into correspondence with Robespierre, who thenceforward became his hero and ideal. Robespierre invited him to Paris, felt flattered by his worship, saw that he suited his purpose, and in a short time the two became hand and glove. Thus supported, Saint-Just became deputy of the department of Aisne to the national convention, where he made his first speech—gloomy, fanatical, remorseless in tone—on November 19, 1792. He had but twenty months to live; but into these he seemed to crowd the life of twenty years. In the convention, in the Jacobin Club, and among the populace his relations with Robespierre became known, and he was dubbed the “St. John of the Messiah of the People.” Hardly a week passed without the attention of France being arrested by his attitude or his utterances. Both were anxiously watched, as the unfailing indication of the trend of Robespierre’s designs. His appointment as a member of the committee of public safety now placed him at the very height and center of the political fever-heat. What were then called reports were far less statements of fact than appeals to the passions; in Saint-Just’s hands they furnished the occasion for a display of fanatical daring, of gloomy eloquence, and of undoubted genius; and—with the shadow of Robespierre behind them—they served their turn. At last, at the famous sitting of the ninth Thermidor, he ventured to present as the report of the committees

of general security and public safety a document expressing his own views, a sight of which, however, had been refused to the other members of committee on the previous evening. Then the storm broke. He was vehemently interrupted, and the sitting ended with an order for Robespierre’s arrest. On the following day, July 28, 1794, twenty-two men, nearly all young, were guillotined. Robespierre was one, aged thirty-six; Saint-Just another, aged twenty-six.

ST. KILDA, the largest islet of a small group of the Outer Hebrides, Scotland, forty miles west of North Uist, in 57° 48' 35" N. latitude and 8° 35' 30" W. longitude. It measures three miles from east to west and two from north to south, and has an area of 3,000 to 4,000 acres. The inhabitants are an industrious Gaelic-speaking community (110 in 1851, and 77 in 1881). They cultivate about forty acres of land (potatoes, oats, barley), keep about 1,000 sheep, and fifty West Highland cows, and catch puffins and other sea-fowl.

ST. KILDA, a watering-place in Victoria, Australia, on the east shore of Hobson’s Bay, 3½ miles south of Melbourne, with which it is connected by a railway. The borough had an area of 1,886 acres, and a population of 11,662 in 1881.

ST. KITTS. See ST. CHRISTOPHER.

SAINT-LAMBERT, JEAN FRANÇOIS DE, French poet, was born at Nancy in 1716, and died at Paris in 1803.

ST. LAWRENCE. The river St. Lawrence in North America, taken in connection with the great lakes, offers to trading vessels the most magnificent system of inland navigation in the world. Its total length from the source of the St. Louis river, which discharges into Fond du Lac at the head of Lake Superior, to Cape Gaspé is 2,100 miles. The river St. Louis springs from the same spacious plateau in Minnesota that gives birth to the Mississippi and the Red River of the North. The intermediate distances between the source of the St. Lawrence and its mouths are shown in Table I. According to the most recent surveys the approximate area of the basin of the St. Lawrence is 510,000 square miles, of which 322,560 belong to Canada and 187,440 to the United States.

Lake Superior, the most westerly of the lakes, is the largest body of fresh water in the world. In addition to the river Nipigon, which may be regarded as the chief source of the upper St. Lawrence, and the St. Louis and Pigeon rivers, which constitute the international boundary, it receives its waters from 200 rivers, draining an aggregate of 84,000 square miles, including its own area of 32,000.

Its length is 390 miles, its greatest breadth 160, and its mean breadth 80. Its mean depth is 900 feet and its altitude above the sea-level 600 feet. Its coast is generally rockbound. Numerous islands are scattered about the north side of the lake, many rising precipitously to great heights from deep water—some presenting castellated walls of basalt and others rising in granite peaks to various elevations up to 1,300 feet above the lake. The Laurentian and Huronian rocks to the north along the shore abound in silver, copper, and iron ores. The United States side is generally lower and more sandy than the opposite shore, and is also especially rich in deposits of native copper and beds of red hematite iron ores. Both these minerals are extensively worked. Unfossiliferous terraces occur abundantly on the margin of the lake; at one point no fewer than seven occur at intervals up to a height of thirty-three feet above the present level of the water. Lake Superior is subject to severe storms, and the effect of the waves upon the sandstone of the “picture rocks” of

Grand Island presents innumerable fantastic and very remarkable forms. The lake never freezes, but cannot be navigated in winter on account of the shore ice. At the west end of the lake, at the mouth of the St. Louis, is situated the city of Duluth, a place of considerable importance as the eastern terminus of the Northern Pacific railway, and of the St. Paul and Duluth railway, which runs to St. Paul on the Mississippi, 155 miles south of Duluth.

TABLE I.—Distances of Sections of St. Lawrence.

Local Name.	From	To	Sections of Navigation.	Statute Miles.	
				Intermedi-ate.	Total from Source of St. Louis.
.....	Source of St. Louis river	Fond du Lac	St. Louis river..	152	152
.....	Fond du Lac	Pointe aux Pins.....	Lake Superior...	390	542
Saulte St Mary	Pointe aux Pins.....	St Joseph's I	St. Mary's river.	55	597
.....	St Joseph's I	Sarnia.....	Lake Huron....	270	867
St Mary river..	Sarnia.....	Amherst-burg.....	St. Claire and Detroit river..	76	943
.....	Amherst-burg.....	Pt. Colborne	Lake Erie.....	232	1175
Niagara river..	Pt. Colborne	Pt Dalho'sie	Welland Canal..	27	1202
.....	Pt Dalho'sie	Kingston...	Lake Ontario...	170	1372
.....	Kingston...	Prescott....	Head of canal section.....	59	1431
St. Lawrence.	Prescott....	Montreal. .	St. Lawrence Canal section....	119	1550
	Montreal...	ThreeRivers	Head of ocean navigation to head of tidal flow.....	86	1636
	ThreeRivers	Quebec.....	Head of tidal flow to Quebec	74	1710
	Quebec.....	Cape Chat..	.....	266	1976
.....	Cape Chat..	Cape Gaspe.	Mouth of river St Lawrence.....	124	2100
.....	Cape Gaspe.	Belle Isle..	Mouth of Gulf of St. Lawrence..	436	2536

St. Mary's river is fifty-five miles long, is the only outlet from Lake Superior, and its course to Lake Huron is but a succession of expansions into lakes and contractions into rivers. St. Mary's rapids, which in a distance of half a mile absorb eighteen feet out of the total fall of twenty-two feet between the two lakes, are avoided by a ship canal, constructed in 1855.

As originally built, the canal was 1 mile long, had a width of 100 feet at the water line and a depth of 12 feet. The locks were two in number, combined, each 350 feet in length, 70 in width, with a lift of 9 feet. At the time the canal was made these dimensions were sufficient to pass any vessel on the lakes fully laden, but by 1870 it became necessary to provide for more rapid lockage and for the passage of larger vessels. Accordingly the old canal was widened and deepened, and a new lock constructed 515 feet long and 80 wide—the width of the gates being 60 feet, the lift of the lock 18, and the depth of water on the miter sills 17. There is now everywhere a navigable depth of 16 feet from Lake Superior through St. Mary's Falls canal and St. Mary's river to Lake Huron.

Lake Huron is 270 miles long and 105 broad and has an area of 23,000 square miles (the area of its basin, including the lake, being 74,000), a mean depth variously stated at from 700 to 1,000 feet, and an altitude above the sea of 574 feet. Georgian Bay on the northeast lies entirely within the region of Canada, while Thun-

der Bay and Saginaw Bay on the west and southwest are in the State of Michigan. The north and northeast shores of Lake Huron are mostly composed of sandstones and limestones, and where metamorphic rocks are found the surface is broken and hilly, rising to elevations of 600 feet or more above the lake, unlike in this respect the southern shores skirting the peninsulas of Michigan and southwestern Ontario, which are comparatively flat and of great fertility. As in Lake Superior, regular terraces corresponding to former water-levels of the lake run for miles along the shores of Lake Huron at heights of 120, 150 and 200 feet; and deposits of fine sand and clay containing freshwater shells rise to a height of forty feet or more above the present level of the water. At several places these deposits extend to a distance of twenty miles inland. The chief tributaries of the lake on the Canadian side are the French river from Lake Nipissing, the Severn from Lake Simcoe, the Muskoka, and the Nottawasaga, all emptying into Georgian Bay; and on the United States side the Thunder Bay river, the Au-Sable, and the Saginaw.

Lake Michigan is entirely in the territory of the United States. It has a maximum breadth of eighty-four miles and its length is 345 miles from the northwest corner of Indiana and the north part of Illinois to Mackinaw, where it communicates with Lake Huron by a strait four miles wide at its narrowest part. Its depth is variously stated at from 700 to 1,800 feet. Its altitude above sea-level is 578 feet. Its basin is 70,040 square miles in area, of which the lake occupies 22,400. Five of its tributaries are from 135 to 245 miles in length. The country round Lake Michigan is for the most part low and sandy. The rocks are limestones and sandstones of the sub-carboniferous groups, lying in horizontal strata, and never rising into bold cliffs. Along the south shore are post-tertiary beds of clay and sand lying a few feet above the level of the lake, the waters of which probably at one time found their way by the valleys of the Illinois and Mississippi into the Gulf of Mexico.

Chicago (population, 503,185 in 1880; 1,099,850 in 1890) is situated at the southwest angle of the lake. In the receipt and shipment of grain and pork it is the largest market in the world. The first appropriation for the harbor of Chicago, made in 1833, was expended in cutting a straight outlet from the Chicago river into the lake. The available depth was only two feet, but since then the harbor accommodation has been extended, by means of piers, dredging, and a breakwater, to accommodate vessels of fourteen feet draught.

The harbor works at Chicago, as well as at other lake and river ports, are constructed simply of cribs or boxes, composed of logs twelve by twelve inches, filled with stone, and joined to each other, after they have finally settled down, by a continuous timber superstructure raised a few feet above the level of the water. On this plan breakwaters, piers at the mouths of rivers, and wharves have been built within the last sixty years at the most important points along the shores of the St. Lawrence lakes, as well as at most of the river harbors communicating with the Atlantic; and experience has proved that no cheaper and better system could have been devised for such localities.

The St. Lawrence leaves Lake Huron by the St. Clair river at Sarnia, and after a course of thirty-three miles enters Lake St. Clair, twenty-five miles long, and terminating at the head of the Detroit river, near the city of Detroit in Michigan. Eighteen miles farther on the St. Lawrence, with a descent of eleven feet, enters Lake Erie. The navigation through the St. Clair river is easy throughout, but in Lake St. Clair there are extensive sandbanks covered with a depth of water vary-

ing from six to ten feet. Previous to 1858 much inconvenience was experienced in navigating the lake owing to its insufficient depth; but at the end of that year the governments of the United States and Canada dredged a canal through the bed of the lake, which is of soft material, to a minimum depth of 12 feet, with a width of 300 feet. This channel has since been deepened to 16 feet over a width of 200 feet, and works are now in progress to deepen the rocky shoal called the "Lime-Kiln Crossing" in the Detroit river to 18 feet, to enable vessels drawing 15 feet to pass with safety from lake to lake in stormy weather.

The peculiar features of Lake Erie are its shallowness and the clayey nature of its shores, which are generally low. The south shore is bordered by an elevated plateau through which the rivers, which are without importance as regards Lake Erie, have cut deep channels. The mean depth of the lake is only 90 feet and its maximum depth 204. Owing to its shallowness it is easily disturbed by the wind, and is therefore the most dangerous to navigate of all the great lakes. Its length is 250 miles and its greatest breadth 60. The area of the basin of Lake Erie is 39,680 square miles, including 10,000 square miles, the area of the lake. Its waters are 564 feet above the sea and 330 above Lake Ontario. The extreme difference observed in the level of the lake between 1819 and 1838 was five feet two inches, but the average annual rise and fall (taken on a mean of twelve years) is only one foot one and one-half inches. The mean annual rainfall is thirty-four inches. The navigation of Lake Erie usually opens about the middle of April and closes early in December. Besides the Erie and the Welland canals, the lake has two other great canal systems on its south shore—the Ohio and Erie canal, from Cleveland to Portsmouth, and the Miami and Erie canal, from Toledo to Cincinnati.

Buffalo (population, 1890, 255,664) is situated at the northeast angle of Lake Erie, and is therefore much exposed to the violence of southwest winds, in which direction the lake has a "fetch" of 200 miles. Thus more than ordinary care has been taken to provide safe harbor accommodation for the large fleets of vessels constantly arriving at Buffalo from the upper lakes. The Buffalo river, which has been made navigable for more than a mile, is protected at its mouth by a breakwater, 4,000 feet long, built at about half a mile from the shore. The harbor thus formed allows of the entrance of vessels of seventeen feet draught as against thirteen in 1853. Not only is the port situated at the head of the Erie canal and within an hour's sail of the Welland canal, but it is the western terminus of the New York Central, Erie, and several other railways. The possession of these exceptional advantages has constituted Buffalo, next to Chicago, the great commercial center of the inland seas of North America.

Freight propellers are now rapidly doing away with sailing vessels, or causing them to be converted into barges or consorts. The rapid increase in their tonnage capacity has been remarkable. In 1841 there was only one freight propeller with a tonnage of 128 tons; in 1850 there were 50 with an average of 215 tons, in 1860 there were 197 with an average of 340 tons, and in 1880 there were 202 with an average of 689 tons.

The Erie canal connects Lake Erie with the Hudson river at Troy and Albany and with Lake Ontario at Oswego. This canal was constructed in 1825 by the State of New York, for the passage of vessels of sixty tons; but by the year 1862 it was sufficiently enlarged to allow of the passage of vessels of 240 tons.

The Welland canal flanks the Niagara river and is twenty-seven miles in length from Port Colborne on Lake Erie to Port Dalhousie on Lake Ontario. It was

opened in 1833 for the navigation of small vessels and was first enlarged in 1844. Its dimensions are now as follows: number of lift locks, 25; dimensions, 270 by 45 feet; total rise of lockage, 326 $\frac{3}{4}$  feet; depth of water on sills, 15 feet.

The Niagara river flows from Lake Erie to Lake Ontario in a northerly direction. Its width between Buffalo and Fort Erie (the site of the international iron-trussed railway bridge) is 1,900 feet and its greatest depth 48. At this point the normal current is five and a half miles an hour—the extreme variation in the level of the river when uninfluenced by the wind being only two feet. During southwest gales, however, the water occasionally rises as much as four feet in a few hours, and at such times the current attains a maximum velocity of twelve miles an hour. Two miles below the bridge the river is divided into two arms by Grand Island, at the foot of which they reunite and spread over a width of two or three miles. The river then becomes studded with islands, until about sixteen miles from Lake Erie, after a total fall of twenty feet, it narrows again and begins to descend with great velocity. This is the commencement of the rapids, which continue for about a mile with a total descent of fifty-two feet. The rapids terminate in the great cataract of Niagara, the fall of which on the American side is 164 feet and on the Canadian side 150 feet. The falls are divided by Goat Island, which rises forty feet above the water and extends to the very verge of the precipice, where the total width of the river, including the island, is 4,750 feet. The Horse-Shoe Fall on the Canadian shore is 2,000 feet long, and the depth of water on the crest of the fall is about twenty feet. The American fall is only one-half that length, and discharges less than one-fourth the volume of the Horse-Shoe Fall. United, they discharge nearly 400,000 cubic feet per second or 41,000,000 tons per hour. The upper layer of the escarpment down which this enormous mass of water leaps consists of hard limestone about ninety feet thick, beneath which lie soft shales of equal thickness, which are continually being undermined by the action of the spray, driven violently by gusts of wind against the base of the precipice. In consequence of this action and that of the frost, portions of the incumbent rock overhang forty feet, and often, when unsupported, tumble down, so that the falls do not remain absolutely stationary in the same spot. Sir C. Lyell in 1842 came to the conclusion that the cataract was receding at an average rate of one foot annually, "in which case it would have required 35,000 years for the retreat of the falls from the escarpment at Queenstown to their present site." From the foot of the falls to Queenstown, a distance of about seven miles, the river descends 104 feet through a gorge from 200 to 300 feet deep, and from 600 to 1,200 feet wide. Midway in this deep defile the turbulent waters strike against the cliff on the Canadian side with great violence, and being thus deflected from west to north, give rise to the dangerous eddy called the "Whirlpool." The escarpments end abruptly at Queenstown, where the waters suddenly expand to a great width, and finally, seven miles farther on, tranquilly flow into Lake Ontario.

About one-third of a mile below the cataract a carriage road suspension bridge (built in 1869 by Mr. Samuel Keefer) formerly spanned the river with a single opening of 1,190 feet, at a height of 190 feet above the water. This bridge was blown down in 1888. Two miles lower down Roebling's celebrated railway and road suspension bridge (completed in 1855) crosses the river at a height of 245 feet above the water with a single span of 800 feet. In November, 1883, a double-

track railway three-span iron and steel cantilever bridge, situated about 100 yards above Roebing's bridge, was completed for the New York Central and Michigan Central railways. The total length of the bridge is 910 feet and that of the center span 470 feet. The height from the water to the level of the rails is 239 feet.

Lake Ontario is the easternmost and smallest of the great lakes of the St. Lawrence system. Its basin drains 29,760 square miles, including the lake surface of 6,700 square miles. The length of the lake is 190 miles, its greatest width 52 miles, its mean depth 412 feet, and its elevation above the sea 234 feet. It never freezes except near the shore. Its chief tributaries are the Trent on the north shore and the Genesee and the Oswego on the south shore, and its chief ports, Toronto, the capital of Ontario, thirty-two miles north of Port Dalhousie, at the foot of the Welland Canal; Oswego, at the southeast angle of the lake; and Kingston, at its northeast extremity, fifty-two miles north of Oswego.

Kingston, being the port of transshipment for Montreal of three-fourths of the grain that arrives from the upper lakes, is a place of some commercial importance. Formerly lake vessels were sent from Chicago to Montreal through the St. Lawrence canals without breaking bulk. But it was afterward found cheaper to transfer grain at Kingston, and to send it down the St. Lawrence in barges, the cost of such transfer being only half a cent per bushel. Kingston is also at the south terminus of the Rideau canal, which connects it with the city of Ottawa.

Almost immediately after leaving Kingston that part of the St. Lawrence commences which is called the Lake of a Thousand Islands. In reality they number 1,692, and extend 40 miles below Lake Ontario. Near Prescott, a town on the Canadian side about 60 miles below Kingston, begins the chain of the St. Lawrence canals proper, which were constructed to overcome a total rise of 206½ feet—the number of locks being 27, and the total length of the six canals 43½ miles.

Near Cornwall, on the left bank, fifty miles below Prescott, the intersection of the parallel of 45° determines the point where the St. Lawrence and its lakes (Lake Michigan excepted), having been an international boundary from the head of Lake Superior, become exclusively Canadian. Immediately below Cornwall the river flows through Lake St. Francis, which has a length of about thirty miles and a width varying from two to five miles. In the long reach of the river below the lake it has been calculated by the Canadian canal commissioners that the mean volume of water discharged is 510,000 cubic feet per second. Ten miles below the foot of Lake St. Francis, near the head of the island of Montreal, the river flows into Lake St. Louis, which receives the main body of the Ottawa river, a small fraction of whose waters is delivered into the St. Lawrence at the foot of the island thirty-five miles lower down the stream.

After leaving Lake St. Louis the St. Lawrence dashes wildly down the Lachine rapids, a descent of forty-two feet in two miles, and eight miles farther on, after passing beneath the twenty-five spans of the Victoria Tubular Railway Bridge, which has a length of 9,144 feet, reaches the quays of Montreal, 198 miles below Kingston. In the beginning of the present century vessels of over 300 tons burden were unable to reach the city, but by deepening Lake St. Peter and the shoals in the St. Lawrence between Quebec and Montreal the latter has been made accessible to vessels of 4,000 tons burden and drawing twenty-five feet of water. Work is being steadily continued and will not cease until a depth of

twenty-seven and one-half feet is attained, so as to enable the largest vessels afloat to reach the long stretch of new deep-water quays. In 1883 the tonnage of the 660 sea-going vessels which visited the port was 664,263 tons, of which 605,805 belonged to 264 steamships, so that only 9 per cent. of the freight arriving from sea was carried in sailing vessels. The St. Lawrence has an average width of one and three-quarters miles for forty-six miles from Montreal down to Sorel on the right bank, at which point it is joined by the Richelieu river, a tributary that drains 9,000 square miles.

Immediately below Sorel the river flows into Lake St. Peter, twenty miles in length by nine in width, through which prior to 1851 no vessel drawing more than eleven feet could pass. Since then a cutting 300 feet wide has been dredged to a depth of 25 feet. At Three Rivers, eighty-six miles below Montreal, the St. Lawrence first meets the tide and receives from the north the waters from the St. Maurice, which drains about 16,000 square miles. Nearing Quebec the river, which maintains an average width of one and a half miles from Lake St. Peter, narrows into a width of three-quarters of a mile at Cape Diamond, on the left bank, 160 miles below Montreal. The depth here is 128 feet and the rise of spring tides eighteen feet.

The lower town of Quebec, which has extensive harbor accommodation, is built on reclaimed land around the base of the cape, one of its sides being washed by the river St. Charles which flows into the St. Lawrence. At the mouth of the St. Charles the Princess Louise embankment, 4,000 feet long by 300 wide, incloses a tidal area of twenty acres, having twenty-four feet of depth at low water. Connected with it is a wet dock, which is to have a permanent depth of twenty-seven feet with an area of forty acres. On the opposite side, at Pointe Levis, the Lorne graving-dock is nearly completed. Its dimensions are 500 feet in length, 100 in width, and 25½ feet depth of water on its sill. During the year ending June, 1884, the departures for sea of vessels from Quebec were 698, with an aggregate burden of 686,790 tons.

Seven miles below Quebec the St. Lawrence is four miles wide, and divides into two channels at the head of the Island of Orleans, nearly opposite which, on the north shore, are the celebrated falls of Montmorency, with a perpendicular descent of 240 feet and a width of 50 feet. At the foot of the island, which is twenty-two miles long, the river expands to a width of eleven miles. This width increases to sixteen miles ninety miles farther on, at the mouth of the river Saguenay, which drains an area of 23,716 square miles. About 260 miles below Quebec, between Pointe des Monts on the north and Cape Chat on the south, the St. Lawrence has a width of thirty miles, and, as this expanse is doubled thirty miles farther seaward, Cape Chat has been considered by many geographers as the southern extremity of an imaginary line of demarcation between the St. Lawrence river and the gulf of the same name. It may, however, be assumed, with more propriety perhaps, taking the configuration of the gulf into special account, that Cape Gaspé, about 400 miles below Quebec and 430 miles from the Atlantic at the east end of the Straits of Belle Isle, marks the true mouth of the St. Lawrence river.

ST. LEONARDS is the name given to the western and more modern part of HASTINGS (*q.v.*), a watering-place on the coast of Sussex, England. The population of St. Leonards in 1881 was 7,165.

ST. LEONARDS, EDWARD BURTENSHAW SUGDEN, LORD, lord chancellor of England, was the son of a hairdresser in Duke street, Westminster, and was born in February, 1781. In 1822 he was made king's

counsel and chosen a bencher of Lincoln's Inn. Under Lord Derby's first administration in 1852 he became lord chancellor and was raised to the peerage as Lord St. Leonards. He died at Boyle Farm, Thames Ditton, January 29, 1875.

ST. LÔ, a town of France, chef-lieu of the department of Manche, on the right bank of the Vire, 195 miles west by north of Paris. Horse-breeding, cloth and calico weaving, wool-spinning, currying and tanning, are the local industries. The population in 1889 was 9,889 (10,121 in the commune).

ST. LOUIS, a city of the United States, the chief city of the lower Mississippi Valley, the commercial metropolis of the State of Missouri, the fifth city in population in the United States, is situated on the west bank of the Mississippi, less than 20 miles from its confluence with the Missouri, and 185 miles north of the influx of the Ohio. It is distant by river about 1,200 miles from New Orleans, and 729 miles from St. Paul, the head of navigation upon the upper Mississippi. Situated in the center of the great valley, through which the waters of the Missouri, Mississippi, Ohio, Illinois and other smaller but navigable streams find their way to the Gulf of Mexico, St. Louis occupied an impregnable commercial position during the years when trade was carried on almost entirely by the river routes.

St. Louis is built upon a series of undulating hills or terraces that rise one above the other from the river for miles to the west. Unlike many other cities in the country there are no natural or physical obstructions to her unlimited growth. This is shown by the extensive system of suburbs to the west and south, which has created a demand for rapid transit met by capital with the result that the most perfect system of cable, electric and horse cars on the continent is now in operation on the streets of St. Louis, with an elevated railroad of three branches and fourteen miles in length under construction (1890).

St. Louis has a river front of 19.5 miles, of which about eleven are given up to commerce and manufacture. The remainder to the north is low land, that will come into use for railroad yard purposes within a few years, owing to the construction of a second bridge over the Mississippi at that point, opened to traffic May 1, 1890. The greatest width of the city is 6.6 miles, and the greatest length drawn in a straight line is 17 miles. The area of the city is 62½ square miles, of which 40 per centum is suburban in character. The elevation of the city directrix above the Gulf of Mexico is 428 feet; that of the highest point of ground within the limits 203 feet above the directrix. The extreme high water mark above the city directrix is 7 feet 7 inches (1844), and the extreme low water mark below the directrix 33 feet 9¾ inches (1863). High water, which generally follows the June rise of the Missouri, causes but little interruption and no disaster to the trade on the river front, the great bottom of Illinois taking off the surplus flood.

The plan of the city is rectilinear. In the old portion of the city, laid out by the early French inhabitants, the streets are narrow, and the blocks average 300 feet square. In the newer portion of the city the streets are wide and pleasantly lined with shade trees, and 400 feet is the average frontage of a block. The east and west streets run from the river at right angles. One of these, Market street, is the dividing center line. The system of numbering houses is that of allotting 100 house numbers to a block. On the north and south streets the houses are numbered each way from the Market street line.

Broadway, paved in granite and Telford pavement, traverses the city from the extreme northern limit of

building, known as Baden, to the southern limit of the ancient town of Carondelet, now one of the twenty-eight wards of the city. The streets in the central section of the city, and on the main avenues north, south, and west, are paved with granite blocks, quarried but ninety miles from the city. The streets running due west in the center of the city are paved with asphalt or wooden blocks. All other streets are constructed of macadam. The boulevard drives in the western limits are of Telford and gravel, on the same plan of construction usually followed in the making of park drives. Throughout the business section, and on certain specified east and west streets, the sidewalks are of granitoid or other composition in lieu of stone; brick sidewalks being prohibited by ordinance.

In 1890 there were in St. Louis 336.58 miles of improved streets; 76.44 miles of paved alleys; 311.09 miles of public and district sewers. The sewer system is most extensive, surface drainage being unknown in the city. The largest sewer, known as the Mill Creek, following the line of a natural drain, is twenty feet wide and fifteen feet high. The city of St. Louis is lighted every night of the year by electricity. The alleys are brightly illuminated with incandescent electric lights, and the streets proper with arc-lights swung over the streets at an elevation of forty-five feet. The municipal buildings and institutions are all lighted under the same contract, which is made for ten years. A short experience with this complete system of street and alley lighting has had a marked effect in diminishing night crimes and marauding.

Gas is supplied to the citizens at \$1.18½ per thousand cubic feet by the Laclede Gas Light Company, which, in 1890, absorbed three rival companies.

The water supply is derived from the Mississippi river, being pumped directly into settling basins at Bissel's Point by low-service engines, and thence by a high-service system into the mains, which are kept regulated by two water-towers and the Compton Hill reservoir. These works, which are owned by the city, represent an expenditure of \$8,000,000, but have proved inadequate, and the service is being extended at an estimated cost of \$7,000,000. A new low-service plant is being erected at the Chain of Rocks, seven miles above the city. An inlet tower in the river, reached by a tunnel bored through the rock of the river bed, 2,200 feet, six settling and filtering basins, and a conduit of brick construction, eight feet in diameter, to carry the water to Bissel's Point, are now under construction. The work will be completed within five years, and the present capacity of the water works (50,000,000 gallons) will be increased to 100,000,000 gallons daily. The total length of water mains in the city is 350 miles.

The public works of St. Louis are under the control of a board of public improvements, composed of commissioners of streets, sewers, water, parks, and harbor. The president is elected by the people; the commissioners are appointed by the mayor and approved by the council. All ordinances for the improvement of streets, sewers, parks, the harbor, or the water supply must originate with this board.

The public buildings of St. Louis are of fair quality. The court-house, the Four Courts, a building used as general police headquarters, and for the criminal and police courts, with the jail attached, is the most notable. The city hall now in use is a temporary structure ill adapted to its use. A new city hall is in course of construction on the site of Washington park at an estimated cost of \$3,000,000. The city hospital, insane asylum, female hospital, originally built as a social evil hospital, the poor house, work house for minor criminals, and house of refuge, a reformatory for boys, are up to



the average in architecture and equipment of institutions of this class.

The United States Government offices are located in the new custom house, completed in 1880 at a cost of \$7,000,000, and in the remodeled old custom house, a building fifty years old. The Merchants' Exchange is an imposing building, but not up to the modern style in architecture which prevails in St. Louis. Of late years there has been a large increase in the erection of tall fire-proof buildings. Since the burning of the Southern hotel in 1877, there have been no extensive buildings constructed that are not actually fire-proof. The Equitable, Rome, Laclede, Turner, Odd Fellows', Mercantile library, Gay, Houser, Bell Telephone, Crow Museum building, and others going up, are ornaments to the city. One of the most valuable of the new structures is the Public School library building, which contains 75,000 volumes. The Mercantile library contains 68,000. The Diocesan library, in connection with St. John's parish, inaugurated by the venerable Archbishop Kenrick, contains over 30,000 religious and historical works.

The public school system is an admirable one. It is under control of a president and board of directors, twenty-one in number, seven of whom are elected from the city at large and the others from districts consisting of two city wards each. The schools consist of one normal school for the education of teachers, a high school occupying three buildings, and seventy-six district or grammar schools, of which thirteen are devoted to colored children. The total number of schools is eighty, occupying one hundred and nine buildings, and this is exclusive of sixty-nine kindergarten structures. Foreign languages are no longer taught in the grammar schools. The grammar schools are divided into eight grades, the high-school course is two years, and the normal course one year. The value of school property is \$3,734,672. The enrollment of pupils for the current year (1890) is, normal pupils, 127; high schools, 1,332; night-schools, 2,186; grammar schools, 55,688.

The school receipts for the year 1889-90 were \$1,126,722; the expenditures \$1,079,285, of which there was paid out in teachers' salaries \$677,520. The scholastic year consists of forty weeks. There are, in addition to the public schools, ninety parochial schools, of which sixty-four are conducted by the Roman Catholics, twenty-three by the Lutherans and three by the Hebrews.

The St. Louis university, founded in 1823 by the Jesuits, now occupies one of the finest and largest school buildings; the Washington university, with its manual training school; the college of the Christian Brothers; Concordia seminary, a Lutheran institution, are the principal private educational institutions in a list of twenty-one academies and colleges, under which head are included two law schools and nine medical colleges of varied systems of practice; a training school for nurses, a college of pharmacy, and a school of midwifery.

There are published in St. Louis five daily papers in English, two morning and three afternoon, and five German dailies, of which three are issued in the morning. With one exception they all publish Sunday issues.

There are 230 church edifices in the city, as follows: Baptist, nine; Christian, five; Congregational, fourteen; Episcopalian, fifteen; German Evangelical, fourteen; English Evangelical Lutheran, one; German Evangelical Lutheran, twelve; Hebrew, nine; Methodist Episcopal, sixteen; Methodist Episcopal Church South, ten; New Jerusalem, three; Presbyterian, twenty-seven; Presbyterian (Cumberland), two; Reformed, one; United, two; Roman Catholic, forty-eight; Unitarian, three; miscellaneous, thirty-nine, of which twelve are colored.

The value of the church property of St. Louis was at the last appraisement \$6,210,000, this inclusive of

parochial schools, convents, hospitals and cemeteries. The city of St. Louis maintains for the public recreation 2,100 acres divided into nineteen parks. The largest of these, Forest Park, is 1,372 acres in extent. There is but one larger public park in the country, Fairmount at Philadelphia. It is reached by three lines of electric cars and one cable line. There are many miles of roadway in the park. It is graced with large statues of Edward Bates, attorney-general under Lincoln, and of Gen. Frank P. Blair. Tower Grove Park, 277 acres in extent, was the gift of Henry Shaw, the philanthropist, who gave with it at different times bronze statues of Columbus, Von Humboldt and Shakespeare, equal to any public works of art. The Missouri Botanical Garden, unequalled in this country, which adjoins Tower Grove Park, is also the gift by will of Mr. Shaw to the people. O'Fallon Park on the north (158 acres) and Carondelet Park (180 acres) in the extreme south end, are the remaining suburban parks. The others are breathing spots of great beauty located in the thickly populated section of the city. Of the central parks Lafayette is the principal. Lafayette Park, located in the southern portion of the city in the midst of one of the finest residence sections of the city, covers an area of but three acres. It was pronounced by the French commissioner who made a tour of the United States at the conclusion of the Centennial Exposition of 1876, the most perfect piece of landscape gardening in the country. It is so laid out that the visitor can form no adequate idea of its extent. Statues of Washington, Lafayette, and Thomas H. Benton ornament the park. An orchestral concert is given at the park every Thursday afternoon. There is music at Tower Grove Park on Sunday afternoon. Benton Park in extreme south St. Louis and Hyde Park in north St. Louis are points of attraction. The Mill creek valley which divides the city practically into north and south St. Louis is wholly given over to railroad tracks, and as a matter of public safety and convenience the valley is spanned at intervals with bridges. Those at Taylor, Jefferson, and Grand avenues are massive and expensive structures, the last named being one of the objects of interest in the city. It is part of the boulevard system and is crossed by most visitors to Tower Grove park. The cost of the structure was \$440,000.

Eight miles below the city on the line of the Iron Mountain railroad and overlooking the river, is the famous and historical Jefferson Barracks, now a recruiting depot for United States cavalry. This post was established by the government in 1826-27, and memories of nearly every prominent soldier on either side of the civil war cluster about the old fortress. The government in 1870 began extensive improvements at the barracks. Adjoining the military reservation, a portion of which is used by the ordnance department for the storage of powder in a chain of six magazines, is the National cemetery, in which are buried 11,508 soldiers, of whom 1,106 are Confederates. The two principal cemeteries of St. Louis are located in the northern part of the city, Bellefontaine with 350 acres, and Calvary, the Roman Catholic burial ground, 280 acres. Both are noted for their many fine monuments and memorial tombs. At Florissant, a suburb, is located the burial ground of the Jesuits, and in it are buried many of the pioneer missionaries of the last century. There are eighteen other cemeteries belonging to various churches and orders. The total estimated value of the parks and improvements exclusive of the Botanical Garden is \$5,370,000.

Although not a public park, the fair grounds, zoölogical garden, and jockey club track, all in one inclos-

ure, 350 acres in extent, in the northwestern portion of the city, thirty minutes' ride by street-cars from the center of the city, should be properly included as one of the park attractions. There are a number of large beer gardens and picnic grounds within the city, which are heavily patronized by the German population on Sundays. The various points of interest in the city are reached by seventeen lines of street cars, of which four are operated by cable, ten by electricity applied by the overhead system, with a total mileage of 215 miles. There are six regular theaters, and many entertainment halls, the largest of which is the Grand Music hall in the Exposition building. An annual exposition of arts and sciences is given for forty days every autumn, contemporaneously with the St. Louis Fair, illumination of the streets and annual pageant of the Veiled Prophet.

Property in St. Louis is guarded by 700 policemen, and protected from fire by twenty-nine fire companies, three chemical engines, and seven hook and ladder companies.

*Charities, Societies, etc.*—The public charities of St. Louis are numerous and extensive, especially those fostered by the Roman Catholic church. A unique charity is the "Mullanphy Emigrant Relief Fund." In 1851 Bryan Mullanphy, a very wealthy but eccentric man, although an eminent lawyer, died. By his will he left an undivided third of all his vast estate to be held in trust and to be and constitute a fund to furnish relief to all poor emigrants and travelers coming to St. Louis on their way, bona fide, to settle in the West. The estate, which is improved property, is governed by a board of commissioners elected by the city council. It yields an annual revenue of \$75,000. Agents of the trust meet all trains and boats, on the lookout for emigrants in need. They are supplied with food and lodging and then sent to their destination. The only condition is that the emigrant must come from east of the Mississippi river. If the emigrant desires to settle in St. Louis, he is given a sum of money according to the size of his family, and allowed henceforth to shift for himself. The fund is estimated at \$700,000.

Local charity is disbursed through the Provident Association, maintained by private subscription, and the St. Vincent de Paul society, a charitable adjunct of the Catholic church.

There are in St. Louis (1890) twenty-three subordinate lodges A. F. and A. M., seven chapters Royal Arch Masons, six commanderies Knights Templar, six organizations of Scottish Rite Masons, and five chapters of the Order of the Eastern Star; thirty subordinate lodges I. O. O. F.; nineteen lodges Knights of Pythias; thirty subordinate lodges Knights of Honor; fifty-one lodges Knights and Ladies of Honor; forty-five lodges Order of Chosen Friends; ten posts of the Grand Army of the Republic, with nine camps Sons of Veterans; seventy-two lodges A. O. U. W.; twenty-two groves Druids; thirty-two lodges Horugori; twenty-seven lodges Sons of Hermann; twenty-six lodges I. O. Y. B. (True League); thirteen tribes Red Men; sixteen branches of the Order of the Iron Hall; twenty-eight councils of the American Legion of Honor; nineteen councils Royal Arcanum; thirty-two branches Catholic Knights of America; seventeen councils Knights of Father Matthew; and a number of other orders in less numbers. There are six prosperous Turnverein in the city, with an aggregate membership of 15,000.

Labor is much given to organization, forty-two subordinate assemblies of Knights of Labor, eighteen trades unions, and ten councils of the United Brotherhood of Carpenters and Joiners, being the principal bodies. The great railroad strike of 1879, the strike on the

Southwestern railroads in 1885, and two desperate strikes of street railroad employes, within six years, are part of the history of St. Louis.

In a population so largely German, singing societies are numerous, thirty-one Saengerbunds being duly incorporated, representing an aggregate of 8,000 voices.

The following table shows the population of St. Louis at different periods:

1799.....	925	1856.....	125,200
1810.....	1,400	1866.....	204,327
1820.....	4,928	1870.....	310,864
1830.....	5,862	1880.....	350,518
1840.....	16,469	1890.....	451,770
1850.....	74,439		

*Government of St. Louis.*—St. Louis is independent of any county alliance. The constitution of 1875 gave to the city the right to renounce allegiance to the county of St. Louis upon the adoption of a new charter. The city extended its limits so as to take in the county eleemosynary institutions, and in return assumed the debt of the county. The governing power is in the mayor and municipal assembly, the latter, composed of thirteen councilmen, elected from the city at large to hold office four years, and twenty-eight members of the House of Delegates to serve two years, each representing a ward. The mayor has an immense patronage at his disposal which he can only exercise at the middle of his term of four years. The scheme of separation and new city charter were not drawn carefully enough to avoid much vexatious legislation since the inauguration of the new order of things in April, 1877. The charter can only be amended by a three-fifths vote of the voters registered. Elections are now held in St. Louis under what is called the Australian system. The bonded debt of St. Louis at the close of the fiscal year, April 7, 1890, was \$21,873,100. This debt is reduced each year by a sinking fund. The receipts for the fiscal year ending April 7, 1890, were from all sources \$9,949,900. The total disbursements were \$6,874,039.

All appropriations are by the State constitution rigidly limited to available means. The city is not permitted to borrow, or to in any manner increase its bonded debt.

In 1860 the taxable wealth of St. Louis was returned at \$69,846,845; in 1870 it was \$147,969,660; in 1880 it was \$160,493,000; and in 1890 the realty is valued at \$196,041,780, the personalty at \$27,979,220; total, \$223,021,000.

The present rate of taxation in the old city limits is: city tax, \$1.50; state, 30 cents; school, 40 cents; total, \$2.20. In the new limits the total is \$1.60 on the \$100.

There were issued during the year 1889 3,544 building permits, for structures which cost, according to first estimates of contractors, \$9,765,000.

*Commerce.*—A few figures taken from the official records of the Merchants' Exchange for 1889, illustrate the commercial and material wealth of the city: Bank clearings for 1889, \$987,522,629; balances, \$163,461,257. Total foreign value of imports, \$3,249,190. Duties paid, \$1,212,702; United States Internal Revenue collections, \$6,767,225, of which tobacco paid \$3,957,173, and beer \$1,487,604. There were manufactured during the year 1889 in the St. Louis district 42,019,474 pounds of tobacco, and 1,487,604 barrels of beer of thirty-two gallons each.

The total tonnage by steamboats and barges was 1,384,335. Tonnage by railroads, received 9,702,297, shipped 5,207,146. The amount of grain received, including flour reduced to wheat, was 68,466,596 bushels. Shipments of grain to Europe, 1,672,361 bushels of wheat and 13,315,982 bushels of corn. Barrels of flour manufactured in city mills and country mills owned by

St. Louis parties, 3,181,591. Cotton received, 544,189 bales. Receipts of wool, 21,019,920 pounds. Twenty-two boot and shoe factories combined an output of \$7,000,000. In drugs St. Louis holds the position of the leading market of the country, sharing in that line its commercial supremacy in the matter of beer, tobacco, hardware, woodenware, saddlery, while as a wool, hide, and shoe market St. Louis has but one superior.

*Manufactures.*—St. Louis is located so closely to the coal fields of Illinois that cheap fuel has naturally attracted manufacturers to her doors. Among the most important industries may be mentioned iron, steel, cars, glass, flour, shoes, bagging, sugar, beer, tobacco, furniture, agricultural implements, carriages and wagons, stoves and ranges, gas and water pipe, white lead, oils and paints, saddlery, clothing, fire brick, gas retorts. In many of these lines of manufacture St. Louis controls, by reason of the size of her output, the markets of the country. The wholesale grocery, boot and shoe, hat and cap and clothing business has grown to enormous proportions within the past ten years.

*Railroads.*—There is a tendency on the part of business of all kinds to locate on the railway tracks. The river front of St. Louis has been given up to railroad tracks, surface and elevated, connecting the two systems of roads that cross the Illinois and St. Louis (or Eads) Bridge, and the Merchants' Bridge, opened to traffic May 1, 1890. Eighteen railroads, with a total mileage of 27,400, enter the union depot. A new union depot is under construction, and another depot is projected in the north end of the city.

*Bridges.*—The Mississippi is spanned by two bridges, one, the last built, being exclusively a railroad bridge. The greater and the older of the two bridges, the Illinois and St. Louis, is one of the most remarkable structures in the world in character and magnitude. It consists of three arches, the two side spans being 502 feet in the clear, and the center span 520 feet, and carries a roadway for ordinary traffic 54 feet wide, and below this two lines of rail. The dimensions of the abutments and piers are as follows:

	Dimensions at foundations.		Dimensions at top.		Height from foundation to top of M.	Foundation below extreme low water.
	L'n'th	Th'kns	L'n'th	Th'kn's		
	ft.	ft. in.	ft. in.	ft. in.	ft. in.	ft. in.
East abutment	83	70 6	64 3½	47 6	192 9	93 3¼
East pier . . . .	82	60 0	63 0	24 0	197 1¼	86 2¼
West pier . . . .	82	48 0	63 0	24 0	172 1¼	61 2¼
West abutm't	94	62 8½	64 3½	47 6	112 8½	13 3¼

The foundations of abutments and piers rest on solid rock. The two piers and the east abutment were sunk by means of pneumatic caissons. The greatest depth below the surface at which work was done was 110 feet, the air-pressure in the caisson being forty-nine pounds. Each arch consists of four equal ribs; each rib is composed of two circular members, twelve feet apart, which are connected by a single system of diagonal braces. The circular members consist of steel tubes, which are twelve feet long and eighteen inches in diameter; each tube is composed of six steel staves, varying in thickness between one and three-sixteenths and two and one-eighth inches. These staves are held together by a steel envelope, a quarter of an inch thick. The tubes are joined together by couplings, and the end tubes are rigidly connected with wrought-iron skew-

backs, which are fixed to the masonry by long bolts. The arches were erected without using any false work. Work on the bridge was commenced March, 1868, and it was opened for traffic on July 4, 1874. The total cost of bridge and approaches was \$6,536,730. It is connected with the union depot by a tunnel running under some of the principal streets, a distance of a mile.

The capacity of this bridge to handle its freight has been inadequate, and the new bridge came as a welcome relief to the often discommoded business community. There crossed the bridge in 1889, both ways, 224,262 cars, carrying 3,286,867 tons of freight. In addition to this there were hauled between railroad yards on either side by teams over the bridge 621,739 tons of freight. The Merchants' Bridge is located at the northern portion of the city, two and a half miles north of the Eads Bridge. It consists of three spans of about 520 feet each, planned to give openings of 500 feet each in the clear and 52 feet above highwater mark. With the approach spans on either side the length of the bridge structure is 2,420 feet. Work was commenced on January 24, 1889, and the bridge proper was completed December 31, 1889. The connections were then completed, and on May 3, 1890, in the presence of 10,000 people the governors of Missouri and Illinois met on the center span with their trains and saluted each other. But fifteen months elapsed from the date of the driving of the first pile until trains were passing. By means of terminal railway facilities the Merchants' Bridge is connected with every road on either side of the river.

*History.*—Pierre Laclède Liguist, established the first permanent settlement on the site of St. Louis in February, 1764. The treaty of Paris was negotiated in 1763, and it was only after Laclède had founded the "future great city" that he learned that the French title was extinguished and Spain was the possessor of the broad region west of the Mississippi river. In 1771 St. Louis was formally occupied by a small body of Spanish troops, and for thirty years the Spanish governor made his residence here. In May, 1780, on the festival of Corpus Christi, the inhabitants were all without the block house fortresses which guarded the settlement when a sudden attack was made upon them by Indians. Thirty were killed, but the Indians were beaten back. In 1800, Spain ceded her right to the territory of Louisiana back to France, and three years later (1803), the country became the property of the United States by purchase.

In 1810, as appears in the table above, the population of St. Louis was less than 1,500, and twenty years later it had not reached 6,000. It was in this year that the steady growth of the city began. A disastrous fire destroyed the business section in 1849. During the Civil War St. Louis was in possession of the Union troops, but as its business was with the South its prosperity was much retarded. The cholera of 1865 swept off many citizens.

German immigration set in to St. Louis in large numbers after the revolution of 1848. St. Louis was at the time the great outfitting point for Western settlers, and the Irish born additions to the population were numbered by the thousands each year. Feeling ran high against the foreigners, and the Native American spirit was rampant, culminating in 1854 in a series of bloody riots; Know Nothing riots they are called in history.

When the war broke out in 1861, the Germans almost to a man were loyal, and on May 10, 1861, under command of General Lyon they marched upon and captured Camp Jackson, where under the guise of a militia instruction camp, the disloyal element were under arms. This *coup d'état* saved St. Louis

the steady growth of the city set in and continued. A disastrous fire destroyed the business section in 1849. During the Civil War St. Louis was in possession of the Union troops, but as its business was with the South its prosperity was much retarded. The cholera of 1865 swept off many hundred old citizens. The future of St. Louis must continue to grow brighter. She has a steady, conservative population, with the confidence in the city to put their money in it, and not trust entirely to natural advantages to divulge the possibilities of the future.

ST. LOUIS, the capital of Senegambia or Senegal, West Africa, and known to the natives as far as Timbuktu as N'dar, is built on an island ten sea-miles above the mouth of the Senegal river, near the right bank.

ST. LUCIA, a West India island, discovered by Columbus in 1502, is situated in  $13^{\circ} 50'$  N. latitude and  $60^{\circ} 58'$  W. longitude, and has a length of forty-two miles and a maximum breadth of twenty-one. The total population was 40,532 in 1883, of whom 1,000 were white, mostly French.

ST. MALO, a seaport town of France, on the English Channel, on the right bank of the estuary of the Rance, is situated in  $48^{\circ} 39'$  N. latitude, fifty-one miles by rail north-northwest of Rennes. Among French seaports St. Malo stands twelfth in commercial importance, but first in the number of seamen on its register. The annual imports and exports together amount to 184,000 tons, and 3,000 tons of shipping are built yearly. St. Malo has statues to Chateaubriand and Duguay-Trouin. The museum contains remains of the ship *La Petite Hermine*, in which Jacques Cartier sailed for the discovery of Canada; and the natural history museum possesses a remarkable collection of from 6,000 to 7,000 European birds. The population of St. Malo in 1881 was 10,891 (commune, 11,212).

STE. MARIE-AUX-MINES. See MARKIRCH.

ST. MARTIN, one of the Lesser Antilles (West Indies), part of which (twenty square miles) belongs to France and forms a dependency of Guadeloupe, while the remainder (eighteen square miles) belongs to Holland and along with Saba, etc., is a dependency of Curaçoa. The population in 1882 was 7,083 (French portion 3,724, Dutch 3,359). Occupied by French freebooters in 1638 and by the Spaniards between 1640 and 1648, St. Martin was divided between the French and Dutch in the latter year.

SAINT-MARTIN, LOUIS CLAUDE DE, French author, known as "le philosophe inconnu" from the fact that all his works were published under that name, was born at Amboise of a poor but noble family, on January 18, 1743. He died at Aunay, near Paris, on October 23, 1803.

ST. MAUR-SUR-LOIRE, founded by St. Maurus (see MAURUS), was the first Benedictine monastery in Gaul. It was situated on the left bank of the Loire about fifteen miles below Saumur. About the middle of the ninth century it was reduced to ruins by the Normans; shortly before the event and in anticipation of it the relics of the saint were transferred to St. Maur-les-Fossés near Paris. St. Maur-sur-Loire was afterward restored and fortified, but the only extant remains consist of a part of the church and a few shattered columns.

ST. MICHAEL'S. See AZORES.

ST. NAZAIRE, a town of France, in the department of Loire Inférieure, and a port on the right bank of the Loire near its mouth. It has rapidly grown since the new docks rendered it the outport or detached harbor of NANTES (*q.v.*), from which it is distant twenty-nine miles west-northwest by water and forty by

rail. The population was 16,314 in 1881 (19,626 in the commune)

ST NICOLAS, a town of Belgium, in the district of Dendermonde, in the province of East Flanders, nineteen and a half miles from Ghent by the railway to Antwerp. It is a well-built, modern-looking place, with a population of 24,729.

ST. OMER, a town and fortress of France, chef-lieu of the department of Pas-de-Calais, situated on the Aa (which flows into the North Sea), 177 miles north of Paris by the railway to Arras, Hazebrouck, and Calais, at the junction of a line to Boulogne. The arsenal is an extensive series of buildings. Besides 30,000,000 to 40,000,000 tobacco pipes exported to America and the colonies, St. Omer manufactures cloth, hosiery, and tulle, cambric, and muslin embroideries. Its trade (and it is the seat not only of a tribunal but also of a chamber of commerce) is mainly in provisions for England, the products of the local industry, and those of the paper-mills, flour-mills, distilleries, and sugar-factories in the vicinity, especially along the banks of the Aa. The population of the town was 20,479 in 1881 (21,556 in the commune).

SAINTONGE (*Santonnia Santonensis tractus*), an old province of France, of which SAINTES (*q.v.*) was the capital, was bounded on the northwest by Aunis, on the northeast by Poitou, on the east by Angoumois, on the south by the Guienne, and on the west by Guienne and the Atlantic. It now forms a small portion of the department of Charente and the greater part of that of Charente Inférieure.

ST. OUEN, an industrial district in the outskirts of Paris, on the right bank of the Seine, one mile above St. Denis. It had 17,718 inhabitants in 1881.

ST PAUL, a city of the United States, capital of the State of Minnesota and of the county of Ramsey, situated in  $44^{\circ} 52' 46''$  N. latitude, and  $93^{\circ} 5'$  W. longitude; on both banks of the Mississippi river, the larger part of the city being on the eastern side; the practical head of navigation from tide-water, 2,150 miles from the mouth of the river, 2,082 miles from New Orleans and 580 from St. Louis. The city is 360 miles northwest from Chicago, as the crow flies, and 409 miles by the shortest rail route. It is distant from Lake Superior 158 miles by rail, and from the head of navigation of the Red River of the North 250 miles. Built originally upon a series of steep terraces, St. Paul was in earlier years confined by its topography almost entirely to the first and second benches, or terraces, ascending from the river. By 1888, however, the city had spread over the wide and commodious plateaus lying east, west, and north of the surrounding bluffs, and now embraces 35,482 acres. Its business center is still confined chiefly to the lower terraces, while the high plateaus that rise above them on every side are the favorite residence districts of the city.

Underneath the most extensive of the benches, occupied mainly by business structures, is a thick stratum of blue limestone which is excavated at slight cost and furnishes an unlimited supply of foundation and structural material. In the older portions of the city the streets are too narrow for comfort or beauty, but in the newer the thoroughfares are ample in width and laid out according to modern ideas of usefulness and sightliness. On the western bluff, known as St. Anthony's Hill, are many streets paved with asphaltum and boulevarded, which are singularly handsome and attractive, and chief of these is Summit avenue, which for a mile or more skirts the brow of the hill overlooking the picturesque Mississippi and is lined on both sides with residences, many of which would attract the eye of the most experienced observer.

The principal public buildings are the State capitol, built in 1882 at a cost of about \$450,000 and to be replaced by a more imposing and costly structure, the court house and city hall, completed in 1890 at a cost of a little more than \$1,000,000, the market house, the chamber of commerce building, the United States custom house (soon to be superseded by one far larger), and a union depot, which ranks second in the United States in the number of trains arriving and departing daily.

The city government is vested in a mayor and common council of seventeen aldermen—six at large and one from each of the eleven wards—and the powers accorded the mayor, under the revised charter, are larger than those ordinarily conferred. Coördinate branches are the board of education, the board of water commissioners, and the park commission. Members of each of these bodies are appointed by the mayor for a term of two years, and the aim has been to have both of the great political parties fairly represented. The board of education has control of all matters pertaining to the public schools. The water commissioners supervise the water supply, all the paraphernalia, including conduits, mains, laterals, reservoirs, and pumping stations being the property of the city and a source of ultimate revenue. To the park commission is intrusted the purchase, laying out, improvement, and maintenance of public parks, and a fund for such purposes is provided by the sale of bonds. Property holders, as in the case of sidewalks, paved streets, and sewers, must pay assessments for public parks, when located by the authorities, proportionate to their nearness to the place and the size and value of their holdings. The improvements of the streets, enlargement and extension of sewers, etc., are under the immediate control of the board of public works (the members of which are also the mayor's appointees) with the advice and assistance of the city engineer. The fire department has its usual board of commissioners, and in St. Paul the service is very effective, especially in recent years, the water supply having been augmented greatly and the applying machinery increased to keep pace with the city's growth. The police department is without commissioners, being under the direct supervision of the mayor, a chief of police, and a number of captains and lieutenants assigned to the central and outlying stations. The force is one of the smallest in the United States, the size of the city and its population being considered; but the average of crime is notably low, and persons and property are acknowledgedly well protected. This is partly due to the excellent system of police telegraph and telephone lines in service.

Headquarters of the Department of Dakota, a military subdivision of the Division of the Missouri, with headquarters in Chicago, is located in St. Paul, and this city has for years been a highly important point in connection with army detail, distribution, operation, and maintenance. The department is the largest in the United States, and the brigadier-general commanding has under his immediate supervision nearly all the Sioux Indians, all the Crows, and many others which, until within a very few years, have been hostile to the government. Large quantities of supplies for the thousands of officers and soldiers located in the department are purchased from the wholesale merchants of the city, the railroad lines diverging offering special facilities for speedy transportation.

In 1890 there were 137 church organizations, the Roman Catholic slightly in excess of any of the other denominations, St. Paul being the seat of an archbishop of that faith. Of roomy and comfortable church build-

ings there is no lack, but of handsome structures devoted to religious observance there are very few. There are forty-one public school buildings (including a large central high-school, and a manual training school), with 17,500 pupils, and 470 teachers. The comparatively small enrollment is explained by the existence, in a more or less flourishing condition, of forty-four private or parochial schools and seminaries. Of the forty-four mentioned twenty-three are under the control of the Roman Catholic church; and eleven of the twenty-three are very largely attended.

In addition to the charitable organizations connected with the churches, of which there are thirty-one, there are three public hospitals, an orphan asylum, a home for the friendless, babies' home, women's Christian home, and a Magdalen hospital. There are two colleges within the city limits—Hamline, under control of the Methodists, and Macalester, a Presbyterian institution.

St. Paul is the official location of a United States collector of customs, and, in 1889, 103 firms imported goods. The volume and increase of the business is shown in the following table:

	1881.	1885.	1888.	1889.
Value of dutiable goods	\$62,783.00	\$186,574.00	\$538,754.00	\$726,477.00
Total duties collected...	26,983.56	78,368.42	177,686.89	229,386.12
Value of free goods.....	.....	.....	175,658.00	372,372.00

The collections of internal revenue for the years 1888 and 1889, were as follows:

	1888.	1889.
Spirits.....	\$ 77,970.92	\$2,267,455.40
Tobacco, snuff and cigars.....	137,527.24	120,867.07
Fermented liquors.....	302,207.71	293,798.68
Penalties.....	1,314.42	2,153.11
Special taxes.....	.....	120,064.36
Totals.....	\$518,920.18	\$2,804,338.62

The large increase in taxes from spirits in 1889 over 1888, was due to the establishment and operation in South St. Paul of one of the largest distilleries in the United States.

Of newspapers and periodicals there are forty-eight, of which eight are issued daily. The State Capitol contains the public law library, with 16,000 volumes; and in the city's public library, which has quarters in the city hall, there are between 20,000 and 21,000 volumes.

St. Paul has a well founded claim to be regarded as an especially healthy city, the death rate in 1888 being officially reported at 10.48 per thousand. This exceptionally low percentage of mortality is due largely to the climate of Minnesota, which is bracing and invigorating, and in no small measure to the facilities offered for drainage. These natural facilities have been supplemented by a system of main and lateral sewers, cut through solid rock in many instances, and aggregating 103 miles in length. There are 169 miles of water mains, the supply coming from two spring-fed lakes, Vadnais and Phaleñ. In 1883 there were less than two miles of paved streets. In May, 1890, there were 40.4 miles with 536 miles of sidewalks. There are 439 miles of graded streets. The material used for paving is granite, cedar blocks, and asphaltum, the latter confined to the residence portions. The city has thirty-eight public parks, or squares, ranging in size from Como Park with 256 acres of lawn and lake, to small breathing places occupying less than one acre.

The park system is yet in its infancy and is susceptible of marked improvement.

In a city of such rapid growth as St. Paul, real estate values naturally prove an important factor. The years 1886 and 1887 showed the greatest activity in transactions involving real property, and the valuations gave a complete rebound from the depressing conditions consequent upon the failure of Jay Cooke in 1873, and its resultant stringency and stagnation. By 1880, however, signs of the coming revival were manifest, the flood being reached in 1887 as stated. Following is a statement of the recorded realty transactions during eight years:

YEARS.	No. of Transfers.	Consideration.
1882 .....	4,447	\$9,354,841
1883 .....	4,847	12,981,331
1884 .....	5,128	8,359,521
1885 .....	6,928	14,318,867
1886 .....	11,443	27,826,633
1887 .....	16,070	58,174,768
1888 .....	7,501	22,520,184
1889 .....	7,104	22,755,608

It is generally conceded that real estate values in St. Paul have been kept at a conservative basis, but naturally the increment has been very great. Many of the older residents, and not a few who came into the city before 1885, have become very wealthy through this natural ratio of increase and the improved business of which it is a concomitant, and, as a consequence, there are at least fifteen residents each of whose holdings amount to more than a million of dollars, and of these two or three would be included in the multi-millionaires of America. It is to this class or descendants therefrom St. Paul must look for what it now sorely needs—a public library building, an art gallery, and an auditorium.

One company controls all the street railways and by the close of 1890, under the requirements of city ordinances, transit facilities will have been much enlarged and improved, and electricity will supplant horse power on all lines where the latter is in use. There are now ten miles of cable line, and five miles in course of construction, forty-one miles of horse-car track, fourteen and one-half miles of electric car track and the latter will be increased by twenty-two miles of track by November 1, 1890.

Seven large bridges cross the Mississippi river at St. Paul, one is under course of construction, and one, to accommodate a belt line of railroad around the city, will be built within a short time. Of the seven now in use five are for foot passengers, teams, and street cars, and two for railways. One bridge is a peculiarity in architecture of this kind, in that in a length of a little more than half a mile, it has a grade of 100 feet, the southern end being by so much higher than the northern. The Mississippi has been partially diked on the western bank, and government appropriations are available for a system of levees which will reclaim many acres of ground suitable for manufactories, railway shops and yards, from any danger of overflow.

St. Paul is the center of a large railway system, twenty-eight lines radiating therefrom in all directions. There are fourteen lines eastward and four to the Pacific coast with terminals at San Francisco, Portland, Tacoma, Seattle, and Vancouver. During the summer months, the season of greatest travel, about 300 passenger trains arrive and depart daily from the Union Depot. Difficulties of entrance and exit presented by the topography of the city have been overcome by tunnels, embankments, cuts, bridges, and gradients following the course of streams penetrating

the city and emptying into the Mississippi. Yard room has been increased by the diking and filling in of low areas near the river.

St. Paul is essentially a commercial city and, as yet, manufactories on any large scale have not been a conspicuous feature of its growth. But it is the seat of a great many flourishing industrial enterprises, and an organized effort is being made to promote the manufacturing interests of the city on a scale commensurate with its commercial importance.

For years the lack of water power and the high cost of fuel militated against extensive manufacturing. The improved facilities for obtaining coal via Lake Superior have to a great extent eliminated the latter difficulty, and the enlargement of the city's limits so that a considerable fall in the Mississippi is now included seems likely to obviate the former.

The two lines of steamers regularly plying between St. Paul and St. Louis during seven months of the year long acted as a check on transportation rates, but the river is now a minor factor in the regulation of freight tariffs. St. Paul is distant but a few hours by rail from the head of Lake Superior, where the constantly increasing tonnage and consequent reduction in transportation rates make it possible for the city to compete with older and more eastern centers for the trade of the great Northwest. That this competition is not only possible but profitable is shown by the increase in St. Paul's jobbing and wholesale trade within the last few years. The following table shows such increase, and coupled therewith are the yearly aggregates of manufactured products:

YEAR.	Jobbing.	Manufacturing.
1881 .....	\$46,555,999	\$15,466,201
1883 .....	72,048,771	25,855,471
1885 .....	81,596,000	29,437,000
1887 .....	101,025,600	37,231,600
1889 .....	109,126,829	48,598,894

St. Paul is growing rapidly into prominence as a live-stock market. Its nearness to the ranges of Dakota and Montana, the increase of stock in Minnesota itself, and the improved facilities for handling cattle, sheep, hogs, and horses account for this. The Union Stock Yards, located in a southern suburb, were first put into general operation in 1888. The increase in 1889 over 1888 is shown in the following table:

Cattle.....	104 per cent.	Sheep.....	98 per cent.
Calves....	85 per cent.	Horses.....	251 per cent.

The total receipts for 1889 at the Union Stock Yards and at the Minnesota Transfer Yards, located near the western boundary of the city, were as follows:

Cattle.....	142,870
Hogs .....	283,064
Sheep .....	234,538
Horses.....	15,301

The Twin City Stock Yards were opened in 1890 in the northwestern part of the city, and others will follow as cattle raising becomes more general and extensive throughout the Northwest.

The growth of population has been most marked within the last decade. The figures appended were obtained in national, State or municipal enumerations:

Year.	Population.	Year.	Population.
1838 .....	3	1875 .....	33,178
1850 .....	850	1880 .....	41,498
1855 .....	4,400	1882 .....	75,835
1860 .....	10,600	1884 .....	99,322
1865 .....	13,100	1885 .....	111,397
1870 .....	20,300		

The United States census of 1890 gave St. Paul a population of 133,156.

The assessed value of real and personal property subject to taxation increased from \$28,957,831 in 1881 to \$127,669,159 in 1889. The rate of taxation decreased from 20 mills in 1887 to 17.10 in 1889. Since 1884 activity in building has been one of the most noteworthy features of the city.

Building associations thrive in St. Paul, as in all of the younger, well-to-do cities, and the city has one marked feature—more workingmen own their own homes than in any other place of equal population in America.

St. Paul is favored in its suburban surroundings, and the high bluffs of the river and the savanna-like territory in its western wards afford desirable building sites, which have been growing into favor within the past few years.

The city has twenty banks and financial institutions, with an aggregate capital of \$7,750,000.

The first white settler came to the present site of the city of St. Paul in 1832; the first log cabin was built in 1838; the first white child was born in 1839; and the town site was located in 1847. The territorial capital was located in 1851, and the first State election was held in 1857. The first railroad was built in 1862, and extended from St. Paul to St. Anthony (now Minneapolis), a distance of ten miles. In 1874 by a popular vote, a portion of Dakota county was transferred to Ramsey county, and the settlement, which has since grown into the municipal division known as West St. Paul, was absorbed. In 1884 an act of the State legislature extended the city's boundaries, westward, northward, and eastward, so that its area is now rectangular in shape, having a length of ten and a width of four miles.

ST. PAUL, a remarkable volcanic island which, along with the island of New Amsterdam, is situated in the Indian Ocean about midway between Africa and Australia, a little to the north of the ordinary route of the steamers from Plymouth (*via* Cape Town) to Adelaide. Its exact position as determined by the Transit of Venus Expedition in 1874 is 38° 42' 50" S. latitude and 77° 32' 29" E. longitude.

The island now known as New Amsterdam was probably that sighted on March 18, 1522, by the companions of Magellan as they sailed back to Europe under the command of Sabastian del Cano; and in 1617 the Dutch ship *Zeewolf* from Texel to Bantam discovered the island which, instead of the name "Zee-wolf" then bestowed on it, soon after began to be called on the charts St. Paul. The designation "New Amsterdam" is derived from the vessel in which Van Diemen sailed between the islands in 1633. The first navigator to set foot on St. Paul was Willen van Vlaming in 1696. Lord Macartney spent a day exploring it in 1793, his guide being a marooned Frenchman, Captain Péron, whose narrative of his sojourn from September 1, 1792, to December 16, 1795, is a document of great value (*Mémoires du Capitaine Péron*, vol. i., Paris, 1824). In 1843 the governor of Réunion took possession of the islands with a detachment of marines—seal-catching and the fisheries having attracted to them a considerable floating population. In June, 1871, the British frigate *Megara* was wrecked at the mouth of the crater and most of the 400 souls on board had to reside on the island upward of three months. Landing on September 23, 1874, a French Transit of Venus expedition remained on St. Paul till January 8, 1875, and a visit of much importance was paid to New Amsterdam.

ST. PAUL DE LOANDA. See LOANDA.

ST. PAUL'S ROCKS, not to be confounded with the island of St. Paul in the Indian Ocean, are a num-

ber of small islands in the Atlantic, nearly 1° north of the equator and 540 miles from South America, in 29° 15' W. longitude. Their outline is irregular, and as they are only separated by narrow but deep channels they have the appearance of being one island. The whole space occupied does not exceed 1,400 feet in length by about half as much in breadth.

ST. PETER PORT, the capital of the island of GUERNSEY (*q.v.*); its population was 16,658 in 1881.

ST. PETERSBURG, a government of northwestern Russia, at the head of the Gulf of Finland, stretching along its southeastern shore and the southern shore of Lake Ladoga. It is bounded by Finland and Olonetz on the north, Novgorod and Pskoff on the east and south, Esthonia and Livonia on the west, and has an area of 20,750 square miles. The population (apart from the capital) was 635,780 in 1882.

ST. PETERSBURG, capital of the Russian empire, is situated in a thinly-peopled region at the head of the Gulf of Finland, at the mouth of the Neva, in 59° 56' N. latitude and 30° 40' E. longitude, 400 miles from Moscow, 696 from Warsaw, 1,138 from Odessa, and 1,338 from Astrakhan. The city covers an area of 21,195 acres, of which 12,820 belong to the delta proper of the Neva; 1,330 acres are under water.

Communication between the banks of the Neva is maintained by only two permanent bridges—the Nicholas and the Alexander or Liteinyi, the latter 467 yards long; both are fine specimens of architecture. Two other bridges—the Palace and the Troitskiy (720 yards)—across the Great Neva connect the left bank of the mainland with Vasilyevskiy Island and the fortress of St. Peter and St. Paul; but, being built on boats, they are removed during the autumn and spring, and intercourse with the islands then becomes very difficult. Several wooden or floating bridges connect the islands, while a number of stone bridges span the smaller channels; their aggregate number is ninety. In winter, when the Neva is covered with ice two to three feet thick, temporary roadways for carriages and pedestrians are made, and artificially lighted. Numerous boats also maintain communication, and small steamers ply in summer between the more distant parts of the capital. A network of tramways (about eighty miles) intersects the city in all directions, reaching also the remoter islands and suburbs, and carrying about 45,000,000 passengers yearly. Omnibuses and public sledges maintain the traffic in winter.

The bulk of St. Petersburg is situated on the mainland, on the left bank of the Neva, including the best and busiest streets, the richest shops, the great bazaars and markets, the palaces, cathedrals, and theaters, as well as all the railway stations, except that of the Finland Railway.

The topography of St. Petersburg is very simple. Three long streets, the main arteries of the capital, radiate from the admiralty—the Prospekt Nevskiy (Neva Prospect), the Gorokhovaya (Peas' Street), and the Prospekt Voznesenskiy (Ascension Prospect). Three girdles of canals, roughly speaking, concentric, cross these three streets—the Moika, the Catherine, and the Fontanka; to these a number of streets run parallel—the Great and the Little Morskaya, the Kazanskaya, the Sadovaya (Garden Street), and the Liteinaya, continued west by Prospekts Zogorodnyi and Rizhskiy (Riga). The Prospekt Nevskiy is a very broad street running straight east-southeast for 3,200 yards from the admiralty to the Moscow railway station, and thence 1,650 yards farther, bending a little to the south, to the Smolnyi convent, again reaching the Neva at Kalashnikoff harbor. The part first mentioned owes its picturesque aspect to its width, its rich shops,

and still more its animation. But the houses which border it architecturally leave very much to be desired. And neither the Cathedral of the Virgin of Kazan (an ugly imitation on a small scale of St. Peter's in Rome), nor the still uglier Gostinyi Dvcr (a two-storied quadrilateral building filled with second-rate shops), nor the Anitchkoff Palace (which looks like immense barracks), nor even the Catholic and Dutch Churches do anything to embellish it. About midway between the public library and the Anitchkoff Palace, an elegant square conceals the old-fashioned Alexandra theater; a profusely adorned memorial to Catherine II. does not beautify it much. The Gorokhavaya is a narrow and badly paved street between gloomy houses occupied mostly by artisans. The Voznesenskiy, on the contrary, though as narrow as the last, has better houses. In its north part it passes into a series of large squares connected with that on which the monument of Peter I. stands. One of them is occupied by the cathedral of St. Isaac (of Dalmatia), and another by the memorial to Nicholas I., the gorgeousness and bad taste of which strangely contrast with the simplicity and significance of that of Peter I. The general aspect of the cathedral is undoubtedly imposing both without and within; its red granite colonnades are not devoid of a certain grandiose character; but, on the whole, this architectural monument, built between 1818 and 1858, according to a plan of Montferrant, under the personal direction of Nicholas I., does not correspond either with its costliness (23,000,000 rubles), or with the efforts put forth in its decoration by the best Russian artists. The pictures of Brüloff, Bruni, and many others, which cover its walls, are deteriorating rapidly and their place is being taken by mosaics. The entire building, notwithstanding its vast foundations and pile-work, is subsiding unequally in the marshy ground, and the walls threaten soon to give way.

The eastern extremity of Vasilyevskiy Island is the center of commercial activity; the stock exchange is situated there as well as the quays and storehouses. The remainder of the island is occupied chiefly by scientific and educational institutions.

Of the 21,195 acres covered by St. Petersburg, 1,160 remain unoccupied. The gardens and parks, public and private, take up 798 acres, to which must be added Aptekarskiy, Petrovskiy, Elaghin, and Krestovskiy Islands, which are almost quite covered with parks. Nearly 30 per cent. of the total area of the most densely populated parts are squares and streets, the aggregate length of the latter being 283 miles. More than half of them are lighted by gas, the remainder with kerosene. Except in a few principal streets, which are paved with wood or asphalt, the pavement is usually of granite boulders, and is bad and very difficult to keep in order. Many streets and embankments in the suburbs are unpaved. Nearly all the more populous parts have water led into the houses, and the same begins to extend also to the right bank of the Neva.

On December 27, 1881, the population of St. Petersburg was 861,303, exclusive of the suburbs, and 929,100 including them.

When Peter I., desirous of giving a "European" capital to his empire, laid the first foundations of St. Petersburg on the marshy islands of the Neva, in land not fully conquered and remote from the centers of Russian life, it is hardly possible that he could have foreseen the rapid development it has since undergone; it has now a population approaching a million and commands more than one-sixth of the foreign trade and manufactures of Russia. In point of fact, there is no capital in Europe so disadvantageously situated with regard to its own country as St. Petersburg. Desolate wilderness begins

at its very gates and extends for hundreds of miles to the north and east. To the south it has the very thinly peopled regions of Pskoff and Novgorod—the marshy and woody tracts of the Valdai Heights. For 400 miles in each of these three directions there is not a single city of any importance; and toward the west, on both shores of the Gulf of Finland, are foreign peoples who have their own centers of gravitation in cities on or nearer to the Baltic. With the provinces of Russia the capital is connected only by canals and railways, which have to traverse vast tracts of inhospitable country before reaching them. But St. Petersburg possesses, on the other hand, one immense advantage in its site, which has proved of great moment, especially in the present century of development of international traffic. Ruled by the idea of creating a new Amsterdam—that is, a meeting-place for traders of all nationalities—and a great export market for Russia, Peter I. could have selected no better place. St. Petersburg has been for nearly 150 years the chief place of export for raw produce from the most productive parts of Russia.

ST. PIERRE, capital of St. Pierre, an island off the south coast of Newfoundland, and which, with the Miquelon islands immediately northwest, forms a colony of France. The town lies on the southeast portion of the island after which it is named, and is a place of considerable importance as a shipping point, having a safe harbor and superior fishing grounds. It is compactly and solidly built, has a convent and churches, besides a bank, warehouses, stores, hotels, and some manufacturing and packing establishments. The population, 3,200 in 1880, had increased so rapidly that in 1890 it was estimated at 6,400.

ST. PIERRE. See RÉUNION.

ST. PIERRE. See MARTINIQUE.

SAINT-PIERRE, CHARLES IRÉNÉE CASTEL, ABBÉ DE, a French writer of much ingenuity and influence, who is not infrequently confounded with the author of *Paul et Virginie*, was born near Barfleur on February 18, 1658. He died at Paris in 1743.

SAINT-PIERRE, JACQUES HENRI BERNARDIN DE, French man-of-letters, was born at Havre on January 19, 1737, and was educated at Caen. His first work of any importance, the *Voyage à l'Île de France*, appeared in 1773 and gained him some reputation. It is the soberest and therefore the least characteristic of his books. The *Etudes de la Nature*, which made his fame and assured him of literary success, did not appear till ten years later, his masterpiece *Paul et Virginie* not till 1787, and his other masterpiece (which, as much less sentimental and showing not a little humor, some persons may be allowed to prefer), the *Chaumière Indienne*, not till 1790. On January 21, 1814, he died at Éragny near Pontoise.

ST. PIERRE AND MIQUELON, two islands ten miles off the south coast of Newfoundland, at the entrance of Fortune Bay, are, with five lesser islets, the last remnants of the North American colonies of France. The population of the islands was 5,564 (town of St. Pierre 4,365) in 1883; but the number is often above 10,000 in the fishing season.

ST. PIERRE-LÈS-CALAIS, a suburb of CALAIS (*q.v.*), with a population of 30,786 in 1881.

ST. POL DE LÉON, a town of France, in the arrondissement of Morlaix and department of Finistère, not far from the shores of the English Channel, thirteen and three-quarter miles northwest of Morlaix by the railway to Roscoff. The population of the town, in 1881, was 3,739, and of the commune, 6,659.

ST. QUÉNTIN, a manufacturing town of France, the chef-lieu of an arrondissement and in population (45,697 in 1881) the largest town in the department of Aisne.



stands on the right bank of the Somme at the junction of the Somme canal with the St. Quentin canal (which unites the Somme canal with the Scheldt), ninety-five and a half miles northeast of Paris. St. Quentin is the center of an industrial district which employs 130,000 workmen in 800 factories, and manufactures the fortieth part of the cotton imported into France, producing goods to the value of about \$17,500,000, mainly calicoes, percales (glazed cottons), cretonnes, jaconas, twills, piqués, muslins, cambrics, gauzes, wool-muslins, Scotch cashmeres, and merinos. Other industries are the making of embroideries by machinery and by hand, turning billiard-balls, and engine-building.

During the Franco-Prussian War St. Quentin repulsed the German attacks of October 8, 1870; and on January 19, 1871, it was the center of the great battle fought by General Faidherbe, one of the last episodes of the campaign.

ST. SEBASTIAN. See SAN SEBASTIAN.

ST. SERVAN, a cantonal town of France, in the department of Ille-et-Vilaine, on the right bank of the Rance to the south of St. Malo, from which it is separated by a creek at least a mile wide (see ST. MALO). In population (10,691 inhabitants in 1881; 12,867 in the commune) St. Servan is slightly the smaller town of the two.

SAINT-SIMON, CLAUDE HENRI, COMTE DE, the founder of French socialism, was born at Paris on October 17, 1760. As a thinker Saint-Simon was entirely deficient in system, clearness, and consecutive strength. But his great influence on modern thought is undeniable, both as the historic founder of French socialism and as suggesting much of what was afterward elaborated into Comtism. Apart from the details of his socialistic teaching, which are vague, inconsistent, and unsystematic, we find that the ideas of Saint-Simon as to the reconstruction of society are very simple. His opinions were conditioned by the French Revolution and by the feudal and military system still prevalent in France. In opposition to the destructive liberalism of the Revolution he insisted on the necessity of a new and positive reorganization of society. So far was he from advocating fresh social revolt that he appealed to Louis XVIII. to inaugurate the new order of things. In opposition, however, to the feudal and military system, the former aspect of which had been strengthened by the restoration, he advocated an arrangement by which the industrial chiefs should control society. In place of the mediæval church the spiritual direction of society should fall to the men of science. What Saint-Simon desired, therefore, was an industrialist state directed by modern science. In short, the men who are fitted to organize society for productive labor are entitled to bear rule in it. The social aim is to produce things useful to life; the final end of social activity is "the exploitation of the globe by association." The contrast between labor and capital so much emphasized by later socialism is not present to Saint-Simon, but it is assumed that the industrial chiefs, to whom the control of production is to be committed, shall rule in the interest of society. Later on the cause of the poor receives greater attention, till in his greatest work, *The New Christianity*, it becomes the central point of his teaching and takes the form of a religion. It was this religious development of his teaching that occasioned his final quarrel with Comte.

During his lifetime the views of Saint-Simon had very little influence; and he left only a very few devoted disciples, who continued to advocate the doctrines of their master, whom they revered as a prophet. He died in 1825.

SAINT-SIMON, LOUIS DE ROUVRAY (or ROUV-

ROY), DUC DE, French author and soldier, was born at Versailles, on January 16, 1675. When he died, at Paris, on March 2, 1755, he had almost entirely outlived his own generation (among whom he had been one of the youngest) and the prosperity of his house, though not its notoriety. This last was in strange fashion revived by a distant relation born five years after his own death, Claude Henri, Comte de Saint-Simon, the subject of the preceding article.

ST. THOMAS, one of the Danish West India Islands, lies thirty-six miles east of Porto Rico (Spanish), and forty north-northwest of St. Croix (Danish), with its principal town (Charlotte Amalie) in 18° 20' 27" N. latitude, and 64° 55' 40" W. longitude. It is thirteen miles long from east to west, with an average breadth of three, and is estimated to have an area of thirty-three square miles. Previous to the abolition of slavery in 1848 the island was covered with sugar plantations, and dotted with substantial mansions; but now a few vegetables, a little fruit, and some guinea grass are all that it produces. Green groceries are imported from the United States, poultry and eggs from the neighboring islands. Nor is the exceptional position which St. Thomas has hitherto enjoyed as a commercial depot any longer secure; the merchants of Venezuela, Porto Rico, San Domingo, Hayti, etc., who used to purchase in St. Thomas, now go direct to the markets of the United States and Europe. In 1880 the inhabitants of the island numbered 14,389 (males, 5,757; females, 8,632), of whom about a sixth are white, of various nationalities; the rest have nearly all more or less of negro blood. English has gradually become almost the exclusive language of the educated classes, and is used in the schools and churches of all the various communities. The curious Creole speech of the negroes, which contained a mixture of broken Dutch, Danish, English, etc., though it was reduced to writing by the Moravian missionaries, subsequent to 1770, is rapidly dying out.

ST. THOMAS (Portuguese, *São Thomê*), a volcanic island in the Gulf of Guinea (West Africa), lies immediately north of the equator and in 6° 40' E. longitude. From the Gaboon, the nearest point of the mainland, the distance is 166 miles, and from the Cameroons 297. The extreme length of the island is thirty-two miles and the breadth from west to east twenty-one; the area is estimated at 355 square miles. In 1890 the population in the island was 18,266.

ST. THOMAS, a town of Ontario in the Dominion of Canada, and capital of the county of Elgin, is situated on the Great Western, Canada Southern, Credit Valley, St. Clair Branch, and London and Port Stanley railroads, sixteen miles south of London and eight miles from Port Stanley. Kettle creek flows through a portion of the city, affording considerable water power, a part of which is utilized. The town has grown rapidly of late years, not only in population and influence but as a commercial, financial, and manufacturing center. It contains six banks, seven churches, two daily and two weekly newspapers, between one and two hundred stores, and a dozen hotels. Saw-mills, grist-mills, foundries, machine-shops, car-shops, employing between 500 and 1,000 men, a car-wheel foundry, tanneries and industries of a varied character make up the lines of manufacture to which special attention is paid. The town also contains a number of buildings of a public character, the architectural excellence of which furnishes additional evidence of the enterprise and liberality of the citizens. The population in 1890 was estimated at upward of 10,000.

SAINT-VICTOR, PAUL DE, one of the chief masters of a very ornate style in recent French literature, was born in Paris in 1827 and died there in 1883. He

was of noble birth and inherited the title of count, but rarely used it, his political principles being democratic.

ST. VINCENT, an island in the British West Indies, discovered by Columbus in 1498, is situated in  $13^{\circ} 10'$  N. latitude and  $60^{\circ} 57'$  W. longitude, 100 miles to the west of Barbados; it is 18 miles in length, 11 in breadth, and has an area of 132 square miles. The capital is Kingstown (population, 5,593), the total population of the island being 42,200, including 2,700 Europeans and 30,000 Africans.

ST. VINCENT, SIR JOHN JERVIS, EARL, a distinguished naval officer, was born at Medford, Staffordshire, England, on January 9, 1734. He commanded the *Foudroyant* in July, 1778, when the memorable *rencontre* took place between Admiral Keppel and Count d'Orvilliers, and bore a very distinguished part in that action. In 1782, while in command of the same vessel, he captured the French ship *Pégase*, of 74 guns and 700 men, off Brest Harbor, and was rewarded for his exploit by being made Knight Companion of the Bath. In 1784 he entered parliament as member for Launceston, and he afterward sat for Yarmouth. In 1795 Jervis became full admiral and succeeded Lord Wood in command of the British fleet in the Mediterranean, where he rendered important service in blockading the French fleet in Toulon, and protecting English trade in the Levant. On February 14, 1797, he won his most celebrated victory. With only fifteen ships of the line, seven frigates, and two sloops he encountered off Cape St. Vincent a Spanish fleet of twenty-six sail of the line, twelve frigates, and a brig, and completely defeated it, capturing four of the enemy's largest ships. He still further distinguished himself some months later by his resolute and sagacious conduct in repressing a mutiny in his fleet when off Cadiz. In June, 1799, he resigned his command in consequence of ill-health, but was shortly afterward placed at the head of the Channel fleet. On the formation of the Addington ministry in 1801 he was made first lord of the admiralty, and in that important office, which he held for three years, the great capacity for business with which he was endowed by nature shone forth in all its luster. Advanced age and impaired health led to his final retirement from public life in 1807, but he survived till March 13, 1823, when he died in his ninetieth year.

ST. VITUS' DANCE, or CHOREA, a disorder of the nervous system occurring for the most part in children, and characterized mainly by involuntary jerking movements of the muscles throughout almost the entire body. It is to be regarded as a functional nervous disorder of wide extent, the manifestations of which appear not merely in disturbance affecting the motor apparatus but in various associated morbid phenomena of cerebral origin. Among the predisposing causes age is important, chorea being essentially an ailment of childhood and more particularly of the period in which the second dentition is taking place. The greater number of the cases occur between the ages of nine and twelve. It is not often seen in very young children nor after puberty; but there are many exceptions to this rule. It is twice as frequent with girls as with boys. Hereditary predisposition to nervous troubles is apt to find expression in this malady in youth, more especially if the general health becomes lowered. Of exciting causes strong emotions, such as fright, ill-usage or hardship of any kind, insufficient feeding, overwork or anxiety, are among the most common; while, again, some distant source of irritation, such as teething or intestinal worms, appears capable of giving rise to an attack. It is an occasional but rare complication of pregnancy. The connection of chorea with rheumatism

is now universally recognized, and is shown not merely by its frequent occurrence before, after, or during the course of attacks of rheumatic fever in young persons, but even independently of this by the liability of the heart to suffer in a similar way in the two diseases.

This disease occasionally assumes a very acute and aggravated form, in which the disorderly movements are so violent as to render the patient liable to be injured, and to necessitate forcible control of the limbs or the employment of anæsthetics to produce unconsciousness. Such cases are of very grave character, if, as is common, they are accompanied with sleeplessness, and they may prove rapidly fatal by exhaustion. In the great majority of cases of St. Vitus' dance, however, complete recovery is to be anticipated sooner or later, the symptoms usually continuing for from one to two months, or even sometimes much longer.

For the treatment of St. Vitus' dance the remedies proposed have been innumerable, but it is doubtful whether any of them have much control over the disease, which under suitable hygienic conditions tends to disappear of itself. These conditions, however, are all-important, and embrace the proper feeding of the child with nutritious light diet, the absence of all sources of excitement and annoyance, such as being laughed at or mocked by other children, and the rectification of any causes of irritation and of irregularities in the general health. For a time, and especially if the symptoms are severe, confinement to the house or even to bed may be necessary, but as soon as possible the child should be taken out into the open air and gently exercised by walking. Of medicinal remedies the most serviceable appear to be zinc, arsenic, and iron, especially the last two, which act as tonics to the system and improve the condition of the blood. They should be continued during the whole course of the disease and convalescence, if they do not disagree. As sedatives in cases of sleeplessness, bromide of potassium and chloral are of use. Many other agents, such as conium, belladonna, strychnia, the salts of silver, etc., have been recommended, but they do not seem to possess any special advantages.

ST. UBES. See SETUBAL.

SAIS. See EGYPT.

SALADIN. See EGYPT.

SALAMANCA, a province of Spain, which until 1833 formed part of that of Leon, is bounded on the north by Zamora and Valladolid, on the east by Avila, on the south by Caceres, and on the west by Portugal. It has an area of 4,940 square miles. The population in 1877 was 285,500; but by the year 1886 it was estimated that it had decreased to about 270,000. Since that time it has increased but little if any.

SALAMANCA (*Salmantica Elmantica*), the capital of the above province, lies on the banks of the Tormes, 172 miles northwest of Madrid by rail. In the Middle Ages the trade of Salamanca was not insignificant, and the stamped leather-work produced there is still sought after. Its manufactures are now of little consequence, and consist of china, cloth, and leather. The population within the municipal boundaries in 1877 was 18,007, and in 1886 was estimated at about 20,000.

SALAMANDRA. In the nomenclature of zoölogy this name designates a genus of animals belonging to the vertebrate class *Amphibia*. The genus was first defined under this name by Laurenti. It will be seen on referring to the taxonomic synopsis of the class given at the end of the article AMPHIBIA that the genus *Salamandra* belongs to the first tribe *Mecodonta* of the fifth division *Salamandrida*. The diagnosis of the genus is as follows:—no fronto-squamosal arch in the skull; tongue large, adherent below, free at the sides

and slightly so behind; toes five; tail cylindrical. There are three species.

The genus is confined to the western sub-region of the palearctic region, extending over almost the whole of Europe, especially the central and southern parts, and occurring also in Algiers and Syria. The spotted species is the commonest and most widely distributed, being found in nearly all parts of Germany, France, Italy, and Spain.

The food of *Salamandra* consists of worms and insects, and, like British frogs and toads, the animals can only exist in damp shady localities. As in all *Salamandrida*, the process of reproduction is commenced by a true copulation, which takes place in spring and summer. The seminal fluid is passed into the female cloaca, where it is received into a tube-shaped receptaculum seminis. The eggs are thus fertilized in the oviduct, but the development takes place under somewhat different conditions in the two species *S. maculosa* and *S. atra*. Both species are viviparous; in the former thirty to forty eggs undergo development in the oviducts at one time, and they are brought forth and deposited in stagnant or sluggishly-flowing water when they have reached a stage similar to that of adult *Perennibranchiata*, the newly-born larvæ having long feather-like external gills and a length of twelve to fifteen minima (one-third to one-half an inch). After a period of aquatic life, the larvæ pass through a metamorphosis; the limbs appear; the gill slits close up; and the young animals, having reached the adult condition, leave the water for a terrestrial life. In *S. atra* only the two lowest eggs which pass into the oviducts, one in the duct of each side, undergo development. The rest of the eggs fuse into a mass of yolk material and are devoured by the two developing larvæ.

SALAMIS, in northern times called by the people *Κολοῦρι* (a ring-shaped cake), and by purists *Σαλαμίς*, is an island in the Saronic Gulf, off the coast of Attica, Greece. It is said to have been called in ancient times by other names—Sciras, which associates it with the worship of Athena Sciras; Cychreia, which connects it with the Eleusinian cultus and the sacred serpent (*κυχρείδης ὄφις*) of Demeter; and Pityussa. The name of Salamis is famous chiefly on account of the great sea-fight, 480 B.C., in which the allied Greeks defeated the Persians under Xerxes. The battle took place beside the town of Salamis and the islands of Psyttaleia, at the southeastern end of the straits.

A city on the east coast of Cyprus, near the river Pedæus, said to have been founded by the Salaminian Teucer, son of Telamon, was also called Salamis.

SALAMONIAN. See AMMONIAN.

SALDANHA, JOÃO CARLOS SALDANHA DE OLIVEIRA E DAUN. See Vol. X.

SALE, an urban sanitary district of Cheshire, England, on the Bridgewater canal and the Mersey, about five miles south of Manchester. The population of the urban sanitary district (area, 2,006 acres) in 1871 was 5,573, and in 1881 it was 7,915.

SALE is one of the forms of CONTRACT, (*q. v.*) The law of contract is accordingly applicable as a whole to the law of sale. But the importance of the contract of sale demands a fuller treatment. The law of the United Kingdom and of the United States is based upon the Roman law in its later stage, as modified by the prætors and by legislation. But there are some considerable differences. In Roman law sale originally meant nothing more than barter; but the introduction of coined money converted the contribution of one of the contracting parties into price (*pretium*), as distinguished from article of sale (*merx*) contributed by the other. Sale fell under the head of consensual contracts, *i. e.*, those

in which the *causa* or that which made the contract enforceable was consent.

Sale in English law may be defined to be "a transfer of the absolute or general property in a thing for a price in money" (Benjamin, *On Sales*, p. 1). The words "absolute or general" are inserted because they may be both a general and a special property in certain cases, and a transfer of the special property would not be a sale.

*Real Estate.*—At common law it was not necessary that there should be written evidence of a contract of sale. The publicity of the feoffment obviated the necessity of writing, which was not essential to the validity of a feoffment until the Statute of Frauds (see FEOFFMENT). The earliest statute making a written instrument essential to a sale appears to be the Statute of Enrollments (27 Hen. VIII. c. 16). The bargain and sale operating under the Statute of Uses, and enrolled under the Statute of Enrollments in the High Court of Justice or with the *custos rotulorum* of the county, is no longer in use; a bargain and sale at common law is a mode of conveyance sometimes used by executors exercising a power of sale. Such a bargain and sale must be by deed since 8 and 9 Vict. c. 106, but need not be enrolled (see FRAUD). In an ordinary case of the sale of real estate the contract is formally drawn up on the basis of particulars and conditions of sale, which ought fairly to represent the actual state of the property. The statute, however, is satisfied by informal agreements, such as letters, if they contain the means of determining the property, the parties, and the price. The price must be a sum of money. If it is another estate, the contract is one of exchange; if no consideration passes, it is a gift. The price may be left to be determined by a third person, as by arbitration. For the way in which payment of the price may be made, see PAYMENT. The formation of a binding contract of sale is the most important stage in the transfer of real estate. From the moment at which the parties are bound by the contract the sale is made; the purchaser has the equitable estate in the subject-matter of the contract (see EQUITY), the vendor holding in trust for him, subject to the payment of the purchase money, for which the vendor has a lien. The price becomes personal estate of the vendor, and the land real estate of the purchaser. The latter has the right to accidental benefits and the burden of accidental losses accruing before completion of the purchase. The rights defined by the contract descend to the representatives of a deceased vendor or purchaser. In most cases the personal representative of a deceased vendor may convey the property under 44 and 45 Vict. c. 41, s. 4. After the contract it becomes the duty of the vendor to deliver an abstract of title, to satisfy the purchaser's reasonable requisition as to any question arising on the title of the purchaser, while the purchaser pays a deposit on account within a certain time, the remainder being paid on completion—that is, the execution of the conveyance and payment of the balance of the price.

*Personal Estate.*—At common law, as in the case of real estate, writing was not essential to the validity of a contract of sale. In sales of personalty, unlike sales of real estate, time is usually of the essence of the contract. A sale of goods may be accompanied by an express warranty or collateral contract as to the title to or quality of the goods. No special form of words is necessary to create a warranty, nor need it be in writing. An implied warranty of title—that is, an affirmation that the vendor has a right to sell—exists certainly in executory contracts of sale. It most probably exists in executed contracts, the exceptions to the rule having in recent times become by judicial decision more numer-

ous than the cases falling under the old rule, that there was no such warranty. Warranty of quality exists either by statute or at common law.

*United States.*—The law as to the sale of real estate agrees generally with English law. It is considerably simplified by the system of REGISTRATION, (*q.v.*) The covenant of warranty, unknown in England, is the principal covenant for title in the United States. It corresponds generally to the English covenant for quiet enjoyment. The right of judicial sale of buildings under a mechanic's lien for labor and materials is given by the law of many States. The sale of public lands is regulated by Act of Congress (*Revised Statutes*, 2353-2379). In the law of sale of personal property American law is also based upon English law. The principal differences are that the law of market overt (see THEFT) is not recognized by the United States, and that an unpaid vendor is the agent of the vendee to resell on non-payment, and is entitled to recover the difference between the contract price and the price of resale. The law of Louisiana (*Civil Code*, § 3194) gives the unpaid vendor a still greater right in his preferential claim for the price against the creditors of the purchaser, if the property still remains in the latter's possession. Warranty of title is not carried as far as in England. United States decisions draw a distinction between goods in the possession and goods not in the possession of the vendor at the time of sale. There is no warranty of title of the latter. The Statute of Frauds has been construed in some respects differently from the English decisions. The differences will be found in Mr. Benjamin's work. As to unlawful sales, it has been held that a sale in a State where the sale is lawful is valid in a State where it is unlawful by statute, even though the goods are in the latter State.

SALEIYER (in Mancassarese *Silâyara*, in Buginese *Silâja*), also called *Tana-dawang* ("Land of Shrimps"), is a Dutch island separated from the south coast of Celebes (East Indies) by a strait eight miles wide, which in the west monsoon is used by vessels bound for the Moluccas, the Philippines, and China. With a length of forty-six miles and general breadth of nine, the area is estimated at 315 square miles. The population of Saleiyer and dependencies, mainly a mixed race of Mancassars, Buginese, and natives of Luvu and Buton, was in 1869 55,147, and in 1880, 66,276.

SALEM, a British district of India, in Madras presidency, lying between  $11^{\circ} 1'$  and  $12^{\circ} 57'$  N. latitude and  $77^{\circ} 32'$  and  $79^{\circ} 5'$  E. longitude. It embraces an area of 7,653 square miles, and is bounded on the north by Mysore and North Arcot, on the south by Coimbatore and Trichinopoly, on the east by Trichinopoly and South and North Arcot, and on the west by Coimbatore and Mysore. In 1881 the population was 1,599,595. The staple crops are rice and ragi; other important crops are pulses and seeds. The chief industry is weaving, which is carried on in almost every large town and village. Carpets of great beauty and superior workmanship are made in the Salem jail. Good iron and steel are made, but only on a small scale.

SALEM, chief town of the above district, situate in  $11^{\circ} 39' 10''$  N. latitude and  $78^{\circ} 11' 47''$  E. longitude, is a busy trading place, with a considerable weaving industry. It is tolerably well built and is prettily situated on the river Tirumanimuttar, 900 feet above sea-level, in a long valley inclosed by the Shevaroy hills, which are six miles distant. The population of the town in 1881 was 50,667 (males 24,584, females 26,083).

SALEM, a city of the United States, capital of Essex county, Mass., is built on a peninsula between North and South rivers, in  $42^{\circ} 31' 18''$  N. latitude and  $70^{\circ} 53'$

$53''$  W. longitude, sixteen miles north by east of Boston, on the eastern division of the Boston and Maine railroad. In the latter part of the eighteenth and the early part of the nineteenth century Salem was the seat of a flourishing foreign commerce, especially with the East Indies; but, its comparative shallow harbor failing to accommodate the larger vessels of modern times, it has been supplanted by Boston, and has to content itself with a good share of the coasting trade. Its industrial activity has, on the other hand, increased, and it now possesses steam cotton-mills, jute factories, extensive tanneries, and various minor manufactories. The main interest, however, of Salem consists in its historical and literary associations, and the institutions by which they are represented. Best known of these institutions is the Peabody Academy, founded in 1867, with funds provided by the well-known philanthropist. The academy at once purchased and refitted the East India Marine Hall, originally built in 1824 by the East India Marine Society (1799), which consisted of captains and supercargoes who had doubled either Cape Horn or the Cape of Good Hope; and the building now contains under the trusteeship of the academy the collections of the old East India Museum and those of the Essex Institute, illustrating the zoölogy, natural history, and archæology of the county. The ethnographical collections, such as that dealing with Corea, are specially valuable. The *American Naturalist* has been the organ of the academy since 1867. The Peabody Institute, not to be confounded with the academy, is in the village of Peabody (Danvers), about two miles distant from Salem and about midway between the house in which the philanthropist was born and the grave, in Harmony Grove cemetery, in which he was buried. Plummer Hall, a fine building in Essex Street, erected in 1856 out of the funds left to the Salem Athenæum by Miss Plummer, contains the libraries of the Athenæum, the Essex Institute (founded in 1848 by the union of the Essex Historical and the Essex County Natural History Societies), and the Essex South District Medical Society, making an aggregate of 50,000 volumes. Behind the hall is the frame of the oldest church edifice in New England, erected in 1634 for Roger Williams. Other buildings of note in Salem are a State normal school, the city hall, the court-houses, the custom-house, in which Nathaniel Hawthorne once acted as surveyor of the port, and several of the private houses (such as "Doctor Grimshawe's house," the dwelling occupied for several years by Doctor Peabody, Mrs. Hawthorne's father), which, while not prototypes, have lent much of their versimilitude to the localities of Hawthorne's fiction. The novelist was born at 21 Union Street. Salem had 24,117 inhabitants in 1870, 27,563 in 1880, and 30,801 in 1890.

SALEM, a city of the United States, the county seat of Salem county, N. J., on a small stream of the same name, by which it has steam communication with Philadelphia (on the Delaware), forty-four miles distant to the north-northeast by rail. While Salem depends mainly on the agricultural prosperity of the surrounding district, it also contains foundries and machine-shops, fruit-canning establishments, glass-ware factories, oil-cloth factories, etc. The population was 3,052 in 1850, 4,555 in 1870, 5,512 in 1890.

A colony settled on the site of Salem in 1641, was replaced by a Swedish fort, and this passed through the Dutch to the English. One of the Quakers who, in 1673, bought Lord Berkeley's half of New Jersey, gave the place its present name and restored the settlement, which in 1682 was declared a port of entry. In 1778 the town was plundered by Colonel Manhood.

SALEM, a city of the United States, the capital of

Oregon, in Marion county, on the east bank of Willamette river, fifty-three miles south of Portland by the Oregon and California railroad. It lies in a fertile prairie district, adorned with copses, and possesses a good source of water-power in Mill creek. The capitol, a rather imposing edifice with a tower 180 feet high, erected in 1875-76, occupies a fine site above the city; other public buildings are the Willamette university (Methodist), which grants degrees in medicine, science, and general literature, the opera-house, the Roman Catholic school for girls, the State penitentiary, and State schools for the deaf and dumb and the blind. Lumber, woolen goods, flour, leather, brass castings, furniture, linseed oil, and building materials are the chief articles of manufacture and trade. The population was 2,538 in 1880, and 4,515 in 1890. Settled in 1834, incorporated in 1853, Salem became the State capital in 1860.

SALEM, the largest town in Columbiana county, Ohio, is located on the Pittsburgh, Fort Wayne and Chicago railroad, sixty-seven miles from Pittsburgh, twenty miles from Youngstown, and thirteen miles east of Alliance. Salem is handsomely situated and handsomely built, while the surrounding country, peopled by an enterprising and intelligent community, is cultivated to the highest degree of excellence. It contains five churches, two Friends meeting-houses, two national banks, three weekly papers, a high school, academy, and graded schools, flour-mills, machine-shops, saw-mills, iron-works, foundries, engine-works, etc., and has a present (1890) population of 6,000.

SALEP (Arab. *sahleb*, Gr. ὄρχις), a drug extensively used in the East as a nervine restorative and fattener, and also much prescribed in paralytic affections, probably owed its original popularity to the belief in the so-called "doctrine of signatures." In Europe it is chiefly used as a demulcent drink, but is also supposed to possess nutrient properties; it may be employed with advantage in inflammatory conditions of the mucous membrane, as in bronchitis, diarrhoea, cystitis, and other urinary disorders. It consists of the tuberous roots of various species of *Orchis* and *Eulophia*, which are decorticated, washed, heated until horny in appearance, and then carefully dried.

SALERNO, a city of Italy, and the chief town of a province of its own name (formerly Principato Citeriore), is beautifully situated on the west coast thirty-four miles southeast of Naples. Silk and cotton spinning are the principal industries. The population was 19,905 in 1870, and 22,328 (commune, 31,245) in 1881.

SALES, FRANÇOIS DE. See FRANCIS, ST., OF SALES.

SALFORD. See MANCHESTER.

SALICIN, the bitter principle of willow bark, was discovered by Leroux in 1831. It exists in most species of *Salix* and *Populus*, and has been obtained to the extent of 3 or 4 per cent. from the bark of *S. helix* and *S. pentandra*. According to Herberger, the bark of the young branches affords salicin in larger proportion than that of the trunk and contains less of the other ingredients which interfere with its extraction. Salicin is prepared from a decoction of the bark by first precipitating the tannin by milk of lime, then evaporating the filtrate to a soft extract, and dissolving out the salicin by alcohol. As met with in commerce it is usually in the form of glossy white scales or needles.

Salicin is chiefly used in medicine as an antipyretic in acute rheumatism, for which it is given in doses of five to thirty grains. Its action is less powerful than that of SALICYLIC ACID (*q.v.*), and its depressing effect on the circulation is less marked. It is also given for headache and for ague.

SALIC LAW, AND OTHER BARBARIAN LAWS. The (1) *Lex Salica* is one of these Teutonic laws of the early Middle Ages which are known as *leges barbarorum*, among which we also reckon the (2) *Lex Ripuariorum* or *Ribuvariorum*, (3) *Ewa (Lex) Francorum Chama-vorum*, (4) *Lex Alamannorum*, (5) *Lex Bajuvariorum*, (6) *Lex Frisionum*, (7) *Lex Angliorum et Werinorum*, h.e., *Thuringorum*, (8) *Lex Saxonum*, (9) *Leges Anglo-Saxonum*, (10) *Lex Burgundionum*, (10a) *Lex Romana Burgundionum*, (11) *Lex Wisigothorum*, (11a) *Breviarium Alarici*, (11b) *Edictum Theodorici*, (12) *Leges Langobardorum*, and to a certain extent (13) *Leges Wallie*. All these laws may in general be described as codes of procedure and of rights, which regulated for some indefinite period the internal affairs of the several Teutonic tribes whose names they bear.

(1) The *Salic Law* originated with the Salian Franks, often simply called Salians, the chief tribe of that conglomeration of Teutonic peoples known as FRANKS, (*q.v.*) The latter first appear in history about 240 (Vopisc., *Vit. Aurel.*, c. 7), after which date we find them carrying on an almost uninterrupted struggle with the Roman empire, till 486, when they finally established a kingdom of their own in provinces which had previously been considered Roman.

We have very few means of ascertaining when the Salic Law was compiled, and how long it remained in force. Our knowledge of the code is derived—(i.) from ten texts, preserved in a comparatively large number of manuscripts, chiefly written in the eighth and ninth centuries; (ii.) from allusions to a Salic Law in various charters and other documents. But the Latin texts do not contain the original Salic Law. This is clear (a) from the allusions we find in them to a "Lex Salica" and "Antiqua Lex," which can hardly be anything but references to another and earlier Lex Salica; (b) from a certain peculiarity and awkwardness in the construction of the Latin, which, though it is so-called Merovingian, and therefore very corrupt, would have been different if the texts were original compilations; (c) from a number of words, found in nearly every paragraph of certain groups of the MSS., and now known as "Malberg glosses," which are evidently the remains of a vernacular Salic Law, and appear to have been retained in the Latin versions, in some cases because the translators seemed doubtful as to whether their Latin terms correctly rendered the meaning of the original, in other cases because these words had become legal terms, and indicated a certain fine. We do not know whether the original Frankish law-book was ever reduced to writing, or merely retained in and handed down to posterity from the memory of some persons charged with the preservation of the law. All that we know of such an original is contained in a couple of prologues (apparently later than the texts themselves) found in certain MSS. of the existing Latin versions.

The famous clause in the Salic Law by which, it is commonly said, women are precluded from succession to the throne, and which alone has become known in course of time as *the Salic Law*, is the fifth paragraph of chapter 59 (with the rubric "De Alodis"), in which the succession to private property is regulated. The chapter opens with four (five) paragraphs in which it is enacted that—(1) if a man died without male issue, his mother (so in first recension; the second to fifth have "pater aut mater") would succeed to the inheritance (in hereditatem succedat); (2) failing her (the father and mother), his brother (brothers) or sister (sisters); (3) failing these, the sister of the mother; (4) when there was no sister of the mother, the sisters (sister) of the father; and (5), failing these, the nearest relative.

It seems clear that the first four paragraphs of the

chapter, which admit women to a share in the inheritance, refer to *private, movable* property, and that, by the fifth paragraph, the inheritance of *land* was exclusively confined to males. We know that this exclusion of women from landed property was hardly a rule anywhere in the Frankish empire, and certainly not in the sixth century, but it obtained more or less afterward, especially during the feudal period, when all the owners of landed property (*i.e.*, the tenants of fiefs) were liable to military service. We do not know when this exclusion of women from landed property began first to be applied and extended to an exclusion from the succession of thrones, as we do not read of such a notion until the middle of the fourteenth century during the controversy between Edward III. and Philip of Valois, when it was alleged to be derived from the Salic Law.

**SALICYLIC ACID**, an organic acid found in nature, in the free state, in the flowers of the meadow-sweet (*Spiræa Ulmaria*, L.), and, combined with methylic ether, in the leaves of the wintergreen (*Gaultheria procumbens*, L.) and *Andromeda Leschenaultii*, in the bark of the sweet birch (*Betula lenta*, L.), and in several species of *Viola*. It was discovered in 1838 by Piria, who prepared it artificially by the decomposition of SALICIN, (*q.v.*) It is remarkable as being the first organic compound occurring in nature which has been prepared artificially on the large scale as a commercial article. During the last few years it has been extensively used in medicine as a remedy for acute rheumatism, either alone or in the form of its sodium salt. Possessing powerful antiseptic properties and being poisonous only in large doses (the medicinal dose being from five to thirty grains), it is capable of manifold uses in the arts and manufactures. In the proportion of from 1 to 10 per cent it prevents the development of bacteria in fluids containing them, and if added to the extent of 1 part in 60 it will destroy their life. It also kills *Torula*, and prevents the souring of beer and milk. It hinders the chemical changes brought about by the action of vegetable ferments or enzymes, such as amygdalin and sinnigrin, and consequently can prevent the formation of essential oil of almonds or of oil of mustard, etc. Plants watered with its solution speedily die. The addition of a little of the acid to glue renders it more tenacious; skins to be used for making leather do not undergo decomposition if steeped in a dilute solution; butter containing a small quantity of it may be kept sweet for months, even in the hottest weather. It also prevents the moldiness of preserved fruits, and has been found useful in the manufacture of vinegar. Unless the perfectly pure acid be employed the addition of salicylic acid to articles of food must be considered dangerous, some persons being peculiarly susceptible to its action.

**SALIERI, ANTONIO**, dramatic composer, was born at Legnano, Italy, August 19, 1750. He died at Vienna May 7, 1825.

**SALII.** See **MARS**.

**SALINA**, the capital of Saline county, Kan., and prominent among the cities of the State, is situated on Smoky Hill river forty-seven miles west of Junction City and thirty-nine miles east of Ellsworth. It is also at the junction of the Union Pacific, Missouri Pacific, Atchison, Topeka and Santa Fe, and Chicago, Kansas and Nebraska railroads, making it one of the most important railway centers in that portion of the State, accessible from all directions. The city contains suitable county buildings, six churches, one private bank in addition to two National and two State banks, five weekly papers, gas, water, and street railway systems, a large number of stores and superior educational facilities. It is the seat of the Normal university and

Methodist college of the State, besides having a fine high-school building and commodious and well appointed graded schools. The manufactories embrace flouring mills, factories, and other enterprises employing a large amount of capital and force of operatives. The population, which was 3,111 in 1880, was 6,031 in June 1890.

**SALISBURY**, or **NEW SARUM**, a city and municipal and parliamentary borough, the county town of Wiltshire, England, is situated in a valley at the confluence of the Upper Avon, the Wily, the Bourne, and the Nadder, on the Great Western and South Western railways, eighty miles west-southwest of London. The population of the city and municipal borough (area 616 acres) in 1871 was 12,903, and that of the parliamentary borough (area (676 acres), 13,839; in 1881 the numbers were 14,792 and 15,680.

Salisbury and its neighborhood are remarkably rich in relics of antiquity. To say nothing of Old Sarum and the scanty ruins of the royal palace of Clarendon, Milford Hill and Fisherton are two of the richest fields in the country for palæolithic implements. In the Blackmore Museum Salisbury possesses one of the finest collections of prehistoric antiquities in England; its splendid gathering of objects from the mounds in the New World is probably unsurpassed.

**SALISBURY, ROBERT, EARL OF.** See **CECIL**.

**SALIVA, SALIVARY GLANDS.** See **NUTRITION**.

**SALLEE.** See **RABÁT**.

**SALLUST.** Sallust is the generally accepted modern form of the name of the Roman historian Caius Sallustius Crispus; 86 B.C. was the year of his birth, and the old Sabine town of Amiternium at the foot of the Apennines was his birthplace. Of his *Histories*, said to have been in five books, and to have commenced with the year 78 B.C. (the year of Sulla's death), and to have concluded with the year 66, we have but fragments; which are, however, enough to show the political partisan, who took a keen pleasure in describing the reaction which followed, on the dictator's death, against his policy and legislation. It is unfortunate that the work has not come down to us entire, as it must have thrown much light on a very eventful period, embracing the war against Sertorius, the campaigns of Lucullus against Mithradates of Pontus, and the victories of the great Pompey in the East. A few fragments of his works were published for the first time from a manuscript in the Vatican early in the present century. We have also two letters (*Duæ epistolæ de Republica ordinanda*) addressed to Cæsar, letters of political counsel and advice, which have been commonly attributed to Sallust, but as to the authenticity of which we must suspend our judgment. He died in 34 B.C.

**SALMASIUS, CLAUDIUS**, in the vernacular **SAUMAISE**, the most distinguished French classical scholar of his day, was born at Semur-en-Auxois in Burgundy, April 15, 1588. He died on September 3, 1653, from an injudicious use of the Spa waters.

**SALMON.** It will be convenient to consider this in connection with the other members of the great family to which it belongs. See **SALMONIDÆ**.

**SALMONIDÆ.** The most conspicuous of the external characteristics is the presence of two dorsal fins, of which the anterior is well developed and supported by the usual jointed bones known as fin-rays, while the posterior is thick and fleshy, rounded in outline, and destitute of rays. The posterior fin is thus a rudimentary organ, and it is commonly called the adipose fin. There are two other families of fishes which resemble the *Salmonidæ* in the arrangement of the dorsal fins—the *Percopsidæ* and *Haplochitonidæ*; but the former

consists of only one species, found in the United States, and the latter is confined to the southern hemisphere. Among British fishes a Salmonoid can be always recognized by its dorsal fins.

The *Salmonidæ* retain the open communication of the air-bladder with the intestine, and the original posterior position of the pelvic fins—features which characterize the division of *Teleostei* known as *Physostomi*. In the great assemblage of bony fishes known as *Physoclisti*, these features are lost in the adult condition. It is known that in all cases the air-bladder develops in the young fish as an outgrowth or diverticulum from the intestine; and it is obvious from a survey of Vertebrates in general that the posterior limbs belong originally to the neighborhood of the anus. It follows therefore that in these features the *Salmonidæ*, and all the *Physostomi*, are more similar to the early ancestors of the bony fishes than are those species in which the air-bladder is closed and the pelvic fins have an anterior position.

In the *Salmonidæ* the characteristic Teleostean pseudo-branchia is present. This organ is the diminished remnant of the series of gill-lamellæ belonging to the posterior face of the hyoid arch, as the pseudo-branchia in Elasmobranchs is the rudiment of the series of gill-lamellæ belonging to the posterior face of the mandibular arch. The bones known as maxillæ form a portion of the boundary of the upper jaw in *Salmonidæ*; in many fishes they are excluded from the jaw margin by the backward prolongation of the premaxillæ. There are no scales on the head in this family, and there are no fleshy filaments or "barbels" in the neighborhood of the mouth as there are in many bony fishes—for example, the Cod, in which a single short barbel is attached beneath the lower jaw. The pyloric appendages, cæcal diverticula of the intestinal tube immediately behind the stomach, are nearly always present in considerable numbers. In the female Salmon the oviduct, the tube connecting the ovary with the exterior, is wanting; the eggs when ripe escape from the surface of the ovary into the abdominal cavity and pass thence to the exterior through a pair of apertures in the body wall situated one on each side of the anus; these apertures are the abdominal pores. In the male salmon there is a duct to the testis, and the semen is extruded through it in the usual way. Fertilization takes place outside the body, the spermatozoa and eggs uniting in the water.

*Distribution.*—*Salmonidæ* are found both in the sea and in fresh water. Most of the marine species inhabit the deeper parts of the ocean. Many of the freshwater forms pass a portion of their lives in the littoral parts of the sea, ascending rivers when adult every year in order to deposit their spawn; that is to say, many species are anadromous. Some are confined entirely to fresh water. The *Salmonidæ* are, with the exception of one species, indigenous to New Zealand, peculiar to the temperate and arctic regions of the northern hemisphere. Fossils belonging to the family are found in strata of Mesozoic age. *Osmerus* occurs in the greensand of Ibbenbüren, and the schists of Glarus and Licata. *Mallotus villosus*, indistinguishable from the living Capelin, occurs abundantly in clay in Greenland, the geological age of the bed being unknown. *Osmeroides acrognathus* and *Aulolepis* are fossil genera occurring in the chalk near Lewis in Sussex, and were probably deep-sea Salmonoids.

#### *Life History of the Salmon and Allied Species.*

Up to a period not many years past, when our knowledge of the breeding and life history of the salmon and kindred species was based entirely on desultory observations of the fish in their natural conditions, there ex-

isted a great deal of uncertainty and diversity of opinion on the subject. Within the last twenty or thirty years the extensive practice of salmon culture has removed nearly all obscurity from the phenomena, and the history of Salmonoids is now more accurately known than that of most other fishes.

The salmon proper, *Salmo salar*, breeds in the shallow running waters of the upper streams of the rivers it ascends. The female, when about to deposit her eggs, scoops out a trough in the gravel of the bed of the stream. This she effects by lying on her side and ploughing into the gravel by energetic motions of her body. She then deposits her eggs in the trough; while she is engaged in these operations she is attended by a male, who sheds milt over the eggs as the female extrudes them, fertilization being, as in the great majority of *Teleostei*, external. The parent fish then fill up the trough and heap up the gravel over the eggs until these are covered to a depth of some feet. The gravel heap thus formed is called a "redd." The period of the year at which spawning takes place varies to a certain extent with the locality, and in a given locality may vary in different years; but, with rare exceptions, spawning is confined to the period between the beginning of September and the middle of January.

The eggs of *Salmo salar* are spherical and non-adhesive; they are heavier than water, and are moderately tough and elastic. The size varies slightly with the age of the parent fish, those from full-sized females being slightly larger than those from very young fish. According to rough calculations made at salmon-breeding establishments, there are 25,000 eggs to a gallon; the diameter is about a quarter of an inch. It is estimated that a female salmon produces about 900 eggs for each pound of her own weight; but this average is often exceeded.

The time between fertilization and hatching, or the escape of the young fish from the egg-membrane, varies considerably with the temperature to which the eggs are exposed. It has been found that at a constant temperature of 41° F. the period is 97 days; but the period may be as short as 70 days and as long as 150 days without injury to the health of the embryo. It follows therefore that in the natural conditions eggs deposited in the autumn are hatched in the early spring. The newly hatched fish, or "alevin," is provided with a very large yolk-sac, and by the absorption of the yolk contained in this the young creature is nourished for some time; although its mouth is fully formed and open, it takes no food. The alevin stage lasts for about six weeks, and at the end of it the young fish is about 1¼ inches long. During the next period of its life the young salmon is called a "parr," and is distinguished by the possession of a number of dark transverse marks along the sides known as "parr marks." These marks occur in the young stage of many species among the *Salmonidæ*. The parr doubles its length in about four months.

The great majority of parr remain in fresh water for two years after hatching, at the end of which time they are about eight inches in length. The second spring after they are hatched they develop a coating of bright silvery scales which completely conceal the parr marks, and they pass into a stage in which they are known as "smolts." The smolt is similar to the adult salmon in all respects except size, and the young salmon, as soon as the smolt stage is reached, migrates down the rivers to the sea.

The above facts have been established within recent years by acute observation and experiment. Not very long ago it was a disputed question whether the parr was the young salmon or a distinct species of fish. It has been conclusively ascertained that some parr become

smolts and migrate to the sea in the spring following that in which they were hatched, while the great majority remain in the parr stage until the second spring, and a few do not attain to the smolt condition until the third year. The male parr when only seven or eight inches in length is often sexually mature, the milt being capable of fertilizing the ova of an adult female salmon.

The migration of smolts to the sea takes place in all rivers at about the same time of the year, viz., between March and June. Sometimes the smolts are observed descending in large shoals. Formerly angling for the descending smolts was a recognized sport, but their capture is now illegal. It is the opinion of the most competent authorities that the smolts increase with wonderful rapidity in size and weight when they reach the sea, and then return to the rivers after a few months, during the same year, as "grilse," which name is given to sexually mature salmon up to a little over five pounds in weight. It is surprising that a smolt weighing only a few ounces should increase to three or four or even six pounds in about three months. Nevertheless it has been proved by actual experiment that this is the fact. At Stormontfield, in May, 1855, 1,300 smolts were marked by cutting off the adipose fin, and twenty-two of these were recaptured the same summer as grilse, weighing from three pounds upward. It might be supposed that some smolts do not return as grilse till the summer following the year of their descent, the time of their stay in the sea being variable, as is the period spent by parr in the rivers. But all the evidence is against this supposition; grilse never commence ascending till late in summer; if they had been more than a year in the sea, some would probably ascend early in the season, as do the larger salmon. At the same time it must be borne in mind that a fish which remained in the sea a year after descending as a smolt might not be recognized as a grilse, having reached the size of a small salmon.

The grilse, after spawning in autumn, return to the sea in the winter or the following spring, and reascend the rivers as mature spawning salmon in the following year. Both salmon and grilse after spawning are called "kelts." The following recorded experiment illustrates the growth of grilse into salmon:—a grilse-kelt of two pounds was marked on March 31, 1858, and recaptured on August 2 of the same year as a salmon of eight pounds.

The ascent of rivers by adult salmon is not so regular as that of grilse, and the knowledge of the subject is not at the present time complete. Although salmon scarcely ever spawn before the month of September, they do not ascend in shoals just before that season; the time of ascent extends throughout the spring and summer. A salmon newly arrived in fresh water from the sea is called a clean salmon, on account of its bright, well-fed appearance; during their stay in the rivers the fish lose the brilliancy of their scales and deteriorate in condition. The time of year at which clean salmon ascend from the sea varies greatly in different rivers; and rivers are, in relation to this subject, usually denominated early or late.

In their ascent salmon are able to pass obstructions, such as water-falls and weirs of considerable height, and the leaps they make in surmounting such impediments and the persistence of their efforts are very remarkable. In a great many rivers anadromous Salmonoids have been excluded from the upper reaches by artificial obstructions, such as dams and weirs, constructed for the purpose of utilizing the water of the stream, or to obtain water power, or simply to facilitate the capture of the fish. Other rivers have been rendered uninhabitable to salmon by pollutions.

The life history of *Salmo trutta* and *S. cambricus* is very similar to that of *Salmo salar*. The river trout, *S. fario*, makes a redd in the shallower parts of streams in the same manner as the salmon, the only difference being that the mound of gravel forming the redd is smaller, the eggs lying from one to two feet below the surface. The breeding period of the trout varies in different rivers, within the limits of September and March. The number of eggs produced by each female is about 800 for every pound of the parent's weight; about 40,000 of the eggs make a gallon, so that they are considerably smaller than those of *S. salar*.

The charrs differ from lake trout in the fact that they do not ascend streams in order to spawn, but form their redds in the gravelly shallows of the lakes they inhabit. The spawning period of the charr of the Cumberland lake district is from the beginning of November to the beginning of December. The eggs of the charr have been found to hatch in from sixty to ninety days, the great majority in seventy days, at an average temperature of 40° F. The American species, *S. fontinalis*, breeds at about the same time as *S. fario*; its eggs are only half the size of those of the latter.

The smelt, *O. eperlanus*, is a gregarious fish and exhibits regular migrations in most estuaries. It is common in the Solway, the Firth of Forth, the rivers of Norfolk, and the estuary of the Thames. In most places where it is found it remains in the fresh and brackish water from August until May, spawning about the month of April, and afterward descending to the sea for the summer. At Alloa on the Forth smelts are taken in large numbers by seine nets in spring, before and during the spawning period. There is a regular fishery for them at the same season on the Solway Firth and in Norfolk. The food of the smelt consists chiefly of young fish, especially young herrings, and crustaceans. The eggs are small, yellowish in color, and adhesive, not adhering by the surface merely as in the case with those of the herring, but each egg possessing a short thread the end of which becomes attached to planks, stones, or other solid objects in the water. According to Mr. Day the eggs are deposited near the high-water mark of spring-tides, so that they must be exposed to the air during the ebb. The smelt when in the sea is largely eaten by the picked dog-fish (*Acanthias vulgaris*). The species is absent from the southern coast of England and from Ireland, the smelt recorded as occurring on those coasts being probably the atherine (*Atherina*), often called the sand-smelt. *O. eperlanus* is abundant on the coast of Finland, and also is common there in freshwater lakes, in which it remains all the year round. It is also common on the Atlantic coast of France. It is of interest to note that the smelt in Britain and on other coasts, when not confined to fresh water, is, in its migration, intermediate between anadromous *Salmonidæ*, which ascend to near the sources of rivers, and such fish as the herring, which approach the shore to spawn but do not usually enter rivers. The smelt as a rule ascends estuaries only as far as the region of brackish water.

The various species of *Coregonus* resemble the charr in their habits, spawning in the autumn in the shallows of the lakes they inhabit.

The grayling, *Thymallus vulgaris*, is in Britain exclusively fluviatile; in Scandinavia it is found also in lakes. It is met with chiefly in clear streams with sandy gravels or loamy beds. It was introduced not many years ago into the Tweed by the marquis of Lothian, and thrives there. It is absent from the Thames, but is common in most of the rivers of England and Wales—*e.g.*, the rivers of Yorkshire, the Severn, and the Wye. It is absent from Ireland. It



feeds on insects and their larvæ, crustaceans, and small mollusks. It breeds in April and May, depositing its ova on the surface of the gravel in the shallows, not in a redd. The ova are smaller than those of the trout, and vary in color from white to deep orange, and they hatch from the twelfth to the fourteenth day after extrusion. The fry grow to four or five inches in length by August, and by the following autumn to nine or ten inches.

**SALOME**, widow of Alexander Jannæus, and queen of Judæa from 79 to 69 B.C. Another Salome is the daughter of Herodias, mentioned in Matt. xiv. 6. Her father was Herod, son of Herod the Great and Mariamme, and she became successively wife of her father's brother the tetrarch Philip (son of Herod the Great by Cleopatra; see **HEROD PHILIP**), and of Aristobulus.

**SALONICA**, or **SALONIKI** (Ital. *Salonico*, Turkish *Selanik*, Slav. *Solun*, the ancient *Thessalonica*), during the Roman empire the capital of the province of Macedonia, and still one of the most important cities of European Turkey, the chief town of an extensive vilayet which includes the sanjaks of Salonica, Serres, Drama, and Monastir, and has an aggregate population of 1,500,000.

The prosperity of Salonica has all along been largely that of a commercial city. During the Christian centuries before the Mohammedan conquest the patron saint of the city was also the saint of a great market or fair to which merchants came from all parts of the Mediterranean, and even from countries beyond the Alps. At the beginning of the present century a large export trade was carried on in woolen and cotton fabrics, white and red yarns, grain, wool, tobacco, yellow berries, silk fabrics, sponges, etc.; and silk gauze was manufactured in the city. Direct British trade with Salonica began after the Greek war of independence. Woven fabrics are at present imported from England, Austria, Germany, Switzerland, and Italy; sugar mainly from Austria; coffee from South America (partly direct); petroleum from America and Russia; soap from Greece and Crete; metal goods from England, France and Austria; and coal from England. The exports comprise cereals (wheat, barley, oats, maize, rye), tobacco, wool, cotton, poppy seed, opium, cocoons, prunes, and timber. In 1884 the industrial establishments were steam flour-mills, a cotton-spinning factory (employing 500 hands and sending its goods to Constantinople, Smyrna, and Beyrout), a distillery, several large soap-works, a nail factory, an iron-bedstead factory, and a number of brick and tile works.

**SALOP**. See **SHROPSHIRE**.

**SALSETTE**, a large island to the north of Bombay, with an area of 241 square miles. It lies between  $19^{\circ} 2' 30''$  and  $19^{\circ} 18' 30''$  N. latitude, and between  $72^{\circ} 51' 30''$  and  $73^{\circ} 3'$  E. longitude; it is connected with Bombay Island by bridge and causeway.

**SALT**. Common salt, or simply salt, is the name given to the native and industrial forms of sodium chloride (NaCl). The consideration of this important substance naturally falls under two heads, relating respectively to sea salt or "bay" salt and "rock" salt or mineral salt. As actually found, however, the one is probably derived from the other, most rock salt deposits bearing evidence of having been formed by the evaporation of lakes or seas at former (often remote) geological periods. This is seen from their stratified nature, with their interposed beds of clay, which could only have been deposited from solution. The crystals of selenite (hydrated calcium sulphate), moreover, which they contain can only have been formed in water and can never have since been subjected to any considerable

amount of heat, otherwise their water of crystallization would have been driven off. The beds also of potassium and magnesium salts found at Stassfurt and other places, interposed between or overlying the rock salt deposits, are in just the position in which one would naturally expect to find them if deposited from salt water. Finally, the marine shells often occurring abundantly in the surrounding rocks of contemporary periods also testify to the former existence of large neighboring masses of salt water.

*Sea Salt*.—Assuming a degree of concentration such that each gallon of sea water contains 0.2547 pounds of salt, and allowing an average density of 2.24 for rock salt, it has been computed that the entire ocean if dried up would yield no less than 4,419,360 cubic miles of rock salt, or about fourteen and a half times the bulk of the entire continent of Europe above high-water mark, mountain masses and all. The proportion of sodium chloride in the water of the ocean, where it is mixed with small quantities of other salts, is on the average about 33.3 per 1,000 parts, ranging from 29 per 1,000 for the polar seas to 35.5 per 1,000 or more at the equator. Inclosed seas, such as the Mediterranean, the Red Sea, the Black Sea, the Dead Sea, the Caspian, and others, are dependent of course for the proportion and quality of their saline matter on local circumstances. Forchhammer found the following quantities of solid matter in the water of various seas:

North Sea.....	32.80	grammes per liter.
Cattegat and Sound.....	15.12	"
Baltic.....	4.81	"
Mediterranean.....	37.50	"
Atlantic.....	34.30	"
Black Sea.....	15.89	"
Caribbean Sea.....	36.10	"

Of this sodium chloride constitutes about four-fifths. See **SEA WATER**.

At one time almost the whole of the salt in commerce was produced from the evaporation of sea water, and indeed salt so made still forms a staple commodity in many countries possessing a seaboard, especially those where the climate is dry and the summer of long duration. In Portugal a total of over 250,000 tons is annually made in the salt works of St. Ubes (Setubal), Alcacer do Sal, Oporto, Aneyro, and Figueras. Spain, with the salt works of the Bay of Cadiz, the Balearic Islands, etc., makes 300,000 tons. Italy has salt works in Sicily, Naples, Tuscany, and Sardinia, producing 165,000 tons. In France, between the "marais salants du midi" and those on the Atlantic, 250,000 to 300,000 tons are annually produced, besides those of Corsica. The "Salzgärten" of Austria produce collectively from 70,000 to 100,000 tons annually at various places on the Adriatic, (Sabioncello, Trieste, Pirano, Capo d'Istria, etc.) In England and Scotland the industry has of late years greatly fallen off under the competition of the rock-salt works of Cheshire, but some small manufactories still exist, at North Shields and elsewhere, where salt is made by dissolving rock-salt in sea water, and evaporating the solution to crystallization by artificial heat.

A large piece of land, varying from one or two to several acres, barely above high-water mark, is leveled, and if necessary puddled with clay so as to prevent the water from percolating and sinking away. In tidal seas a "jas," as the storage reservoir is called, is constructed alongside, similarly rendered impervious, in which the water is stored and allowed to settle and concentrate to a certain extent. In non-tidal seas this storage basin is not required. The prepared land is partitioned off into large basins (*adernes* or *muants*) and others (called in France *aires*, *euillets*, or *tables salantes*) which get smaller and more shallow in pro-

portion as they are intended to receive the water as it becomes more and more concentrated, just sufficient fall being allowed from one set of basins to the other to cause the water to flow slowly through them. The flow is often assisted by pumping. The sea salt thus made is collected into small heaps on the paths around the basins or the floors of the basins themselves, and here it undergoes a first partial purification, the more deliquescent salts (especially the magnesium chloride) being allowed to drain away. From these heaps it is collected into larger ones, where it drains further, and becomes more purified. Here it is protected by thatch till required for sale.

The salt is collected from the surface by means of a sort of wooden scoop or scraper which the workman pushes before him, but in spite of every precaution some of the soil on which it is produced is inevitably taken up with it, communicating a red or gray tint. Sea salt is thence known in many of the French markets as *sel gris*, and frequently contains as much as 15 per cent. of impurity.

*Rock-Salt.*—This appears to occur in almost every formation, except in the Primary rocks, strictly so called. The oldest deposit of which the age may be considered to have anything like precisely determined may be said to be the great salt range of the Punjab, which is regarded as belonging to the Permian; and that lately discovered at Middlesbrough, Yorkshire, immediately overlying the magnesian limestone, may be probably referred to the same period. In the northern counties of England there are frequent instances of brine springs rising from the Carboniferous and contiguous formations. The Cheshire and Worcestershire salt-beds are by some attributed to the Permian; more generally, however, they are referred to the Trias. Those of West New York and Gooderich (Canada) are said to belong to the Salina period of the Upper Silurian. The deposits of the Vosges, Salzburg, and others of central Germany and Austria are considered to belong to the Trias; that of Bex in Switzerland to the Lias. Those of Wieliczka in Poland, Cardona in Spain, and some Algerian formations are admitted to be Cretaceous. Those of Bayonne, Dax, and Camarade, in the Pyrenees, are probably Tertiary, while the Dead Sea, Lake Elton in Astrakhan, the Bitter Lakes of the Isthmus of Suez, the Kara Boghaz on the shores of the Caspian, the Limans of Bessarabia south of Odessa, the Runn of Cutch, and certain formations of the sea of Azoff, etc., are instances of salt formations now in actual progress. The frequent association of bitumen and petroleum with rock-salt and brine is one of the most noticeable features in the geology of those substances, and seems to point to some unknown condition of the formation of the two first named. The Dax salt is close to the bitumen deposits of Bastenès and Gaujac. Borings made at Dax, as well as at Salies, about twenty miles distant (where also salt exists), gave vent to an efflux of inflammable gas which continued for several weeks, and the water of several springs in that neighborhood is tainted with petroleum. Bitumen and petroleum occur near Volterra in Tuscany, where a large deposit of salt is being worked. In Wallachia the two occur in the same formation. In the United States and in the south of Russia petroleum and brine are found in many places either actually associated or in near proximity; petroleum has recently been discovered not far from the salt deposits of Hanover, and one of the beds of rock-salt at Nancy is strongly colored by bitumen, while almost all rock-salt has more or less perceptible bituminous odor when struck or rubbed. In the province of Szechuen, China, are some remarkable salt springs, where the brine is accompanied by

such an efflux of inflammable gas that the latter serves as fuel for its evaporation; and other springs accompanied by the same phenomenon exist in the same region. In fact, instances without end might be cited of the two occurring together, and it would appear that petroleum for some mysterious reason can only be formed in presence of salt.

The chief rock-salt districts of Europe may be classified as follows: (1) the Carpathians; (2) Austrian and Bavarian Alps; (3) West Germany; (4) Vosges; (5) Jura; (6) Swiss Alps; (7) Pyrenees and the Spanish or Celtiberian Mountains; (8) the British salt deposits; (9) isolated deposits and springs in Russia, Turkey, Italy, etc.

SALTA, capital of a province of the same name in the Argentine Republic, with a population of about 20,000 (1881), is a well built town occupying a somewhat insalubrious situation, 3,780 feet above the sea, at the confluence of the Rio de la Sillata and Rio de Arias, head streams of the Rio Salado (there called Rio Pasaje or Juramanto), about 820 miles northwest of Buenos Ayres. The town, founded by Abreu in 1582, was originally known as San Clemente de Nueva Castilla.

SALTCOATS, a seaport and watering-place of Ayrshire, Scotland, contiguous to Ardrossan, and nineteen miles north of Ayr. The population, 4,624 in 1871, in 1881 was 5,096.

SALTILLO, the capital of the state of Coahuila in Mexico, sixty-five miles southwest of Monterey by the Mexican National railway, on the slope of a hill overlooking a fertile valley. It has well-paved streets, several good public buildings, and cotton factories and other industrial establishments. The population is about 17,000.

SALT LAKE CITY (originally Great Salt Lake City), a city of the United States, the capital of Utah Territory, and the metropolis of Mormonism, stands nearly in  $41^{\circ}$  N. latitude, and  $112^{\circ}$  W. longitude, at a height of 4,250 feet above the sea, on the brow of a slight decline at the western base of the Wahsatch range, and on the right bank of the Jordan, a stream which flows from Utah Lake into Great Salt Lake. By the Utah Central railroad the city is thirty-six miles south of Ogden Junction on the Union and Central Pacific railroad, and it is the terminus of the Southern and Western Utah railroads. The city is laid out chess-board fashion, with all the streets 137 feet wide and all the blocks 40 rods square. Shade and fruit trees have been freely planted, and on each side of every north and south street flows a stream of pure water in an open channel. With the exception of some modern erections, the houses are nearly all of sun-dried bricks. The largest and ugliest public building is the tabernacle, with its huge oval wooden dome. It is said to accommodate 8,000 to 10,000 persons, and has the second largest organ in America. Within the same inclosure as the tabernacle are the endowment house, where the initiation ceremonies of Mormonism are performed, and the new Mormon temple (1874-5), erected at a cost of \$10,000,000. Other conspicuous buildings are the city-hall, used as the Territorial capitol, the theater, Walker's opera house, the Salt Lake pavilion, the museum, the Deseret university, several hospitals, and the city prison. The population was 5,000 in 1850, 8,230 in 1860, 12,813 in 1870, 20,768 in 1880, and 44,843 in 1890.

When Great Salt Lake City was founded in July, 1847, the whole region lay far beyond the advancing wave of western civilization. But the city did not long remain the isolated oasis in the desert which its first settlers made it; and it has now a considerable non-Mormon population, a United States garrison at Camp

Douglas (between two and three miles distant), and United States judges.

During the past few years the non-Mormon or gentile element in Salt Lake City has steadily increased, and at the spring elections of 1890 the Mormons suffered an overwhelming defeat. The usual cry of fraud was raised, and detectives from various cities employed to unearth the alleged frauds, but with no material effect. The result of the election, together with the laws against polygamy, bids fair to extinguish aggressive Mormonism practically and socially.

SALTPETER, or NITRATE OF POTASH ( $\text{KNO}_3$ ), is a salt obtained as a commercial product in three different ways. (1) It occurs as an efflorescence on the surface or in the superficial stratum of the soil in many parts of the world, but specially to a great extent in the Ganges valley and other parts of India. (2) It is obtained in a semi-artificial manner in nitreries or saltpeter plantations. These consist of heaps of decomposing animal matter mixed with lime ashes, road scrapings, and other rubbish covered over from rain, and from time to time damped with the runnings from stables and other urine. Such heaps develop within them small proportions of the salt and other nitrates, and are, in effect, artificial imitations of the saltpeter-bearing soil of India. They were formerly very common in Switzerland, France, Germany, and Sweden. (3) A large quantity of saltpeter is now prepared from Chili saltpeter, the nitrate of soda, by double decomposition of the soda salt with another salt of potash. Saltpeter is of importance in numerous industries, among the most prominent of which are gunpowder manufacture and pyrotechny. It is also used as an oxidizing agent in glassmaking and in metallurgical operations. In the curing of meat it is extensively employed with common salt and sugar, and it also occupies an important place in pharmacy.

SALUS (Safety), a goddess worshiped in various parts of ancient Italy. At Rome a temple adorned with paintings by Fabius surnamed the Painter (Pictor) was dedicated to her in 302 B.C.; and public prayers were offered to her on behalf of the Roman people and the emperor.

SALUTATIONS, or greetings, are customary forms of kindly or respectful address, especially on meeting or parting or on occasions of ceremonious approach. Etymologically the word *salutation* (Lat. *salutatio*, "wishing health") refers to words spoken, but the conventional gestures are even more purposeful, and both should be considered together. The principal modes of saluting, when classified, fall into a few groups, with well-defined meanings, the examination of which explains the practice of any particular tribe or nation.

Forms of salutation frequent among savages and barbarians may last on almost unchanged in civilized custom, or may be found in modified shapes, while in other cases they may have disappeared altogether and been replaced by new greetings. The habit of affectionate clasping or embracing is seen at the meetings of the rude Andamaners and Australians, or where the Fuegians in friendly salute hug "like the grip of a bear."

The embrace continues habitual through later ages, and, though in modern times a good deal restricted, it still marks the meetings of near kinsfolk and lovers. But the kiss associated with it has no such universality. The idea of the kiss being an instinctive gesture is negatived by its being unknown over half the world, where the prevailing salute is that by smelling or sniffing (often called by travelers "rubbing noses"), which belongs to Polynesians, Malays, Burmese and other Indo-Chinese, Mongols, etc., extending thence eastward to the Eskimo and westward to Lapland, where Lin-

næus saw relatives saluting by putting their noses together. This seems the only appearance of the habit in Europe. On the other hand the kiss, the salute by tasting, appears constantly in Semitic and Aryan antiquity, as in the above cases from the book of Genesis and the *Odyssey*, or in Herodotus' description of the Persians of his time kissing one another—if equals on the mouth, if one was somewhat inferior on the cheek. In Greece in the classic period it became customary to kiss the hand, breast, or knee of a superior. In Rome the kisses of inferiors became a burdensome civility.

The early Christians made it the sign of fellowship, "greet all the brethren with an holy kiss." Strokings, pattings, and other caresses have been turned to use as salutations, but have not a wide enough range to make them important. Weeping for joy, often occurring naturally at meetings, is sometimes affected as a salutation; but this seems to be different from the highly ceremonious weeping performed by several rude races when, meeting after absence, they renew the lamentations over those friends who have died in the meantime. The typical case is that of the Australians, where the male nearest of kin presses his breast to the new comer's, and the nearest female relative, with piteous lamentations, embraces his knees with one hand, while with the other she scratches her face till the blood drops. Obviously this is no joy-weeping, but mourning, and the same is true of the New Zealand *tangi*, which is performed at the reception of a distinguished visitor, whether he has really dead friends to mourn or not.

Cowering or crouching is a natural gesture of fear or inability to resist that belongs to the brutes as well as man; its extreme form is lying prostrate, face to the ground. In barbaric society, as soon as distinctions are marked between master and slave, chief and commoner, these tokens of submission become salutations. The sculptures of Egypt and Assyria show the lowly prostrations of the ancient East, while in modern Dahomey or Siam subjects crawl before the king, and even Siberian peasants grovel and kiss the dust before a noble.

Bowing, as a salute of reverence, appears in its extreme in Oriental custom, as among the ancient Israelites: "bowed himself to the ground seven times" (Gen. xxxiii. 3). The Chinese, according to the degree of respect implied, bow kneeling or standing. The bowing salutation, varying in Europe from something less than the Eastern salaam down to the slightest inclination of the head, is interesting from being given mutually, the two saluters each making the sign of submission to the other, which would have been absurd till the sign passed into mere civility. Uncovering is a common mode of salutation, originally a sign of disarming or defencelessness or destitution in the presence of a superior. Polynesian or African chiefs require more or less stripping, such as the uncovering to the waist which Captain Cook describes in Tahiti. Taking off the hat by men has for ages been the accepted mode in the Western world, done in a frequent, demonstrative way by such as make a show of politeness, and who by being "free of cappe and full of curtesye" pay cheaply social debts; but modern society has moderated this bowing and scraping (the scrape is throwing back the right leg as the body is bent forward), as well as the curtseys (*courtoisie*) of women. Eastern nations are apt to see disrespect in baring the head, but insist on the feet being uncovered. Grasping hands is a gesture which makes its appearance in antiquity as a legal act symbolic of the parties joining in compact, peace or friendship; this is well seen in marriage, where the hand grasp was part of the ancient Hindu ceremony, as was the "dextrarum junctio" in Rome, which passed on into the Christian rite.

As to words of salutation, it is found even among the

lower races that certain ordinary phrases have passed into formal greetings. Thus among the Tupis of Brazil, after the stranger's silent arrival in the hut, the master, who for a time had taken no notice of him, would say "*Preioubé?*" that is "Art thou come?" to which the proper reply was, "Yes, I am come!" Many formulas express difference of rank and consequent respect, as where the Basuto salute their chiefs with "*Tama sevata!*" *i.e.*, "Greeting, wild beast!" Congo negroes returning from a journey salute their wives with an affectionate *Okowe!* but they, meekly kneeling around him, may not repeat the word, but must say *Ka! Ka!* Among cultured nations salutations are apt to be expressions of peace and goodwill. On the whole, though the half-meaningless forms of salutation may often seem ridiculous, society would not carry them on so universally unless it found them useful. In fact, they serve the substantial purpose of keeping up social intercourse, and establishing relations between the parties in an interview, of which their tone may strike the key note. Montaigne, a master of the courtesy of an age more ceremonious than ours, truly asserts their importance, "C'est au demourant une très utile science que la science de l'entregent."

**SALUZZO**, or **SALUCES**, a city of Italy, at the head of a circondario in the province of Cuneo, forty-two and one-half miles south of Turin (with which it is connected by railway and a steam tramway), is situated 600 to 650 feet above the sea, just where the last hills of the Monte Viso die away into the plain between the Po and its tributary the Vraita. The population of the city was 10,145 (commune 16,247) in 1880.

**SALVADOR**. See **SAN SALVADOR**.

**SALVAGE** is "the reward which is earned by those who have voluntarily saved or assisted in saving a ship or boat, or their apparel, or any part thereof; or the lives of persons at sea; or a ship's cargo or any part thereof from peril; or a wreck from total loss." The word salvage is indifferently used to denote the claim, the reward, or the property saved. Salvage is interesting as being perhaps the one case in English law in which a person may become liable to a claim upon him for services rendered to him without his request, express or implied. Salvage may be either military or civil. Claims for military salvage, *i.e.*, salvage on recapture (for which see **PRIZE**) are decided by a prize court. The tribunal for determining cases of civil salvage, the usual kind, is a court having admiralty jurisdiction. In England or Ireland the High Court of Justice (Admiralty Division), in Scotland the Court of Sessions, have cognizance of salvage claims to any amount.

The rules which guide the courts in the award of salvage are reducible to a few simple principles, depending partly upon the general maritime law, partly upon the Merchant Shipping Acts, 1854 and 1862. (1) The salvage service must have been rendered within the jurisdiction of the **ADMIRALTY**, (*q.v.*) (2) There must be no legal duty on the part of the salvors to render assistance. Therefore there must be very meritorious and exceptional services on the part of the crew, or even of a pilot, a passenger, or a crew of a tug, to entitle any of them to salvage. The same is the case with the officers and crew of a queen's ship, coastguardsmen, etc., who are bound by their position to assist. (3) The property must have been in peril, and rescued by the salvors. (4) The services must have been successful. Of course where a request for help has actually been made, and the property perishes, the right of remuneration nevertheless survives, on the ordinary principles of contract. The basis of salvage proper is service independently of contract.

Salvage is a term also applied by analogy to property

not saved at sea, but from fire on land. In nearly all American cities there is an insurance patrol called "salvage corps," whose duty it is to use every endeavor to save property from destruction by fire. The term is also applied to property recovered from destruction by the aid of voluntary payments. The person making the last advance is entitled to priority in the nature of quasi salvage, as the continued existence of the property at all may be due to him, *e.g.*, the case of a payment made to prevent the forfeiture of a policy of insurance. Charges in favor of a solicitor upon property recovered or preserved by his means have been several times declared by the courts to be in the nature of salvage of this kind.

The law of the United States is in general agreement with that of England. The court of admiralty jurisdiction is the district court. The area in which salvage services may be rendered is much wider than in England, as it includes the great freshwater navigable rivers and lakes. This difference arises from the greater importance of inland navigation in the United States. See **RIPARIAN LAWS**.

**SALVIAN**, a Christian writer of the fifth century, was born in Gaul, and most probably in the neighborhood of Treves or Cologne. His birth has been conjecturally assigned to the period from 390 to 420. He seems to have been still living at Marseilles when Gennadius wrote under the papacy of Gelasius (492-496).

Of Salvian's writings there are still extant two treatises, entitled, respectively, *De Gubernatione Dei* and *Ad Ecclesiam*, and a series of nine letters.

**SALWIN HILL TRACTS**, a district in the Tenasserim division of British Burmah, extending from the northern portion of the province southward to Kawka-rit on the Salwin river, and occupying the whole of the country between that river on the east and the Pong-loung Mountains on the west. The district contains an area of about 4,646 square miles. The population in 1881 was returned at 30,009.

**SALZA**, **HERMANN VON**, one of the most illustrious knights of the Teutonic order, was a scion of the house of Langensalza in Thuringia, where he was born about 1180. He was a faithful and influential councilor of the emperor Frederick II., and took a prominent part in the contemporary affairs of the German empire. The events of his life are involved in the history of the **TEUTONIC ORDER**, of which he was elected master in 1210 or 1211. He died in 1239.

**SALZBRUNN**, a small German watering-place, visited annually by about 4,000 patients, is situated in Silesia, thirty miles to the southwest of Breslau. Its alkalo-saline springs, which are especially efficacious in pulmonary complaints, were known as early as 1316, but afterward fell into disuse until their merits were once more discovered at the beginning of this century. The resident population in 1880 numbered 5,777.

**SALZBURG**, capital of the present Austrian crown-land and formerly of the archbishopric of the same name, occupies a position of singular beauty on the Salzach, eighty-seven miles southeast of Munich, and 154 miles west-by-south of Vienna.

The origin and development of Salzburg were alike ecclesiastical, and its history is involved with that of the archbishopric to which it gave its name.

By the peace of Lunéville Salzburg was given to the archduke of Austria and grand-duke of Tuscany in exchange for Tuscany; and its new owner was enrolled among the electoral princes. In the redistribution following the peace of Pressburg in 1805, Salzburg fell to Austria. Four years later it passed to Bavaria, but the peace of Paris in 1814 restored it to Austria, to

which it has since belonged. Under the designation of a duchy the territory formed the department of Salzach in Upper Austria until 1849, when it was made a separate crown-land, with the four departments of Salzburg, Zell, Tamsweg, and St. Johann. In 1861 the management of its affairs was intrusted to a local diet, consisting of the governor, the archbishop, and twenty-five representatives. The area of the duchy is 2,762 square miles and the population in 1880 was 163,570, almost exclusively Roman Catholic and of German stock. In 1880 the population (including the suburbs) was 20,336.

**SALZKAMMERGUT**, a district in the southwest angle of Upper Austria, between Salzburg and Styria, famous for its fine scenery, forms a separate imperial domain about 250 square miles in area, with a population of over 18,000. The beauty of its lofty mountains, sequestered lakes, and green valleys has made it one of the favorite tourist resorts of Europe, and has gained for it the title of the "Austrian Switzerland;" but it owes its name (literally "salt-exchequer property") and its economic importance to its extensive and valuable salt mines.

**SALZWEDEL**, an ancient town of Prussian Saxony, lies on the Jeetze, a tributary of the Elbe, thirty-two miles to the northwest of Stendal. It is an industrial place of some importance, with linen, cotton, and woolen manufactures, carries on a brisk river trade in grain, and possesses a fine Gothic church of the thirteenth century. The population in 1880 was 8,780.

**SÁMÁNID DYNASTY**, the name of the third among those native dynasties which sprang up in the ninth and tenth centuries in the eastern portions of Persia, and, although nominally provincial governors under the suzerainty of the caliphs of Baghdád, succeeded in a very short time in establishing an almost independent rule over the vast territories round the Oxus and Jaxartes. The Ma'mún, Hárún-alrashíd's son, to whose patronage the Táhirid family owed their supremacy in Khorásán and Transoxiana (820-872, 205-259 A.H.) appointed three sons of Sámán, originally a Tartar chief who claimed descent from the old Sásánian kings, governors of Herát and some districts beyond the Oxus; and these soon gained such an ascendancy over all rival clanships that in 872, when the Táhirids were overthrown by the Saffárids under the leadership of Ya'kúb b. Laith (868-878), they were strong enough to retain in their family the governorship of Transoxiana, with the official sanction of the caliph Mo'tamid (870-892), and to establish a semi-royal court in Bokhárá, the seat of the new Sámánid government. During the reign of Ya'kúb's brother 'Amr b. Laith (878-900) Isma'íl b. Ahmad, Sámán's great-grandson (892-907, 279-295 A.H.), crossed the Oxus with a powerful army, invaded the territory of the Saffárids, sent 'Amr as prisoner to Baghdád, and gradually extended his rule over Khorásán, Khwárizm, Jurján, and the neighboring countries. His successors, all renowned by the high impulse they gave both to the patriotic feelings and to the national poetry of modern Persia (see PERSIA), were Ahmad b. Isma'íl (907-913, 295-301 A.H.); Nasr II. b. Ahmad, the patron and friend of the great poet Rúdagi (913-942, 301-331 A.H.); Núh I. b. Nasr (942-944, 331-342 A.H.); 'Abd al-Malik I. b. Núh (954-961, 343-350 A.H.); Mansúr I. b. Núh, whose vizier, Bal'amí, translated Tabarí's universal history into Persian (961-976, 350-366 A.H.); Núh II. b. Mansúr, whose court-poet Dakíkí commenced the *Sháhnáma* (976-997, 366-387 A.H.); Mansúr II. b. Núh (997-998, 387-389 A.H.); and 'Abd al-Malik II. b. Núh (999), with whom the Sámánid dynasty came to a rather abrupt end,

**SAMAR.** See PHILIPPINE ISLANDS.

**SAMARA**, a government of southeastern Russia, on the left bank of the lower Volga, bounded on the north by Kazañ, on the west by Simbirsk and Saratoff, on the east by Ufa and Orenburg, and on the south by Astrakhan, the Kirghiz Steppes, and the territory of the Ural Cossacks. The area is 58,320 square miles, and the population in 1882 was 2,224,093.

**SAMARA**, capital of the above government, is situated on the slopes of the left bank of the Volga, 743 miles to the southeast of Moscow, at the mouth of the Samara, and opposite the hills of Zheguleff. It is one of the most important towns of the lower Volga for its trade, and its importance cannot fail to increase as the railway to Central Asia advances eastward. Its population rose from 34,500 in 1869 to 63,400 in 1880.

**SAMARANG.** See JAVA.

**SAMARCAND.** See SAMARKAND.

**SAMARIA**, the capital of Northern Israel from the time of Omri to the fall of the kingdom, which was consummated in the long siege of the royal city by Shalmaneser and its capture by his successor Sargon. It stands in the very center of Palestine and of the country of the dominating tribe of Joseph, and, built on a steep and almost isolated hill, with a long and spacious plateau for its summit, was naturally a position of much strength, commanding two of the most important roads—the great north and south road which passes immediately under the eastern wall, and the road from Shechem to the maritime plain which runs a little to the west of Omri's capital.

**SAMARITANS.** This term, which primarily means "inhabitants of Samaritis or the region of Samaria," is specially used, as in the New Testament and in Josephus, as the name of a peculiar religious community which had its headquarters in the Samaritan country, and is still represented by a few families (about 150 souls) at Nábulus, the ancient Shechem. They regard themselves as Israelites, descendants of the ten tribes, and claim to possess the orthodox religion of Moses, accepting the Pentateuch and transmitting it in a text which for the most part has only microscopic variations from the Torah of the Jews. But they regard the Jewish temple and priesthood as schismatical, and declare that the true sanctuary of God's choice is not Zion but Mount Gerizim, overhanging Shechem (John iv. 20); here they had a temple which was destroyed by John Hyrcanus about 128 B.C. (Jos., *Ant.*, xiii. 9, 1), and on the top of the mountain they still celebrate the passover. The sanctity of this site they prove from their Pentateuch, reading Gerizim for Ebal in Deut. xxvii. 4. With this change the chapter of Deuteronomy can be interpreted with a little straining as a command to select Gerizim as the legitimate sanctuary (comp. ver. 7); and accordingly in Exod. xx. and Deut. v. a commandment taken from Deut. xxvii. is inserted at the close of the decalogue. Thus on their reckoning the tenth commandment is the direction to build an altar and do sacrifice on Gerizim—from which of course it follows that not only the temple of Zion but the earlier temple of Shiloh and the priesthood of Eli were schismatical. Such at least is the express statement of the later Samaritans; the older Samaritans, as they had no sacred books except the Pentateuch, probably ignored the whole history between Joshua and the captivity, and so escaped a great many difficulties.

Jews and Samaritans were separated by bitter jealousies and open feuds (Jos., *Ant.*, xii. 4, 1), but their internal development and external history ran closely parallel courses till the Jewish state took a new departure under the Maccabees. The religious resemblance

between the two bodies was increased by the adoption of the institution of the synagogue, and from the synagogue there certainly grew up a Samaritan theology and an exegetical tradition. The latter is embodied in the Samaritan Targum or Aramaic version of the Pentateuch, which in its present form is, according to Nöldeke's investigations, not earlier than the fourth Christian century, but in general agrees with the readings of Origen's *τὸ Σαμαρειτικόν*. For the dogmatic views of the Samaritans our sources are all late; they embrace hymns and other books of little general interest, and mainly at least of mediæval origin.

**SAMARKAND**, a city of Central Asia, anciently *Marcanda*, the capital of Sogdiana, then the residence of the Sámánids, and subsequently the capital of Timur, is now chief town of the Zerafshan district of the Russian dominions. It lies in a richly cultivated region, 185 miles southwest of Tashkend, and 145 miles east of Bokhara, in 39° 39' N. latitude and 67° 17' E. longitude, 2,150 feet above the sea, in the valley of the Zerafshan, at the point where it issues from the extreme western spurs of the Tian-Shan before entering the steppes of Bokhara. Destroyed and pillaged by Jenghis Khan, its population was reduced to one-quarter of what it had been, but it still reckoned 25,000 families within its walls. The present population is estimated at 36,000.

**SAMNITES**, a people of ancient Italy, whose name figures conspicuously in the early history of Rome. They occupied an extensive tract in the center of the peninsula, which derived from them the name of Samnium. The territory thus designated was a wholly inland district, bounded on the north by Marsi, Peligni, and Frentani, who separated them from the Adriatic, on the east by Apulia, on the south by Lucania, and on the west by Campania and Latium.

The Samnites early came into collision with the Romans, having four times engaged in war with that people. The first contest was of short duration; and after two campaigns the Romans were willing not only to conclude peace with Samnium but to renew the previously existing alliance, to which the Samnites continued faithful throughout the great struggle which ensued between the Romans and the allied Campanians and Latins. The Second Samnite War was of a very different character. Both nations felt that it was a struggle for supremacy, and, instead of being brought to a close within three years, it lasted for more than twenty years (326-304), and was marked with considerable vicissitudes of fortune, among which the celebrated disaster of the Caudine Forks (321) stands most conspicuous. Nor was the struggle confined to the two leading powers, many of the neighboring nations espousing the cause of the one side or the other, and often with fluctuating faith, in accordance with the varying fortunes of the war. The result, however, was on the whole favorable to the Roman arms, notwithstanding which they were willing to conclude peace in 304, on condition of the renewal of the previously existing alliance. This interval of tranquillity was of short duration, and little more than five years elapsed between the end of the Second Samnite War and the commencement of the Third (298). In this fresh contest they received a formidable auxiliary in a large body of Gauls, who had recently crossed the Alps, and, together with their countrymen the Senones, espoused the cause of the Samnites against Rome. Their combined forces were, however, defeated in the great battle of Sentinum (294), and after several successive campaigns the consul M. Curius Dentatus was able to boast of having put an end to the Samnite Wars (290), after they had lasted more than fifty years.

**SAMOA**. See **NAVIGATORS' ISLANDS**.

**SAMOS**, one of the principal and most fertile of the islands in the Ægean Sea that closely adjoin the mainland of Asia Minor, from which it is separated by a strait of only about a mile in width. It is about twenty-seven miles in length, by about fourteen in its greatest breadth.

During the Greek War of Independence Samos bore a conspicuous part, and it was in the strait between the island and Mount Mycale that Canaris achieved one of his most celebrated exploits by setting fire to and blowing up a Turkish frigate, in the presence of the army that had been assembled for the invasion of the island, a success that led to the abandonment of the enterprise, and Samos held its own to the very end of the war. On the conclusion of peace the island was indeed again handed over to the Turks, but since 1835 it has held an exceptionally advantageous position, being in fact self-governed, though tributary to the Turkish empire, and ruled by a Greek governor nominated by the Porte, who bears the title of "Prince of Samos," but is supported and controlled by a Greek council and assembly. The prosperity of the island bears witness to the wisdom of this arrangement. It now contains a population of above 40,000 inhabitants, and its trade has rapidly increased. Its principal article of export is its wine, which was celebrated in ancient times, and still enjoys a high reputation in the Levant. It exports also silk, oil, raisins, and other dried fruits.

**SAMOTHRACE** was the ancient name of an island in the northern part of the Ægean Sea, nearly opposite to the mouth of the Hebrus, and lying north of Imbros and northeast of Lemnos. It is still called Samothraki, and though of small extent, is, next to Mount Athos, by far the most important natural feature in this part of the Ægean, from its great elevation—the group of mountains which occupies almost the whole island rising to the height of 5,240 feet.

No modern traveler appears to have visited Samothrace till the year 1858, when it was fully explored by Conze, who published an account of it, as well as the larger neighboring islands, in 1860. The ancient city, of which the ruins are called Paleopoli, was situated on the north side of the island close to the sea; its site is clearly marked, and considerable remains still exist of the ancient walls, which were built in massive Cyclopean style, but no vestiges are found of temples or other public buildings. The modern village is on the hill above. The island is at the present day very poor and thinly peopled, and has scarcely any trade; but a considerable sponge fishery is carried on around its coasts by traders from Smyrna.

**SAMOYEDES**, a Ural-Altaic stock, scattered in small groups over an immense area, from the Altai Mountains down the basins of the Obi and Yenisei, and along the shores of the Arctic Ocean from the mouth of the latter river to the White Sea. They may be subdivided into two main groups. (A) Those inhabiting the southern parts of the government of Tomsk and Yeniseisk have been so much under Tartar influence as to be with difficulty separated from the Tartars; their sub-groups are the Kamasin Tartars, the Kaibals, the Motors, the Beltirs, the Karagasses, and the Samoyedes of the middle Obi. (B) Those inhabiting the subarctic region form three separate sub-groups: (a) the Yuraks in the coast-region from the Yenisei to the White Sea; (b) the Tavghi Samoyedes, between the Yenisei and the Khatanga; (c) the Ostiak Samoyedes, intermingled with Ostiaks, to the south of the others, in the forest regions of Tobolsk and Yeniseisk. Their whole number may be estimated at from 20,000 to 25,000.

**SAMPIERDARENA** (population in 1881, 19,501). See **GENOA**.

**SAMSON** (Hebrew, *Shimshōn*), the great enemy of the Philistines, is reckoned as one of the judges of Israel in two editorial notes which belong to the chronological scheme of the book of Judges (xv. 20, xvi. 31), but his story itself, which is a self-contained narrative by a single hand (Jud. xiii. 2-16, 31a), represents him not as a judge but as a popular hero of vast strength and sarcastic humor, who has indeed been consecrated from his birth as the deliverer of Israel, and is not unaware of his vocation, but who yet is inspired by no serious religious or patriotic purpose, and becomes the enemy of the Philistines only from personal motives of revenge, the one passion which is stronger in him than the love of women. In his life, and still more in his death, he inflicts great injury on the oppressors of Israel, but he is never the head of a national uprising against them, nor do the Israelites receive any real deliverance at his hands. The story of his exploits is plainly taken from the mouths of the people, and one is tempted to conjecture that originally his Nazarite vow was conceived simply as a vow of revenge, which is the meaning it would have in an Arab story. Our narrator, however, conceives his life as a sort of prelude to the work of Saul (xiii. 5), and brings out its religious and national significance in this respect in the opening scene (ch. xiii.), which is closely parallel to the story of Gideon, and in the tragic close (ch. xvi.); while yet the character of Samson, who generally is quite forgetful of his mission, remains much as it had been shaped in rude popular tale in a circle which, like Samson himself, was but dimly conscious of the national and religious vocation of Israel.

**SAMUEL** (שְׁמוּאֵל, *Shēmūēl*), a seer and "judge" of Israel in the time of the Philistine oppression. His history, as told in the first book of Samuel (compare Psalm xcix. 5; Eccles. xlvi. 13 sq.), is too familiar to call for repetition here.

**SAMUEL, BOOKS OF.** The Hebrew Book of Samuel, like the Hebrew Book of Kings, is in modern Bibles divided into two books, after the Septuagint and Vulgate, whose four books of "kingdoms" answered to the Hebrew books of Samuel and Kings. The connection between the books of Samuel and Kings has been spoken of in the article **KINGS**, (*q.v.*) These two books, together with Judges, are made up of a series of extracts and abstracts from various sources worked over from time to time by successive editors, and freely handled by copyists down to a comparatively late date, as the variations between the Hebrew text and the Septuagint show. The main redaction of Judges and Kings has plainly been made under the influence of the ideas of the book of Deuteronomy, and it was in connection with this redaction that the history from the accession of Solomon onward was marked off as a separate book (see **KINGS**). In Samuel the Deuteronomistic hand is much less prominent, but in 1 Sam. vii. 2-4, and in the speech of Samuel, ch. xii., its characteristic pragmatism is clearly recognizable; the nature of the old narrative did not invite frequent insertions of this kind throughout the story. So, too, the chronological system which runs through Judges and Kings is not completely carried out in Samuel, though its influence can be traced. But, though the book of Samuel has been much less systematically edited than Kings, unsystematic additions to and modifications of the oldest narratives were made from time to time on a very considerable scale, and in this book, as in Judges, we not seldom find two accounts of the same events which not only differ in detail but plainly are of very different date.

The book as a whole may be divided into three main sections—(1) *Samuel and Saul*, 1 Sam. i.-xiv.; (2) *The*

*rise and Kingdom of David*. 1 Sam. xv.-2 Sam. viii.; (3) *The personal history of David's court at Jerusalem* (mainly from a single source, which also includes 1 Kings i., ii.), 2 Sam. ix.-xx. Finally the appendix, 2 Sam. xxi.-xxiv., must have been added after the book of Kings had been separated from the context to which 1 Kings i., ii. originally belonged. As the greater part of the book of Samuel is occupied with the history of David, which has been discussed at length in his article, and with that of Samuel and Saul, the chief points of which have been critically examined in the article **ISRAEL**, a very brief resumé of the contents of each of the main sections must here suffice.

**SANAA** (SAN'Á), the capital of Yemen in Arabia, and seat of the Turkish governor of that province, is situated in 15° 22' N. latitude and 44° 31' E. longitude, in a well-watered upland valley, 4,000 feet above the sea and six to nine miles broad, running north and south between two table-lands. The western table-land rises 1,200 feet, the eastern (J. Nokom) is some 300 feet higher, and crowned by the ruins of the fortress Birásh, which local tradition connects with the name of Shem, son of Noah, to whom the foundation of the city is attributed by Hamdání, *Jazírat*, p. 55. In 1872, having been hard pressed by the Bedouins for several years, Sanaa opened its gates to the Turks, who were then engaged in the reconquest of Yemen. In the following year Millingen estimated the population at only 20,000.

The climate is good, though the extreme dryness of the air is trying. Rain usually falls in January and June, and more copiously in the end of July; the markets are well supplied with grain and fruit; vineyards were formerly numerous, but were largely given up after an attack of vine disease some thirty years ago.

**SANÁ'Í.** Abulmajd Majdúd b. Ádam, commonly known as the hakím or philosopher Saná'í, the earliest among the great Súfic poets of Persia, was a native of Ghazna or Ghaznín (in the present Afghánistán), and flourished in the reigns of the Chaznawid sultáns Ibráhím, and his grandson Bahrámsháh. The exact dates of the poet's birth and death are uncertain, Persian authorities giving the most conflicting statements. At any rate, he must have been born in the beginning of the second half of the eleventh century and have died between 1131 and 1150 (525 and 545 A.H.)

**SAN ANTONIO**, the capital of Bexar county, Tex., is handsomely situated on San Antonio river eighty miles west of Austin, 256 miles west of Galveston, and 547 miles west of New Orleans, on the San Francisco and New Orleans division of the Southern Pacific. It has railway communication with the Gulf by the San Antonio and Aransas Pass road, and with Galveston and Harrisburg by the Galveston, Harrisburg and San Antonio road. The city was founded on the site of Fort Alamo, a military post celebrated in the early history of Texas, as the place at which the garrison made an heroic defense against the Mexican army led by Santa Anna in person in which Travis, Crockett, Bowie, and other Texan patriots, together with a force of considerable number were ruthlessly slaughtered. Since the close of the civil war San Antonio has grown rapidly and is among the leading cities in the southwest as a commercial and railroad center, also as a distributing point for a rich country of which cotton, wool, and hides are the principal products and sources of an increasing prosperity. The city contains a court-house, three national and six private banks, Roman Catholic cathedral, eleven churches, a complete and valuable system of education, three daily and four weekly papers and a collection of fine business houses and private residences. In the line of manufactures San Antonio has

ement, iron and electric light works, foundries and machine shops, factories for the production of doors, sash, blinds, cigars and tobacco, hardware and metals, cotton seed oil, and baking powder, etc., all of which are in active operation. The city is well provided with park and amusement facilities lighted by gas and electric lights, and has a present (census 1890) population of 37,673.

SANCHEZ. Three persons of this name once enjoyed considerable literary celebrity:—(1) FRANCISCO SANCHEZ (Sanctius) (born in 1523, died 1601), successively professor of Greek and of rhetoric at Salamanca, whose *Minerva*, first printed at that town in 1587, was long the standard work on Latin grammar; (2) FRANCISCO SANCHEZ, a Portuguese physician of Jewish parentage, professor of philosophy and physic at Toulouse, where he died at the age of seventy in 1632, whose ingenious but sophistical writings (*Quod nihil scitur*, 1581) mark the high-water of reaction against the dogmatism of the traditional schools of his time; (3) THOMAS SANCHEZ of Cordova (born in 1551, died 1610), Jesuit and casuist, whose treatise *De Matrimonio* (Genoa, 1592) is more notorious for its repulsive features than celebrated for its real learning and ability.

SANCHO I. (born 1154, died 1211) and SANCHO II. (born 1208, died 1248), kings of Portugal from 1185 and 1223 respectively. (See PORTUGAL).

SANCHUNIATHON, (that is, סַכְנִיתוֹן, "the god Sakkun hath given") is the name of the pretended author of the Phœnician writings said to have been used by PHILO BYBLIUS, (*q.v.*) See also PHœNICIA.

SAN CRISTOBAL DE LOS LLANOS, otherwise known as CIUDAD REAL, chief town of the Mexican state of Chiapas, stands in a fertile valley on the eastern slope of the central mountain range 450 miles east-southeast from the city of Mexico. Its inhabitants, variously estimated as numbering from 8,000 to 12,000, are chiefly employed in rearing cattle. Coarse woolen and cotton stuffs, and also common earthenware, are manufactured.

SANCROFT, WILLIAM, archbishop of Canterbury, was born at Fressingfield in Suffolk, January 30, 1616, and entered Emmanuel College, Cambridge, in July, 1634. He became M.A. in 1641 and fellow in 1642, but was ejected in 1649 for refusing to accept the "Engagement." He then remained abroad till the Restoration, after which he was chosen one of the university preachers, and in 1663 he was nominated to the deanery of York. In 1664 he was installed dean of St. Paul's. From August 5, 1691, till his death on November 24, 1693, he lived a very retired life in his native place. He is characterized by Macaulay as "an honest, pious, narrow-minded man."

SANCTUARY is the Christian representative of the classical ASYLUM (*q.v.*), and was no doubt suggested in the first instance by the cities of refuge of the Levitical law. Originally every church or churchyard was a sanctuary for criminals. The protection afforded by a sanctuary at common law was this: A person accused of felony might fly for the safeguard of his life to sanctuary, and there, before the coroner, within forty days, confess the felony and take an oath of abjuration entailing perpetual banishment into a foreign Christian country. The privilege of sanctuary as protecting from civil process extended to certain places, parts or supposed parts of royal palaces, such as White Friars or Alsatia, the Savoy, and the Mint.

In Scotland religious sanctuaries were abolished at the Reformation. But the debtor still finds sanctuary from diligence in Holyrood-House and its precincts. The sanctuary does not protect criminals, or even all

debtors, *e.g.*, not crown debtors or fraudulent bankrupts; and a *meditatio fugæ* warrant may be executed within the sanctuary.

SAND, GEORGE. See DUDEVANT.

SANDALWOOD, a fragrant wood obtained from various trees of the natural order *Saatalaceæ* and from the genera *Santalum* and *Fusanus*. The principal source of sandalwood is *Santalum album*, L., a native of India, but it is also yielded by *S. Freycinetianum*, Gaud., and *S. pyrularium*, A. Gray, in the Hawaiian Islands, *S. Homei*, Seem., and *S. anstro-caledonium*, Viell., in New Caledonia, and *S. insulare*, Bert., in Tahiti. The wood of *S. latifolium*, Benth., and also that of *Fusanus spicatus*, R. Br., have been exported from southwest Australia, and that of *Eremophila Mitchellii*, of the natural order *Myoporineæ*, from Queensland, but these have little odor and are chiefly used for cabinet work. Sandalwood is also said to be produced in Nossi-Bé, and has been imported into London from Zanzibar, and into Germany from Venezuela, but of the botanical source of these varieties little is at present known. Until the middle of the eighteenth century India was the only source of sandalwood. The discovery of sandalwood in the islands of the Pacific led to a considerable trade of a somewhat piratical nature, resulting in difficulties with the natives, often ending in bloodshed. About the year 1810 as much as \$400,000 is said to have been received annually for sandalwood by Kamehameha, king of Hawaii. The trees consequently have become almost extinct in all the well-known islands, except New Caledonia, where the wood is now cultivated. Sandalwood of inferior quality derived from *Fusanus acuminatus* was exported from southwest Australia in 1884.

During the last few years oil of sandalwood has largely replaced copaiba, both in the United Kingdom and on the Continent, in the treatment of various diseases of the mucous membrane.

SANDARACH is a resinous body obtained from the small Coniferous tree *Callitris quadrivalvis*, native of the northwest regions of Africa, and especially characteristic of the Atlas Mountains. The resin, which is produced as a natural exudation on the stems, and also obtained by making incisions in the bark of the trees, comes into commerce in the form of small round balls or elongated tears, transparent, and having a delicate yellow tinge. It is a little harder than mastic, has a faintly bitter resinous taste and a pleasant balsamic odor. Sandarach is imported chiefly from Mogador, and is an important ingredient in spirit varnishes. It is also used as incense, and by the Arabs medicinally as a remedy for diarrhœa.

SANDBACH, a town and urban sanitary district of Cheshire, England, is situated on the Trent and Mersey canal, and on the London and Northwestern railway, at the junction for Northwich, twenty-five miles east-southeast of Chester and five northeast of Crewe. The principal industry was formerly silk throwsting, but this is now discontinued, and the inhabitants are chiefly employed in the salt-works and alkali-works. The population of the urban sanitary district (area 2,694 acres) in 1871 was 5,259, in 1881 it was 5,493, and in 1890 about 5,900.

SAND-BLAST. The erosive influence of driven sand is turned to useful account for several industrial purposes by means of an apparatus devised, about 1870, by B. C. Tilghman of Philadelphia. Tilghman's sand-blast consists of a contrivance for impelling, with graduated degrees of velocity, a jet or column of sand, by means of compressed air or steam, against the object or surface to be acted on. The apparatus is principally adapted for obscuring, engraving, and ornamenting glass, but according to the velocity with which the sand



is impelled it may be used to carve deep patterns in granite, marble, and other hard stones, to bite into steel, etc., and even to cut and perforate holes through these and other most refractory materials. In 1884 Mr. Mathewson patented an apparatus in which, by an ingenious exhaust arrangement, the impelling steam is swept away, leaving only cool, dry sand to strike against the object acted on; and the success of this device has already opened up a wider field for the employment of the sand-blast.

SANDBY, PAUL, founder of the English school of water-color painting, was descended from a branch of the Sandbys of Babworth, and was born at Nottingham, England, in 1725. He died in London on November 9, 1809.

SANDEAU, LÉONARD SYLVAIN JULES, a French novelist of much grace and not a little power, was born at Aubusson (Creuse) on February 9, 1811. He died on April 24, 1882. He was never a very popular novelist, judging by the sale of his works; and the peculiar quiet grace of his style, as well as his abstinence from sensational incident, and his refusal to pander to the French taste in fictitious morals, may be thought to have disqualified him for popularity.

SANDEC. See NEU-SANDEC.

SAND-EEL or SAND-LAUNCE. The fishes known under these names form a small isolated group (*Ammodytina*), distantly related to the cod-fishes. Their body is of an elongate-cylindrical shape, with the head terminating in a long conical snout, the projecting lower jaw forming the pointed end. A low, long dorsal fin, in which no distinction between spines and rays can be observed, occupies nearly the whole length of the back, and a long anal, composed of similar short and delicate rays, commences immediately behind the vent, which is placed about midway between the head and caudal fin. The caudal is forked and the pectorals are short. The total absence of ventral fins indicates the burrowing habits of these fishes. The scales, when present, are very small; but generally the development of scales has only proceeded to the formation of oblique folds of the integuments. The eyes are lateral and of moderate size, the dentition is quite rudimentary. They live in shoals at various depths on a sandy bottom, and bury themselves in the sand on the slightest alarm. Sand-eels are very rapacious, destroying a great quantity of fry and other small creatures, such as the lancelet (*Branchiostoma*), which lives in similar localities. They are excellent eating, and are much sought after for bait.

Sand-eels are common in all suitable localities of the North Atlantic; a species scarcely distinct from the European common sand-launce occurs on the Pacific side of North America, another on the east coast of South Africa. On the British coasts three species are found—the Greater Sand-Eel (*Ammodytes lanceolatus*), the Common Sand-Launce (*A. tobianus*), and the Southern Sand-Launce (*A. siculus*). The last species is common in the Mediterranean, but local farther northward.

SANDEMANIANS. See GLAS.

SANDERSON, ROBERT, bishop of Lincoln, and one of the worthies celebrated by Izaak Walton, was born at Rotherham, Yorkshire, England, in 1587. He took orders in 1611, and was promoted successively to several benefices. In 1642 Charles created him regius professor of divinity at Oxford, with a canonry of Christ Church annexed. But the civil war prevented him until 1646 from entering on the office; and in 1648 he was ejected by the visitors whom the parliament had commissioned. He recovered these preferments at the Restoration, and was promoted to the bishopric of Lincoln, but lived only two years to enjoy his new dignities, dying in his seventy-sixth year in 1663.

SAND-GROUSE, the name by which are commonly known the members of a small but remarkable group of birds frequenting sandy tracts, and having their feet more or less clothed with feathers after the fashion of Grouse.

Externally all Sand-Grouse present an appearance so distinctive that nobody who has seen one of them can be in doubt as to any of the rest. Their plumage assimilates in general color to that of the ground they frequent, being above of a dull ochreous hue, more or less barred or mottled by darker shades, while beneath it is frequently varied by belts of deep brown intensifying into black. Lighter tints are, however, exhibited by some species—the drab merging into a pale gray, the buff brightening into a lively orange, and streaks or edgings of an almost pure white relieve the prevailing sandy or fawn-colored hues that especially characterize the group. The sexes seem always to differ in plumage, that of the male being the brightest and most diversified. The nest is a shallow hole in the sand. Three seems to be the regular complement of eggs laid in each nest. These eggs are of peculiar shape, being almost cylindrical in the middle and nearly alike at each end, and are of a pale earthy color, spotted, blotched, or marbled with darker shades, the markings being of two kinds, one superficial and the other more deeply seated in the shell. The young are hatched fully clothed in down (*P. Z. S.* 1866, pl. ix. fig. 2), and though not very active would appear to be capable of locomotion soon after birth. Morphologically generalized as the Sand-Grouse undoubtedly are, no one can contest the extreme specialization of many of their features, and thus they form one of the most instructive groups of birds with which ornithologists are acquainted.

SANDHURST, a city of Victoria, Australia, in the county of Bendigo, is situated in 36° 46' S. latitude and 144° 17' E. longitude, at a height of 758 feet above the sea, on Bendigo creek (a sub-tributary of the Murray), 100¾ miles north-northwest of Melbourne by the railway to Echuca. Besides gold-mining, which in the Sandhurst district employs 6,800 miners, the local industries are brewing, iron-casting, coach-building, the working of bricks and tiles and earthenware, and tanning. The population of the city (which is divided into three wards—Sutton, Darling, and Barkly) was 28,662 in 1881, and about 30,000 in 1889. The value of ratable property is \$319,550.

SAN DIEGO, a port of entry and the chief city in Southern California, is situated in San Diego county within fifteen miles of the Mexican border, and upon San Diego Bay, one of the most beautiful sheets of water and most secure harbors on the Pacific coast. The city was founded by Roman Catholic missionaries over a century ago, and has within recent years become one of the most attractive and fashionable resorts as also one of the most progressive cities west of the Rocky Mountains. It is located on the Southern California Division of the Atchison, Topeka and Santa Fé railroad, 450 miles south-southeast of San Francisco, and 120 miles in the same direction from Los Angeles, direct communication with the coast being also afforded by the Coronado railroad. The soil in the vicinity of the city is of exceptional fertility, the orange, fig, olive, date palm, and other tropical fruits being successfully cultivated, while the cereals and vegetables of every description attain to unusual perfection. The mild climate, a temperature not liable to extremes of heat or cold, and the balmy but bracing atmosphere afford additional inducements for rapid growth and development. The city contains a courthouse, two banks, five churches, two female seminaries and a full complement of school accommodations.

two daily and two weekly newspapers, and many stores, offices, etc. The manufacture of machinery, hardware, plumbing goods, cigars, leather, boilers, cornices, carriages, fencing, beer, wine, etc., are profitably carried on, and other lines of industrial endeavor are successfully established. Easy transit is furnished to all portions of the city by cable and electric railways, and the city is well lighted both by gas and electricity. To the north of the city is the old city of San Diego, and within a short distance of the new city is a lake of boiling mud, half a mile long. The city, which contained a population of 2,637 in 1880, has now (1890) 16,159 inhabitants.

**SAN DOMINGO**, or **SANTO DOMINGO**. See **HAYTI**.

**SANDOMIR**, or **SEDOMIERZ**, a town of Russian Poland, in the province of Radom, is one of the oldest towns of Poland, being mentioned in annals as early as 1079; from 1139 to 1132 it was the chief town of the principality. Under Casimir III. it received extensive privileges and reached a high degree of prosperity and strength. It is now a quite unimportant place, but retains a few remarkable monuments of its past. The beautiful cathedral, rising on a high hill above the Vistula, and facing the plains of Galicia, was built between 1120 and 1191; it was rebuilt in stone in 1360, and is thus one of the oldest monuments of old Polish architecture. In 1881 the population was 6,265, or, including the suburbs, 14,710.

**SANDOWAY**, a district in the south of the Arakan division of British Burmah, ceded to the British by treaty in 1826, embracing an area of 3,667 square miles, and bounded on the north by the Ma-i river, on the west by the Bay of Bengal, on the east by the Arakan Mountains, and on the south by the Khwa river. The whole face of the country is mountainous, the Arakan range sending out spurs which reach down to the coast.

Only 135 square miles of the total area are cultivable, and of these but seventy-five are cultivated. The chief crops are rice, sesamum, tobacco, cotton, sugar-cane, *dhani* palms, and yams. The revenue in 1883-84 was £13,978 (about \$69,000), the land tax realizing £6,749 (\$33,000) of that amount. This mountainous and forest-clad country, with such a small cultivable area, is sparsely inhabited, the population, as returned by the census of 1881, being only 64,010 (males, 32,706; females, 31,304). There are no towns with a population exceeding 2,000.

**SANDPIPER** (Germ. *Sandpfeifer*), according to Willughby in 1676 the name given by Yorkshiremen to the bird now most popularly known in England as the "Summer-Snipe"—the *Tringa hypoleucus* of Linnæus and the *Totanus Actitis*, or *Tringoides hypoleucus* of later writers. Placed by most systematists in the family *Scolopacidae*, the birds commonly called Sandpipers seem to form three sections, which have often been regarded as Subfamilies—*Totaninae*, *Tringinae*, and *Phalaropodinae*, the last indeed in some classifications taking the higher rank of a family—*Phalaropodidae*. This section comprehends three species only, known as Phalaropes or swimming Sandpipers, which are at once distinguished by the membranes that fringe their toes, in two of the species forming marginal lobes, and by the character of their lower plumage, which is as close as that of a duck, and is obviously connected with their natatory habits. The distinctions between *Totaninae* and *Tringinae*, though believed to be real, are not so easily drawn. It usually makes its appearance in May, and thence during the summer months may be seen in pairs skimming gracefully over the water from one bend of the stream to another, uttering occasionally a shrill but plaintive whistle, or running nimbly along

the margin, the mouse-colored plumage of its back and wings making indeed but little show, though the pure white of its lower parts often renders it conspicuous. The nest, in which four eggs are laid with their pointed ends meeting in its center (as is usual among Limicoline birds), is seldom far from the water's edge, and the eggs, as well as the newly-hatched and down-covered young, so closely resemble the surrounding pebbles that it takes a sharp eye to discriminate them. The common sandpiper is found over the greater part of the Old World. In summer it is the most abundant bird of its kind in the extreme north of Europe, and it extends across Asia to Japan. In winter it makes its way to India, Australia, and the Cape of Good Hope. In America its place is taken by a closely kindred species, which is said to have also occurred in England—*T. macularius*, the "Peetweet," or spotted Sandpiper, so called from its usual cry, or from the almost circular marks which spot its lower plumage. In habits it is very similar to its congener of the Old World, and in winter it migrates to the Antilles and to Central and South America. Of other *Totaninae*, one of the most remarkable is that to which the inappropriate name of Green Sandpiper has been assigned. This Sandpiper is characterized by its dark upper plumage, which contrasts strongly with the white of the lower part of the back and gives the bird, as it flies away from its disturber, much the look of a very large House-Martin. The so-called Wood-Sandpiper, *T. glareola*, has a considerable resemblance to the species last mentioned.

Of the section *Tringinae* the best known are the KNOT and the Dunlin *T. alpina*. Next to the Dunlin and the Knot the commonest British *Tringinae* are the Sanderling, *Calidris arenaria*, the Purple Sandpiper, *T. striata* or *maritima*, the Curlew Sandpiper, *T. subarquata*, and the Little and Temminck's Stints, *T. minuta* and *T. temmincki*. Two other birds, however, must be mentioned. These are the Broad-billed Sandpiper, *T. platyrhyncha*, of the Old World, and the marvelous Spoon-billed Sandpiper, *Eurynorhynchus pygmaeus*, whose true home has still to be discovered, according to the experience of Baron Nordenskjöld in the memorable voyage of the *Vega*.

**SANDROCOTTUS** (CHANDRAGUPTA), founder of the Maurya kingdom in India. See **INDIA** and **PERSIA**.

**SANDUSKY**, the capital of Erie county, Ohio, is located on Sandusky Bay at the mouth of the Sandusky river, 60 miles south of Cleveland and 210 miles north of Cincinnati. It is delightfully situated on ground rising gradually from the shores of the bay and stretching back far into the interior where the country is not only picturesque but highly cultivated and productive. It is the lake terminus of the Indiana, Bloomington and Western, and the Lake Erie division of the Baltimore and Ohio roads, and a prominent point on the main line of the Lake Shore and Michigan Southern; Sandusky, Mansfield and Newark, and Sandusky, Dayton and Cincinnati roads. In addition to the unsurpassed transportation facilities thus afforded, the city is in direct communication by water with all points on the great chain of lakes from Duluth to Buffalo and the Canadian Dominion, and steady employment is furnished a fleet of steamers and sailing vessels which ply between the city and these ports, during each annual season. The city is noted throughout the State for the wealth and refinement of its inhabitants and the elegance of its public buildings, notably the court-house and high-school, and private residences. It is also the center of a large vine-growing district, and in addition to being the largest freshwater fish market in the United States is the headquarters of the State fish-hatchery. It contains twenty-five churches, five public

schools, four national banks and one savings bank, with a total cash capital of \$600,000; two daily, one tri-weekly, one semi-weekly and four weekly papers, three hotels, several public halls having an aggregate capacity of 2,500, and the government building or custom-house, a handsome structure of blue limestone. Its manufactures embrace car works, foundries, machine shops, engines and boilers, cutlery, edge-tools, wine, beer, and carved woods. Large exportations of cured fish and fresh fruits are annually made. The population was 18,471 in 1890.

SANDWICH, an English borough, market-town, and Cinque Port, is situated in the east of Kent, opposite the Downs, on a branch of the Southeastern railway, and on the Stour, two miles from the sea, twelve miles east of Canterbury, and four northwest of Deal. The streets are narrow and the houses irregularly built. The old line of the walls on the land side is marked by a public walk. Until the beginning of the sixteenth century Sandwich was of considerable importance as a port, but after the filling up of the harbor with sand, about the beginning of the sixteenth century, it fell into decay. The principal industries of the town are market-gardening, tanning, wool-sorting, and brewing. Coal, timber, and iron are imported. Sandwich returned two members to parliament till 1880, and was merged in the St. Augustine's division of the county in 1885. The parliamentary borough which included Deal and Walmer (area, 2,684 acres), had in 1881 a population of 15,655, while that of the municipal borough (area, 706 acres) was 2,846, and is at present (1890) about 3,250.

SANDWICH, EDWARD MONTAGU, EARL OF, general and admiral, was the son of Sir Sidney Montagu, youngest brother of Edward, Lord Montagu of Boughton, and was born July 27, 1625. At the Restoration, having commanded the fleet which conveyed the king to England, he was made Knight of the Garter, and soon afterward elevated to the peerage as Baron Montagu of St. Neots, Viscount Hinchinbroke, and Earl of Sandwich. After his return to England he was sent to negotiate a peace between Spain and Portugal, and also a treaty of commerce with Spain. On a renewal of the war in 1672 he again commanded the Blue squadron under the duke of York, and during the fight in South-

wold Bay, on May 28th, his ship, the *Royal James*, was set on fire by the Dutch, when he leaped overboard and was drowned. His body was found a fortnight afterward, and was interred in Henry VII.'s Chapel, Westminster Abbey.

SANDWICH, JOHN MONTAGU, FOURTH EARL OF, was born November 3, 1718, and succeeded his grandfather in the earldom, October 20, 1729. He was educated at Eton and at Trinity College, Cambridge, which he entered in 1735. After a voyage round the Mediterranean he returned to England and began to take an active interest in politics as a supporter of Sir Robert Walpole. The high opinion the government entertained of his judgment and his diplomatic abilities was evidenced by his appointment in 1746 as plenipotentiary to the congress at Breda, which was continued till peace was negotiated at Aix-la-Chapelle in 1748. On his return he became first lord of the admiralty, retaining the post until June, 1751. He held the same office from 1763 to 1765, and again from 1771 till the dissolution of Lord North's administration in 1782. He died April 30, 1792.

SANDWICH ISLANDS. See HAWAIIAN ISLANDS.

SANDYS, GEORGE, famous in the reigns of James I. and Charles I. as a traveler and a metrical translator. He was born in 1577, the youngest son of an archbishop of York, studied at St. Mary Hall, Oxford, and afterward probably at Corpus Christi, and began his travels in 1610. Later on in his life he published translations of Ovid's *Metamorphoses*, the first book of the *Æneid*, and various books of Scripture. His verse was praised by Dryden, and deservedly so, for it has vitality as well as a clearly marked rhythm. He died in 1644.

SAN FERNANDO, formerly ISLE DE LEON, a fortified city of Spain, in the province of Cadiz, near the head of the inner bay, and nine and a half miles by rail from the city of Cadiz, is a modern town with straight and level streets, two churches, two hospitals, several barracks, and a school of navigation, with an observatory. It has considerable trade in the salt produced in the neighboring "salinas." The population within the municipal limits (which include the "poblacion" of San Carlos and the naval arsenal of La Carraca) was returned as 26,346 in 1877.







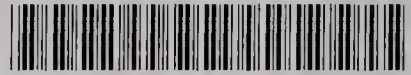








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